

Implementation Costs and Funding Sources

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1 Acronyms and Abbreviations

BDCP or Plan	Bay Delta Conservation Plan
BiOp	biological opinion
CALFED	CALFED Bay-Delta Restoration Program
Caltrans	California Department of Transportation
CVP	Central Valley Project
CVPA	Central Valley Project Act
CVPIA	Central Valley Project Improvement Act
DBEEP	Delta-Bay Enhanced Enforcement Project
DHCCP	Delta Habitat Conservation and Conveyance Program
DRERIP	Delta Regional Ecosystem Restoration Implementation Plan
DWR	California Department of Water Resources
EIR	environmental impact report
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERP	Ecosystem Restoration Program
ESA	Endangered Species Act
Fish & Game Code	California Fish and Game Code
GIS	geographic information system
GPS	global positioning system
HCP	habitat conservation plan
IAV	invasive aquatic vegetation
IEP	Interagency Ecological Program
MAF	million acre-feet
mg/L	milligrams per liter
MHHW	mean higher high-water
MLLW	mean lower low-water
MPTO	Modified Pipeline/Tunnel Option
NAVD88	North American Vertical Datum of 1988
NCCP	natural community conservation plan
NCCPA	Natural Community Conservation Planning Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
O&M	operations and maintenance
PRC	Public Resources Code
Reclamation	Bureau of Reclamation
ROA	restoration opportunity area

SFCWA	State and Federal Contractors Water Agency
State Water Board	State Water Resources Control Board
SWP	State Water Project
TMDL	total maximum daily load
USC	United States Code
USFWS	U.S. Fish and Wildlife Services
USGS	U.S. Geological Survey

1

8.1 Introduction

This chapter outlines the estimated costs associated with implementation of the BDCP (or Plan) over the proposed 50-year term of the Plan and, for some components of the Plan, beyond the duration of the Plan. The federal Endangered Species Act (ESA) requires that habitat conservation plans (HCPs) specify “the applicant will ensure that adequate funding for the plan will be provided” for conservation actions that minimize and mitigate impacts on covered species (United States Code [USC] 1539(a)(2)(A)). The Natural Community Conservation Planning Act (NCCPA) requires that natural community conservation plans (NCCPs) contain “provisions that ensure adequate funding to carry out the conservation actions identified in the Plan” (California Fish and Game Code [Fish & Game Code] 2820(a)(10)).

Based on the estimated implementation costs, this chapter identifies the potential sources of funding for Plan implementation and the mechanisms that will be used to secure such funds. This chapter also describes the basis for the assurances provided by the Plan participants that adequate funding will be available from the applicants and the state and federal governments to cover the costs of Plan implementation.

The chapter is organized as follows.

- Section 8.2, *Cost Estimate*, describes the cost estimate, including common assumptions for cost estimation, and the costs associated with the conservation measures, Plan administration, monitoring and research actions, and changed circumstances.
- Section 8.3, *Funding Sources*, describes funding from the State Water Project (SWP), state and federal water contractors, and from state and federal funds.
- Section 8.4, *Funding Assurances*, describes the funding assurances related to additional funds that may be needed for restoration, management, or monitoring; the potential failure of bond measures; and management and monitoring after the permit term.

Because of the large geographic scale of the Plan, the complexity of the implementation actions, and extended timeframe over which these actions will occur, the process of estimating the costs of the Plan involved a number of assumptions as presented and explained in various sections of this chapter. Costs identified in this chapter are often at a programmatic level and are intended to estimate funding levels needed to implement the Plan. The cost estimate will be used by the Implementation Office to develop annual capital and operating budgets that will include cost controls as described in Chapter 6, *Plan Implementation*. Appendix 8.A, *Implementation Costs Supporting Materials* provides additional detail on the data and assumptions used to estimate costs presented in this chapter.

The Delta is an ecosystem of national significance. Consistent with the “beneficiary pays” principle and in recognition of public benefits associated with environmental restoration of this important region, it is assumed that a state and federal investment will be available and necessary to implement the BDCP, as described in Section 8.3, *Funding Sources*. This public contribution is further

1 justified by the fact that there are stressors contributing to the decline of the Delta ecosystem and
2 dependent species that are not directly related to operations of the SWP and Central Valley Project
3 (CVP). Public funding for programs of this nature is consistent with other HCPs and restoration
4 efforts that involve large ecosystems of national significance such as the Lower Colorado River,
5 Platte River, Chesapeake Bay, Great Lakes, and Florida Everglades. Many of these large-scale
6 restoration efforts share similar goals of the BDCP to increase water supply reliability and to restore
7 ecosystem function and endangered species populations.

8 8.2 Cost Estimate

9 8.2.1 Scope and Purpose of the Cost Analysis

10 The BDCP identifies a range of actions that will be implemented over the term of the Plan to meet
11 the biological goals and objectives described in the conservation strategy and to comply with the
12 requirements of the ESA and the NCCPA. The cost analysis conducted for the BDCP quantifies both
13 the overall estimated cost of the BDCP and the estimated cost of specific plan components. These
14 estimates were used to establish the funding requirements for plan implementation over the course
15 of a 50-year term and beyond the permit term. These estimates will also guide future decisions
16 regarding the allocation of funding responsibilities among the plan participants, including California
17 Department of Water Resources (DWR), the U.S. Department of the Interior, Bureau of Reclamation
18 (Reclamation), and participating state and federal water contractors. As is typically the case of
19 NCCPs and HCPs, plan costs will be borne by the applicants and the state and federal governments.
20 See Section 8.3, *Funding Sources*, for a description of the proposed funding plan. Note that this
21 chapter is not a financing plan to support the issuance of bonds or to provide a basis for the
22 establishment of new funding mechanisms; nor does it establish the final allocation of cost or
23 repayment responsibility; rather, financing plans will be prepared separately by various funding
24 agencies and through future discussions between state and federal agencies.

25 Specifically, the analysis set forth in this chapter addresses costs related to the following
26 components of the BDCP:

- 27 • **Conservation measures**, described in Chapter 3, *Conservation Strategy*.
 - 28 ○ **Water facilities construction and operations.** This category covers those conservation
29 measures related to water facilities and water operations. The costs associated with these
30 measures include the development of new water conveyance and other water management
31 facilities that will be located both within and around the Delta. This category also includes
32 actions associated with the operations of both existing and new facilities.
 - 33 ○ **Natural community restoration and protection.** This category includes conservation
34 measures associated with the preservation, restoration, and protection of natural
35 communities.
 - 36 ○ **Other stressors.** This category covers conservation measures designed to reduce the direct
37 and indirect adverse effects of various stressors on ecological functions, covered species,
38 and natural communities. Such stressors include toxic contaminants and other factors
39 affecting water quality, nonnative species, harvest, hatcheries, diversions unrelated to the
40 SWP or the CVP, predators, and migration barriers and other impediments to movement.

- 1 • **Program administration.** This category consists of expenditures necessary to administer the
2 BDCP. It includes the startup cost of establishing the Implementation Office and the ongoing
3 costs of administration, including expenses associated with personnel, offices and other
4 facilities, equipment, vehicles, contracted services, and other overhead and related expenses.
5 The approach to the administration of the BDCP is described in Chapter 7, *Implementation*
6 *Structure*.
- 7 • **Monitoring and adaptive management.** This category includes the startup and ongoing costs
8 of the monitoring, research, and adaptive management programs, including expenses related to
9 research and data collection, management, and analysis. The BDCP monitoring and adaptive
10 management programs are described in Chapter 3, *Conservation Strategy*.
- 11 • **Changed circumstances.** This category covers the cost of implementing measures to respond to
12 changed circumstances. Those measures are set forth in Chapter 6, *Plan Implementation*. Costs
13 related to the mitigation of effects on natural communities and covered species are included in
14 the cost estimates of the conservation measures.

15 The cost analysis includes sections describing how funding needs were estimated for each Plan
16 component, including the assumptions and data used to determine the level and timing of funding
17 needed over the course of Plan implementation. Many of the cost estimates are based on conceptual
18 and engineering designs for water facilities and habitat restoration projects available at the time of
19 Plan formulation.

20 The costs of many of the mitigation measures in the environmental impact report
21 (EIR)/environmental impact statement (EIS) overlap with many of the costs of the conservation
22 measures. Costs associated with EIR/EIS mitigation measures that are not accounted for in the
23 conservation measures are described in Appendix 8.A, *Implementation Costs Supporting Material*.

24 8.2.2 Common Assumptions for Cost Estimation

25 To estimate Plan costs, a detailed cost model was constructed using linked spreadsheets that
26 enabled all major cost categories to be developed independently (Appendix 8.A, *Implementation*
27 *Costs Supporting Materials*). The model structure was based on and refined from cost models
28 developed for other large, complex regional HCPs and NCCPs. The goal of the cost model was to
29 allow for conservative estimates of all expenses of the Implementation Office and other entities with
30 implementation responsibility over the permit term to ensure that total program costs would not be
31 underestimated. The cost model provides budget scenario estimates that the Implementation Office
32 will use to project over the lifetime of the Plan annual funding needs for Plan implementation (see
33 Chapter 6, *Plan Implementation*, for details on the annual budgeting process). The cost model was
34 designed to demonstrate that all costs have been accounted for and reasonably estimated. Some of
35 the assumptions used to estimate costs apply to all of the cost estimates presented in this chapter.
36 These common assumptions are described in the following subsections (also see Appendix 8.A,
37 *Implementation Costs Supporting Materials*).

38 8.2.2.1 Cost Periods

39 Cost estimates were prepared in 5-year increments, starting with the first year in which regulatory
40 authorizations are issued by the fish and wildlife agencies, and concluding at the expiration of the
41 permit term. The timing of the incurrence of costs is based on the schedule of implementation
42 presented in Chapter 6, *Plan Implementation*. Average annual costs are summarized for the near

1 term (years 1 through 10), early long-term (years 11 through 15), and late long-term (years 16
2 through 50) phases of Plan implementation. Additionally, at the end of the permit term, certain
3 management costs will continue *in perpetuity*. These costs will be funded through a nonwasting
4 endowment or other appropriate mechanisms. Costs that will be funded by the endowment include
5 those related to reserve management, administration, and land use monitoring. Endowment funding
6 and costs that will be incurred for the conservation measures that require long-term management
7 are described in Section 8.2.3.11, *CM11 Natural Communities Enhancement and Management*.

8 **8.2.2.2 Cost Contingency**

9 The American Association of Cost Engineers defines *contingency* as a specific provision for
10 unforeseeable elements of cost within the defined project scope. Cost uncertainties may result from
11 not fully completed project designs at the time of permitting, unforeseen and unpredictable
12 conditions, or uncertainties within the defined project scope. The amount of contingency will
13 depend on the status of project designs at the time of permitting, procurement, and construction;
14 and the complexity and uncertainties of the component parts of the project. For planning studies,
15 standard contingencies typically range between 20 and 30%, but may be as high as 50% for
16 experimental or special conditions. Cost estimates developed for major Plan elements, such as water
17 facilities, tidal natural community restoration, and Yolo Bypass improvements, include various
18 contingencies as specific cost line items. In those cases where cost contingency has not been
19 explicitly factored into a cost estimate, a 20% contingency is added.

20 **8.2.2.3 Financial Assumptions**

21 Costs estimates for individual conservation measures presented in Section 8.2.3, *Conservation*
22 *Measure Costs* are reported in undiscounted 2012 dollars.¹ Costs not already expressed in 2012
23 dollars have been converted to 2012 dollars using various price indices, including consumer price
24 indices published by the U.S. Department of Labor and civil works construction cost indices
25 published by USACE. Costs are reported in terms of one-time capital outlays, as well as ongoing
26 operational costs. The summaries of total BDCP capital and operating costs presented in
27 Section 8.2.7, *Summary of Estimated Costs* are reported in both undiscounted 2012 dollars and
28 discounted present value dollars.² When future costs are converted to present value, a 3% real
29 discount rate is used.³ The real discount rate was selected to be consistent with current long-term

¹ This means the estimates exclude future inflation. Reporting costs in (inflation-adjusted) constant dollars allows for a more accurate comparison of relative expenditure over time. These estimates, however, are not indicative of nominal dollar outlays that will be required over the permit period and should not be used directly for financial planning, where use of nominal values would be most appropriate.

² Discounting future outlays to present value allows for an assessment of the economic cost of total program expenditures when costs are expected to be spread over a long span of time. This is because a dollar received (or expended) in the future does not have the same value as a dollar received (or expended) today. Consider receiving \$100 today versus receiving \$100 ten years from today. By deferring the receipt of the money by ten years, it could be invested and earn a return over this period. For example, if the rate of return on investment were 5%, over ten years it would grow in value to \$163. Under this scenario, the *future value* ten years hence of \$100 today is \$163. The same principle holds in reverse. The value of receiving (or expending) \$100 ten years from today is equivalent to receiving (or expending) \$61 today. That is, the *present value* of \$100 received (or expended) 10 years from today is \$61 because that amount if invested today would yield \$100 ten years from now.

³ The real discount rate is roughly equal to the nominal rate of interest less the long-term rate of inflation.

1 (40 year) nominal bond yields of about 5% and a long-term expected rate of inflation of 2%, as
2 indicated by the current spread between nominal and inflation-indexed 30-year U.S. Treasury notes.

3 **8.2.2.4 Delta Real Estate Values and Acquisition**

4 The Implementation Office may obtain interests in land for the purpose of physical restoration
5 actions, resource protection, and water facilities development through various means, including the
6 acquisition of fee title or easement. Land acquisition costs associated with Plan implementation are
7 based on the assumptions set forth in this section.

8 **8.2.2.4.1 Land Acquisition Requirements**

9 Land acquisition for conservation measures other than *CM1 Water Facilities and Operation* will
10 occur in a manner consistent with the implementation schedule for natural community protection
11 and restoration conservation measures as described in Table 6-2, *Implementation Schedule for*
12 *Natural Community Protection and Restoration Conservation Measures*, of Chapter 6, *Plan*
13 *Implementation*.⁴ Some acquired acreage will serve multiple protection and/or restoration
14 objectives, which results in differences between the amount of acreage listed in Table 6-2 and the
15 amount of acreage that may need to be acquired for Plan implementation. These differences are
16 summarized in Table 8-1.

17 **Table 8-1. Land Acquisition Assumed for Cost Estimate of Protection and Restoration Conservation**
18 **Measures (acres)**

Conservation Measure	Chapter 6 Table 6-2	Cost Assumption	Reason for Difference
BDCP Reserve System			
<i>CM3 Natural Communities Protection and Restoration</i>			
Valley/foothill riparian	750	750	
Vernal pool complex	600	600	
Alkali seasonal wetland complex	150	150	
Grassland	8,000	8,000	Note: 1/6 of 3,000-acre rice or rice equivalent requirement listed in Table 6-2 can be satisfied through the 8,000-acre grassland reserve. This does not entail additional land acquisition.
Managed wetland (salt marsh harvest mouse habitat)	1,500	1,500	
Managed wetland (natural community)	6,600	6,600	
Cultivated lands (non-rice)	48,125	48,125	
Cultivated lands (rice)	500	1,500	Requirement 500 acres of rice per Table 6-2 plus 1/3 of the 3,000-acre rice or rice equivalent requirement.
Cultivated lands (rice or equivalent)	3,000	0	Requirement for rice or rice equivalent acres is counted under cultivated lands (rice), CM3

⁴ Land acquisition for CM1 is discussed in Section 8.2.3.1, *CM1 Water Facilities and Operation*.

Conservation Measure	Chapter 6 Table 6-2	Cost Assumption	Reason for Difference
			grassland reserve, CM8 grasslands restoration, and CM10 nontidal marsh restoration acreage requirements.
Nontidal Marsh	50	50	
Total BDCP Reserve System	69,275	67,275	
Natural Community Restoration			
<i>CM4 Tidal Natural Communities Restoration</i>	65,000	60,273	65,000 acres of tidal wetland restoration, of which 60,273 acres expected to be acquired from private landowners and 4,727 acres expected to come from existing publicly owned land.
<i>CM5 Seasonally Inundated Floodplain Restoration</i>	10,000	11,105	1,105 acres added to accommodate levee footprints needed for restoration
<i>CM6 Channel Margin Enhancement (miles)</i>	0	63	63 acres added to accommodate levee footprints needed for enhancement actions
<i>CM7 Riparian Natural Community Restoration</i>	5,000	971	Of the 5,000 acres of riparian habitat, 4,029 are expected to be developed on lands acquired as part of CM5 and CM6. Riparian restoration associated with CM4 will require acquisition of an additional 971 acres. Thus, CM7 has a net land acquisition requirement of only 971 acres.
<i>CM8 Grassland Natural Community Restoration</i>	2,000	2,500	2,000 acres of grassland restoration per Table 6-2 plus 1/6 of the 3,000-acre rice or rice equivalent requirement.
<i>CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration</i>			
Vernal pool complex	67	67	
Alkali seasonal wetland	72	72	
<i>CM10 Nontidal Marsh Restoration</i>			
Nontidal marsh restoration	1,200	2,200	1,200 acres of nontidal marsh restoration per Table 6-2 plus 1/3 of the 3,000-acre rice or rice equivalent requirement.
Managed wetland	500	500	
Total Natural Community Restoration	83,839	77,751	
Total Acquisition and Restoration	153,114	145,026	

1

2 **8.2.2.4.2 Land Value Assumptions**

3 Different land value assumptions apply to Delta lands within the Restoration Opportunity Areas
4 (ROA) and lands outside of these areas to reflect differences in soil characteristics, productivity, and
5 market opportunities.

1 **ROA Land Value Assumptions.** For cost estimation, ROA lands are grouped into the following land
2 use categories.⁵

- 3 • Field and pasture crop production (pasture, hay, grain, and other field crops)
- 4 • Vegetable crop production
- 5 • Orchard
- 6 • Vineyard
- 7 • Native vegetation

8 The acreage-weighted average value of land in each ROA is summarized in Table 8-2. The estimates
9 are derived from value ranges published by the California Chapter of the American Society of Farm
10 Managers and Rural Appraisers (CSFMRA) in 2009. The following CSFMRA value ranges were used
11 to estimate values for each land use category. In all cases, the value is set to the average of the low
12 and middle values of the CSFMRA value range.⁶

- 13 • **Field and pasture.** CSFMRA Region 1 (Subregion: South Sutter, Western Placer, Solano, and
14 Yolo Counties) land values for Class II/III cropland were used to estimate values for the Cache
15 Slough, Suisun Marsh, and Yolo Bypass ROAs. CSFMRA Region 3 (Subregion: San Joaquin
16 County) land values for Delta lands were used to estimate values for the Cosumnes/Mokelumne,
17 South Delta, and West Delta ROAs.
- 18 • **Vegetable crops.** CSFMRA Region I (Subregion: South Sutter, Western Placer, Solano, and Yolo
19 Counties) land values for Class I/II cropland were used to estimate values for the Cache Slough,
20 Suisun Marsh, and Yolo Bypass ROAs. CSFMRA Region 3 (Subregion: San Joaquin County) land
21 values for Delta lands were used to estimate values for the Cosumnes/Mokelumne, South Delta,
22 and West Delta ROAs.
- 23 • **Orchards.** CSFMRA Region I (Subregion: South Sutter, Western Placer, Solano, and Yolo
24 Counties) land values for pear orchards were used to estimate values for the Cache Slough,
25 Suisun Marsh, and Yolo Bypass ROAs. CSFMRA Region 3 (Subregion: San Joaquin County) land
26 values for cherry orchards were used to estimate values for the Cosumnes/Mokelumne, South
27 Delta, and West Delta ROAs.
- 28 • **Vineyards.** CSFMRA Region I (Subregion: South Sutter, Western Placer, Solano, and Yolo
29 Counties) land values for vineyards were used to estimate values for the Cache Slough, Suisun
30 Marsh, and Yolo Bypass ROAs. CSFMRA Region 3 (Subregion: San Joaquin County) land values
31 for wine grapes were used to estimate values for the Cosumnes/Mokelumne, South Delta, and
32 West Delta ROAs.

⁵ California Department of Water Resources (DWR) land use survey data at the detailed analysis unit level were used to classify existing ROA land uses. The DWR Land and Water Use Program collects land use data and develops water use estimates used in statewide water planning. It accomplishes this by conducting surveys of agricultural, urban and environmental land uses, and developing annual estimates of land uses on a regional basis. Since 1986, DWR has compiled land use survey data into georeferenced digital maps. The smallest level of resolution for these maps is the detailed analysis unit, the smallest study area used by DWR, generally defined by hydrologic features or boundaries or organized water service agencies. In the major agricultural areas, a detailed analysis unit typically includes 100,000 to 300,000 acres.

⁶ A comparison of the CSFMRA land values with a sample of parcel-level assessment values (updated to reflect current market conditions) for each ROA showed that ROA land values tended to cluster in the bottom third of the CSFMRA value range for each crop classification.

- 1 • **Native vegetation.** Land values for native vegetation were derived from parcel-level county
2 assessment data for each ROA.⁷

3 **Table 8-2. Restoration Opportunity Area Land Value Assumptions**

Restoration Opportunity Area and Yolo Bypass	Average Fee Title Value ^a (\$/Acre)
Cache Slough ROA	\$4,100
Cosumnes/Mokelumne ROA	\$5,600
South Delta ROA	\$5,500
Suisun Marsh ROA	\$3,600
West Delta ROA	\$3,200
Yolo Bypass	\$4,200
Notes:	
^a Average fee value is the acreage-weighted average value (rounded to nearest \$100) based on the hypothetical tidal natural communities restoration footprints used to cost CM4, except in the case of Yolo Bypass, where it is the acreage-weighted average value for the entire bypass.	

4

5 **Non-ROA Land Value Assumptions.** A similar procedure was used to estimate land values for
6 agricultural and native vegetation land uses for the broader Delta. In the case of non-ROA land, the
7 expected value was set to the midpoint of the CSFMRA value range because of the higher fraction of
8 prime farmland outside of the ROAs. Land values by Conservation Zone and land use category used
9 later in the chapter to estimate land acquisition costs for terrestrial conservation measures and
10 water facilities are shown in Table 8-3.

11 **8.2.2.4.3 Easement Values**

12 Easement values in the Delta vary widely, depending on type of easement and restrictions placed on
13 land use. Expressed as a percent of fee title value, surface easement costs may range between 10%
14 and 90% while subsurface easements may range between 30 and 50% (Davis pers. comm.). For
15 estimating land easement costs, the upper end of these ranges was used. Habitat conservation
16 easements, which typically entail significant restrictions on land use, were set to 80% of the fee title
17 value; agricultural easements were set to 60% of fee title value; and subsurface easements were set
18 to 40% of fee title value. The amount of land that will be acquired by fee title versus easement is
19 expected to vary by conservation measure. The relative shares of each that were assumed for cost
20 estimation are presented as part of each conservation measure's cost estimate.

21

⁷ Parcels with assessments made between 2000 and 2009 and having at least two-thirds of their land uses classified as native vegetation were used to estimate the average value of land classified as native vegetation in the ROAs. Assessed values were adjusted using the U.S. Department of Agriculture's California land value index for nonirrigated farmland to reflect changes in rural land values since the time of the assessment (U.S. Department of Agriculture 2010).

1 **Table 8-3. Non-ROA Delta Land Value Assumptions**

Conservation Zone	County	CSFMRA Region	Fee-Title Value \$/Acre (2012 dollars) ^a					
			Native Veg. ^b	Range land	Pasture/Alfalfa	Field Crop	Truck Crop	Orchard/Vineyard
1	Solano	Region One: South Sutter, Western Placer, Solano and Yolo Counties	\$1,621	\$3,259	\$3,180	\$7,261	\$8,744	\$9,539
2	Yolo	Region One: South Sutter, Western Placer, Solano and Yolo Counties	\$1,621	\$3,259	\$3,180	\$7,261	\$8,744	\$9,539
3	Yolo, Sacramento	Region One: South Sutter, Western Placer, Solano and Yolo Counties	\$1,621	\$3,259	\$3,180	\$7,261	\$8,744	\$9,539
4	San Joaquin, Sacramento	Region Three: Lodi Region	\$1,621	\$3,259	\$11,659	\$13,779	\$15,899	\$17,489
5	San Joaquin, Sacramento	Region Three: Delta Lands	\$1,621	\$3,259	\$3,710	\$6,095	\$8,479	\$17,489
6	San Joaquin, Contra Costa	Region Three: Delta Lands	\$1,621	\$3,259	\$3,710	\$6,095	\$8,479	\$17,489
7	San Joaquin	Region Three: Westside	\$1,621	\$3,259	\$8,479	\$10,599	\$12,719	\$17,489
8	San Joaquin, Contra Costa, Alameda	Region Three: Westside	\$1,621	\$3,259	\$8,479	\$10,599	\$12,719	\$17,489
9	Contra Costa	Region Three: Westside	\$1,621	\$3,259	\$8,479	\$10,599	\$12,719	\$17,489
10	Contra Costa	Region Three: Westside	\$1,621	\$3,259	\$8,479	\$10,599	\$12,719	\$17,489
11	Solano	Region One: South Sutter, Western Placer, Solano and Yolo Counties	\$1,621	\$3,259	\$3,180	\$7,261	\$8,744	\$9,539

Notes:

^a Average fee value (rounded to nearest \$100) for specific land use categories by county. Fee values based on midpoint CSFMRA land value estimate for CSFMRA regional estimate for which county is located.

^b The native vegetation land costs are based on parcel-level county assessor data for Delta ROA footprints, adjusted for when the parcel was placed on the tax roll. The estimate only applies to Delta lands classified as native vegetation by DWR and does not apply to rangeland. Rangeland values are drawn from California Society of Farm Managers and Rural Appraisers publications. The differential in rangeland values reflects the relative urban development pressures in the different counties. Within the legal Delta itself, land values reflect very limited development opportunities. There would be a significant difference depending on which side of the legal Delta line the property lays. Lands classified as native vegetation have very limited or no agricultural potential and therefore much lower land values than other categories.

CSFMRA = California Chapter of the American Society of Farm Managers and Rural Appraisers.

2

1 **8.2.2.4.1 Land Acquisition Transaction Costs**

2 Purchase of interests in land, either through fee title or through easements, for the purpose of
3 carrying out restoration actions, ensuring the protection of resources, and undertaking construction
4 of water facilities, is assumed to involve transactional costs in addition to the price paid for that
5 property interest. For cost estimation, these costs are assumed to average 10% of the fee-title value
6 of the acquired land. This assumption is based on a detailed parcel-level analysis of expected
7 transaction costs—including costs for due diligence, pre-acquisition surveys, and real estate and
8 legal services— completed for CM4.

9 **8.2.2.5 Staff Salary Costs and Benefits Multiplier**

10 The Implementation Office will build a staff to oversee or carry out the actions outlined in the Plan
11 (Chapter 7, *Implementation Structure*). The salary cost estimates associated with these personnel
12 needs are based on proposed fiscal year 2008–2009 salary scales for reference positions in various
13 departments of the California Natural Resources Agency (California Department of Finance 2008),
14 updated to 2012 dollars (see Appendix 8.A, *Implementation Costs Supporting Materials*, for salary
15 assumptions). A benefits multiplier of 1.35 is applied to salary and wage costs to account for certain
16 assumed benefits, such as paid leave, health insurance, and pensions.⁸ Salary and benefit cost
17 estimates are marked up an additional 15% to accommodate differences in state salary and benefit
18 compensation rates compared to rates for the federal and private sectors.

19 **8.2.3 Conservation Measure Costs**

20 This section describes the data, methods, and assumptions used to estimate the cost of
21 implementing the conservation measures. Estimation methods differ by conservation measure,
22 depending on the conceptual and engineering design and cost data available at the time of plan
23 formulation. The approach taken for each conservation measure and the sources of data and other
24 information used for the analysis are described in the following subsections.

25 **8.2.3.1 CM1 Water Facilities and Operation**

26 Cost estimates for *CM1 Water Facilities and Operation* are presented for the design, project
27 management, construction management of the water conveyance facilities; the intake and
28 conveyance construction costs; the construction cost contingency; land acquisition; annual
29 operation, maintenance, power, and capital replacement. The construction and operating cost
30 estimates were prepared by the Delta Habitat Conservation and Conveyance Program (DHCCP) and
31 are based on the *Modified Pipeline/Tunnel Option (MPTO) 2013 Conceptual Engineering Report*
32 (MPTO CER 2013).

33 Facility features are summarized in Table 8-4. Estimated costs for land acquisition, facility
34 construction, and facility operation are summarized in Table 8-5. The following data and
35 assumptions underlie the cost estimates.

⁸ The multiplier is based on average benefits paid by state and local governments as a percent of total employee compensation in 2009, as reported by the U.S. Bureau of Labor Statistics (BLS 2009).

1 **Table 8-4. Summary of Intake and Conveyance Facility Features**

Item	Quantities			
Intake capacity	9,000 cfs			
Intake pumping plants	3 at 3,000 cfs each			
Installed power demand	50-60 megawatts			
Surge towers	5 each, one at each pumping plant site			
Tunnels	Two 40-foot diameter at 30.2 miles, two 29-foot diameter at 11.5 miles total, and one 20-foot diameter at 2.5 miles			
Canals	Approximately 10,000 feet of canal segments connecting the modified Clifton Court Forebay with existing approach canals to the Banks and Jones Pumping Plants			
Box culvert siphons	3			
Forebay total acreage	3,195 acres (includes emergency spillway inundation area associated with the Intermediate Forebay and the total final area for the modified Clifton Court Forebay)			
New bridges	None			
Estimated Non-State Owned Acreage Required for Right-Of-Way, Staging, and Borrow Site Footprints, by Land Use and County				
Surface Acreage	Alameda/ Contra Costa	Sacramento	San Joaquin	Total
Ag—field crop/grazing	1,394	865	2,346	4,605
Ag—truck crop	3	288	90	381
Ag—orchard	5	194	0	199
Ag—vineyard	9	100	0	109
Semiagricultural	129	67	85	281
Urban	36	39	23	98
Native	365	130	228	723
<i>Total surface acreage</i>	<i>1,941</i>	<i>1,683</i>	<i>2,772</i>	<i>6,396</i>
Subsurface Acreage				
Ag—field crop/grazing	19	85	501	605
Ag—truck crop	0	42	51	93
Ag—orchard	0	5	0	5
Ag—vineyard	0	71	0	71
Semiagricultural	2	8	16	26
Urban	0	5	4	9
Native	1	10	90	101
<i>Total subsurface acreage</i>	<i>22</i>	<i>226</i>	<i>662</i>	<i>910</i>
ag = agriculture; cfs = cubic feet per second				

2

3 **Land acquisition.** The cost estimate for land acquisition and related expenditures is \$161.2 million.
4 The cost estimate is composed of five parts: (1) fee-title acquisition of land for facility right-of-way
5 and construction, (2) easement acquisition of subsurface right-of-way, (3) purchase of affected
6 mineral rights along the facility right-of-way, (4) real estate transaction cost, and (5) contingency.

1 The estimated cost of each cost element is shown in Table 8-5. Acquisition of surface acreage for
2 facility right-of-way and construction is expected to comprise the majority of the cost for land
3 acquisition.

4 **Facility construction.** Construction of the conveyance facility, including contingency and
5 construction management, is estimated to cost \$14.4 billion. Direct construction costs tally to \$9.2
6 billion and derive from the *DHCCP Modified Pipeline/Tunnel Option (MPTO) 2013 Conceptual*
7 *Engineering Report* (DHCCP 2013). The estimate of direct construction cost is based on a 10%
8 engineering design level and has an expected accuracy range of +50% to -25%, per the cost
9 estimating classification system developed by the Association for the Advancement of Cost
10 Estimating (2011). Contingencies for tunnel construction and other construction elements are \$2.64
11 billion and \$657.7 million, respectively. Estimated cost of final design and construction/project
12 management is \$1.9 billion.

13 The estimate of direct construction cost relies on a combination of unit prices developed for similar
14 work in various locations around the United States; historical unit prices compiled over time by
15 DHCCP staff; average unit prices recorded by the California Department of Transportation (Caltrans)
16 (2007a); budgetary vendor pricing; and estimates developed specifically for portions of work by
17 DHCCP cost estimators. Unit prices were converted to 2012 dollars using Reclamation index charts
18 or other methods (Bureau of Reclamation 2011a).

19 Facility construction elements were separated into a logical division of work such as constructing
20 river intake structures, pumping plants, conveyance pipelines, canals, culvert siphons, tunnels,
21 bridges, utilities, forebays, controls and communications infrastructure, and power supply and grid
22 connections. Major project components were further subdivided into subcomponents until discrete
23 activities could be identified and either unit prices or a detailed estimate could be applied.

24 The following key assumptions were adopted to estimate direct construction cost.

- 25 ● Land will be acquired to provide enough soil to construct each facility (e.g., canal and forebay
26 embankments, pumping plant pads). These borrow sites will be within a 5-mile haul (one way,
27 using off-highway equipment).
- 28 ● All excess or unsuitable soil will be deposited (spoiled) within a 1-mile haul from the facility
29 (one-way, using off-highway equipment).
- 30 ● The soil can be dewatered effectively.
- 31 ● The installation of sheet-pile cofferdams will occur during allowable seasonal windows;
32 however, once cofferdams are in place, work within the cofferdam will occur year round.
- 33 ● Tunneling work may continue at all hours on all days; all other work is expected to be
34 performed on a 5-day, 10-hour shift basis with two shifts per day.
- 35 ● Labor rates are based on prevailing wage determinations made by the Director of Industrial
36 Relations for northern California and Sacramento, San Joaquin, Yolo, Solano and Contra Costa
37 Counties. Employer cost as well as overhead was calculated and special shift arrangements were
38 factored for overtime.
- 39 ● Equipment rates are based on USACE guidelines (2005), Caltrans (2007b) Labor Surcharge and
40 Equipment Rental Rates, and quotes from northern California equipment rental companies,
41 updated to 2012 dollars.

- 1 • Material costs are based on quotes received from various northern California material vendors.
2 Pumping plant equipment quotes were provided by major national and international suppliers
3 (e.g., pumps, valves).

4 **Facility operation and capital replacement.** Estimated facility operation and capital replacement
5 costs over the 50-year permit period total \$1.456 billion. Operating costs are composed of three
6 components: (1) power costs for pumping and other operations, (2) other facility O&M, and (3)
7 capital replacement.

8 Estimated costs for power are derived from dynamically simulated diversion flows using CALSIM II
9 and operating rules in the Delta Simulation Model II (see Chapter 5, Section 5.2, *Methods*, for
10 descriptions of these hydrologic models). DHCCP cost estimators used simulation results to
11 characterize typical diversion volumes during wet, normal, and dry year hydrologic conditions.
12 Power requirements for pumping are a function of the pumping flow rate, total dynamic head, and
13 combined efficiency of the pumps and motors. Power requirements for pumping were increased by
14 15% to account for all other project power uses (e.g., heating, ventilating, and air conditioning;
15 general operations and maintenance [O&M]; lighting). Annual power costs are based on a
16 combination of Western Area Power Administration unit energy costs, estimates of bulk power
17 purchased in northern California, and an estimate of CVP-generated power for 40% of pumped
18 water. The estimate accounts for pricing differentials in peak and off-peak power purchases.

19 General O&M costs inclusive of salary costs, including benefits and overhead, and normal operating
20 and facility maintenance costs are assumed to begin in year 11 of plan implementation and average
21 \$18.85 million per year through the end of the permit period. General O&M costs are based on
22 similar costs for existing SWP operations.

23 Replacement costs for major equipment (e.g., pumps, motors, high voltage switchgear) are assumed
24 to begin in year 21 of plan implementation and average \$15 million per year through the end of the
25 permit period. The capital replacement rate is derived from the initial capital cost estimate and rates
26 of depreciation and replacement observed for existing SWP facilities.

1 **Table 8-5. Cost Estimate for Water Facility Construction**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions)			50-Yr Permit Term Total Expenditure (Millions)
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Land Acquisition				
Surface footprint, staging, borrow sites	\$8.6	\$0.0	\$0.0	\$85.5
Subsurface easements	\$0.4	\$0.0	\$0.0	\$4.3
Mineral rights and gas well relocation	\$3.2	\$0.0	\$0.0	\$32.3
Due diligence & transaction costs	\$1.2	\$0.0	\$0.0	\$12.2
Subtotal	\$13.4	\$0.0	\$0.0	\$134.3
Contingency (20%)	\$2.7	\$0.0	\$0.0	\$26.9
Total Land Acquisition	\$16.1	\$0.0	\$0.0	\$161.2
Construction				
River intake #2 with pumping plant	\$34.9	\$0.0	\$0.0	\$348.8
River intake #3 with pumping plant	\$27.1	\$0.0	\$0.0	\$270.7
River intake #5 with pumping plant	\$30.3	\$0.0	\$0.0	\$303.2
Intermediate forebay & flow control structures	\$7.1	\$0.0	\$0.0	\$70.9
Byron Tract Forebay & flow control structures	\$61.9	\$0.0	\$0.0	\$619.4
North tunnels & shafts	\$101.8	\$0.0	\$0.0	\$1,017.9
Main tunnels & shafts	\$622.0	\$0.0	\$0.0	\$6,219.6
Access, power delivery & utility relocations	\$31.7	\$0.0	\$0.0	\$316.5
Communications & control	\$2.3	\$0.0	\$0.0	\$23.4
Subtotal	\$919.0	\$0.0	\$0.0	\$9,190.4
Tunneling contingency	\$264.2	\$0.0	\$0.0	\$2,641.7
All other contingency	\$65.8	\$0.0	\$0.0	\$657.7
Construction w/ Contingency Subtotal	\$1,249.0	\$0.0	\$0.0	\$12,489.8
Project management, construction management, and final design	\$192.0	\$0.0	\$0.0	\$1,919.9
Total Construction	\$1,441.0	\$0.0	\$0.0	\$14,409.7
Total Capital	\$1,457.1	\$0.0	\$0.0	\$14,570.9
Operations & Maintenance (O&M) Costs				
Power	\$0.00	\$6.25	\$6.25	\$250.0
Facility O&M	\$0.00	\$18.85	\$18.85	\$754.0
Capital replacement	\$0.00	\$0.00	\$12.91	\$452.0
Total O&M	\$0.00	\$25.10	\$38.01	\$1,456.0

Notes: The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error. O&M = operations and maintenance

2

3 **8.2.3.2 CM2 Yolo Bypass Fisheries Enhancement**

4 With *CM2 Yolo Bypass Fisheries Enhancement*, the Implementation Office will provide for the
5 implementation of physical modifications within the Yolo Bypass to enhance floodplain habitat for
6 spawning and rearing splittail and rearing habitat of juvenile Sacramento River salmonids, as
7 described in Chapter 3, *Conservation Strategy*. The measure includes development of a fisheries
8 enhancement plan for the Yolo Bypass to determine the best approaches for achieving biological
9 objectives.

1 Acquisition of flood and levee easements needed for CM2 is estimated to cost \$33 million.
2 Modification of existing and construction of new bypass facilities are estimated to cost \$682 million.
3 Estimated costs are summarized in Table 8-6. The cost estimates are based on the following data
4 and assumptions.

5 **Easements.** Modification of existing and addition of new flood easements may be required in the
6 eastern, central, and western parts of the bypass. Additionally, modification of the existing bypass
7 facilities may require additional easements to accommodate levee footprints. The flood easement
8 cost estimate is based on farm income losses in the bypass estimated by Howitt et al. (2012). This
9 study estimated more frequent and longer duration bypass flooding under CM2 could result in loss
10 of agricultural income of approximately \$740,000 per year. The flood easement cost estimate is set
11 to the capitalized value of these losses over the 50-year permit period, which is \$19.8 million. In
12 addition to the cost of flood easements, a lump sum allowance of \$5.2 million is added to the
13 estimate to account for possible easements needed to accommodate levee footprints. Transaction
14 cost and 20% contingency add an additional \$8.0 million to the estimate.

15 **Construction.** The preferred design of Yolo Bypass improvements will not be determined until
16 completion of the fisheries enhancement plan. For purposes of cost estimation, construction of the
17 following proposed improvements has been assumed.

- 18 • **Fremont Weir fish ladder replacement.** The existing Fremont Weir Denil fish ladder will be
19 removed and replaced with a new salmonid passage facility. Specific design criteria have not yet
20 been determined. This facility will incorporate monitoring technologies to allow for collection of
21 information to evaluate its efficacy at passing adult fishes.
- 22 • **Experimental sturgeon ramps.** One or more experimental ramps will be constructed at the
23 Fremont Weir to allow for the effective passage of adult sturgeon and lamprey. Specific design
24 criteria for the ramps have not yet been determined. This facility will incorporate monitoring
25 technologies to allow for collection of information to evaluate its efficacy at passing adult fishes.
- 26 • **Deep fish passage gates and channel.** To enhance adult fish passage through the Fremont
27 Weir, as part of modifications to the Fremont Weir, a deep fish passage notch will be cut through
28 a much smaller section of the Fremont Weir to an elevation of 11.5 feet North American Vertical
29 Datum of 1988 (NAVD88). This notch will be fitted with operable fish passage gates that will
30 allow controlled flow into the Yolo Bypass. A fish passage channel will be excavated to convey
31 water from the Sacramento River to the new fish passage gates and from the fish passage gates
32 to the Tule Canal.
- 33 • **Stilling basin modification.** Modifications will be made to the existing Fremont Weir stilling
34 basin to ensure that the basin drains sufficiently into the deep fish passage channel.
- 35 • **Sacramento Weir improvements.** Modifications will be made to reduce leakage at the
36 Sacramento Weir and therefore reduce attraction of fish from the Yolo Bypass to the weir. For
37 comparative analysis purposes, the fisheries enhancement plan will review the benefits and
38 necessity of constructing fish passage facilities at the Sacramento Weir to reduce juvenile fish
39 stranding and improve upstream adult fish passage. This action may require excavation of a
40 channel to convey water from the Sacramento River to the Sacramento Weir and from the
41 Sacramento Weir to the toe drain, construction of new gates at a portion of the weir, and minor
42 modifications to the stilling basin of the weir to ensure proper basin drainage. Specific design
43 criteria for ramps have not been determined. It is not certain at this time whether the
44 Sacramento Weir improvements will be required.

- 1 ● **Tule Canal/toe drain and Lisbon Weir improvements.** The fisheries enhancement plan will
2 include physical modifications to passage impediments, including road crossings and
3 agricultural impoundments in the Tule Canal/toe drain to improve fish passage and survival.
4 The cost estimate assumes the replacement of three existing structures at the northern end of
5 the Tule Canal with bridges or other structures to allow adult fish passage. Lisbon Weir will be
6 redesigned to improve fish passage while maintaining or improving water capture efficiency for
7 irrigation.
- 8 ● **Lower Putah Creek improvements.** Lower Putah Creek will be realigned to improve upstream
9 and downstream passage of Chinook salmon and steelhead in Putah Creek and floodplain
10 restoration to provide benefits for multiple species on existing public lands.
- 11 ● **Fremont Weir modification.** The Fremont Weir will be modified to manage the timing,
12 frequency, and duration of inundation of the Yolo Bypass with Sacramento River flows. It was
13 assumed a section of the Fremont Weir will be lowered to 17.5 feet (NAVD88) and fitted with
14 operable gates that will allow for controlled flow into the Yolo Bypass when the Sacramento
15 River stage at the weir exceeds 17.5 feet. New flood channels would be excavated to connect the
16 Sacramento River to the new gate structure and to connect the new gate structure to the Yolo
17 Bypass.
- 18 ● **Yolo Bypass modification.** Tule Canal/toe drain channel capacities will be reduced through
19 grading, removing existing berms, levees, and water control structures, constructing berms or
20 levees, reworking agricultural delivery channels, and providing earthwork or structures to the
21 extent necessary to improve the distribution (e.g., wetted area) and hydrodynamic
22 characteristics (e.g., residence times, flow ramping, and recession) of water moving through the
23 Yolo Bypass. The fisheries enhancement plan will include modifications to allow water to
24 inundate in certain areas of the bypass to maximize biological benefits. It will keep water away
25 from other areas to reduce stranding of covered fish species in isolated ponds, minimize effects
26 on terrestrial covered species (e.g., giant garter snake), and accommodate other existing land
27 uses (e.g., wildlife, public, and agricultural use areas). If necessary, lands will be acquired, in fee-
28 title and through conservation or flood easements.
- 29 ● **Westside option.** The fisheries enhancement plan will include a feasibility study and evaluation
30 of a gated channel to provide flows into Yolo Bypass along the west side. Potential flow sources
31 are the Sacramento River, Colusa Basin Drain or Sacramento River flows through Knights
32 Landing Ridge Cut, or augmentation of other western tributaries. Some modification of the
33 existing configuration of the discontinuous channels along the western edge of the Yolo Bypass
34 may also be required. If effective at meeting biological objectives, this option could be included
35 in the implementation of the conservation measure. It is uncertain at this time whether a gated
36 channel will need to be constructed.

37 For cost estimation, it is assumed Yolo Bypass enhancement elements will be constructed between
38 year 1 and 10 of Plan implementation. Low and high construction costs for each element were
39 estimated by DHCCP (Delta Habitat Conservation and Conveyance Program 2010). The midpoints of
40 these ranges are summarized here. These are Class 4 cost estimates with an expected accuracy
41 range of +120 to -60%. A 50% contingency is added to the direct construction cost estimate to
42 account for the substantial cost uncertainties associated with the bypass construction elements at
43 this stage in the planning process. Total construction costs, including contingency, are estimated at
44 \$682 million.

1 **Table 8-6. Cost Estimate for Yolo Bypass Fisheries Enhancement**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Yr Permit Term Total Expenditure (Millions)
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Land Acquisition				
Easement costs	\$2.5	\$0.0	\$0.0	\$25.0
Due diligence & transaction costs	\$0.3	\$0.0	\$0.0	\$2.5
Subtotal	\$2.8	\$0.0	\$0.0	\$27.5
Contingency (20%)	\$0.6	\$0.0	\$0.0	\$5.5
Total Land Acquisition	\$3.3	\$0.0	\$0.0	\$33.0
Construction				
Planning, preliminary engineering & permitting	\$3.0	\$0.0	\$0.0	\$30.0
PM/CM/final design	\$10.1	\$0.0	\$0.0	\$101.1
Fremont Weir fish facilities	\$16.1	\$0.0	\$0.0	\$161.3
Other civil/site Work near Fremont Weir	\$1.1	\$0.0	\$0.0	\$11.2
Sacramento Weir	\$4.9	\$0.0	\$0.0	\$49.5
Lisbon Weir	\$2.4	\$0.0	\$0.0	\$24.3
Los Rios check structure	\$1.8	\$0.0	\$0.0	\$17.5
Putah Creek gate structure	\$1.7	\$0.0	\$0.0	\$17.5
Putah Creek realignment	\$1.2	\$0.0	\$0.0	\$12.1
West Side supply element	\$3.0	\$0.0	\$0.0	\$30.3
Subtotal	\$45.5	\$0.0	\$0.0	\$454.7
Contingency (50%)	\$22.7	\$0.0	\$0.0	\$227.3
Total Construction	\$68.2	\$0.0	\$0.0	\$682.0
Total Capital	\$71.5	\$0.0	\$0.0	\$715.0
In undiscounted 2012 dollars. The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error. PM = project management; CM = construction management				

2

3 **8.2.3.3 CM3 Natural Communities Protection and Restoration**

4 With *CM3 Natural Communities Protection and Restoration*, the Implementation Office will provide
5 for the establishment of a reserve system to protect, restore, and enhance areas of existing natural
6 communities and covered species habitat, protect and maintain occurrences of selected plant
7 species with very limited distributions, and provide habitat connectivity among the various BDCP

1 conservation lands in the reserve system. This section presents land acquisition costs for the
2 protection of existing natural communities.⁹

3 **Land acquisition.** The cost estimate for land acquisition needed for the implementation of CM3 is
4 \$460.1 million. The Plan implementation period in which land would be acquired is based on the
5 schedule shown in Table 8-7. The cost estimate is summarized in Table 8-8. The cost estimate is
6 comprised of four parts: (1) fee-title acquisition of reserve land, (2) easement acquisition of reserve
7 land, (3) real estate transaction cost, and (4) contingency. Acreages used for cost estimation are
8 those shown in Table 8-2. This schedule is derived from the implementation schedule in Table 6-2,
9 *Implementation Schedule for Natural Community Protection and Restoration Conservation Measures*,
10 of Chapter 6, *Plan Implementation*.¹⁰ Specific assumptions use to estimate fee-title, easement, and
11 transaction costs are as follows.

- 12 ● **Fee-title cost.** For cost estimation, it is assumed fee-title interest in land needed for the
13 protection of specific natural communities would be purchased. This includes establishment of
14 reserves for vernal pool complex, alkali seasonal wetland complex, valley/foothill riparian,
15 grassland, managed wetland, nontidal perennial aquatic, and nontidal freshwater perennial
16 emergent wetland. Purchase of fee-title interest in land for these purposes is estimated to cost
17 \$114.8 million. The estimate is based on the weighted average value of land in each
18 Conservation Zone from which land will need to be acquired. Calculation details are provided in
19 Appendix 8.A, *Implementation Costs Supporting Materials*.
- 20 ● **Easement cost.** For cost estimation, it is assumed conservation easements would be used to
21 secure 80% of the cultivated habitat reserve. The cost estimate for conservation easements is
22 \$228.6 million.¹¹ The estimate is based on the weighted average value of land in each
23 Conservation zone from which land for the cultivated habitat reserve will need to be acquired.
24 Calculation details are provided in Appendix 8.A, *Implementation Costs Supporting Materials*.
- 25 ● **Transaction and contingency costs.** Transaction and contingency cost estimates are \$40.1 and
26 \$76.7 million, respectively.¹²

⁹ The costs for acquiring lands needed for the restoration of natural communities are not counted here. Rather, they are included as part of the cost estimates for the natural communities restoration conservation measures (CM4-CM10).

¹⁰ These assumptions have been developed only for the purposes of the cost estimate and do not reflect permit conditions. Actual acquisition by conservation zone and period will likely differ from these assumptions but is expected to be within the estimated overall cost.

¹¹ Conservation easement cost is set to 80% of the fee-title land value, per Section 8.2.2.4.3.

¹² The cost analysis assumes that fee-title and easement purchases would have similar transaction costs per acre, which would average 10% of the fee-title value of the land. Because easement cost is set to 80% of fee-title value, the calculation of transaction cost in Table 8-8 is $(\$114.8 + \$228.6/0.8) \times 0.1 = \40.1 million.

1 **Table 8-7. Land Acquisition Schedule for Reserve System**

Conservation Measure	Total Acquisition Requirement (acres)	Percent of Acquisition by 5-Year Time Periods									
		Near-Term		Early Long-Term	Late Long-Term						
		1 to 5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50
CM3 Natural Communities Protection and Restoration											
Valley/foothill riparian	750	53%	47%	0%	0%	0%	0%	0%	0%	0%	0%
Vernal pool complex	600	33%	33%	33%	0%	0%	0%	0%	0%	0%	0%
Alkali seasonal wetland complex	150	0%	80%	3%	3%	3%	3%	3%	3%	0%	0%
Grassland	8,000	13%	13%	13%	13%	13%	13%	13%	13%	0%	0%
Managed wetland	8,100	23%	36%	7%	7%	7%	7%	7%	7%	0%	0%
Cultivated lands	49,625	16%	16%	13%	11%	11%	11%	11%	11%	0%	0%
Nontidal marsh	50	20%	30%	10%	10%	10%	10%	10%	0%	0%	0%
Total Acquisition	67,275	17%	19%	12%	11%	10%	10%	10%	10%	10%	0%

2

1 **Table 8-8. Cost Estimate for Land Acquisition to Protect Existing Natural Communities**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Land Acquisition				
Fee-title costs	\$3.98	\$2.87	\$1.73	\$114.8
Easement costs	\$7.29	\$5.98	\$3.59	\$228.6
Due diligence & transaction costs	\$1.31	\$1.03	\$0.62	\$40.1
Subtotal	\$12.59	\$9.88	\$5.95	\$383.5
Contingency (20%)	\$2.52	\$1.98	\$1.19	\$76.7
Total Land Acquisition	\$15.10	\$11.85	\$7.14	\$460.1

Notes:
^a In undiscounted 2012 dollars
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.

2

3 **8.2.3.4 CM4 Tidal Natural Communities Restoration**

4 With *CM4 Tidal Natural Communities Restoration*, the Implementation Office will provide for the
5 restoration of 65,000 acres of tidal perennial aquatic, tidal mudflat, tidal freshwater emergent
6 wetland, and tidal brackish emergent wetland natural communities in the ROAs (Figure 3.2-2,
7 *Conservation Zones and Restoration Opportunity Areas*, in Chapter 3, *Conservation Strategy*). Tidal
8 natural communities will be restored along a contiguous gradient encompassing shallow subtidal
9 aquatic, tidal mudflat, and tidal marsh plain. The restoration will be phased to develop 19,150 acres
10 by year 10, 29,800 acres (cumulative) by year 15, and 65,000 acres (cumulative) by year 40 of Plan
11 implementation. The cost estimate of acquisition of land needed for implementation of CM4 is
12 \$376.5 million. The cost estimate for constructing and restoring tidal natural communities on
13 acquired lands is \$1.49 billion. The cost estimate for CM4 is summarized in Table 8-9, and is based
14 on the following data and assumptions.

15 **Land acquisition.** For cost estimation, it is assumed purchase of fee-title interest in 60,273 acres of
16 land will be required. The remainder of the land needed to meet CM4's 65,000-acre restoration
17 target is assumed to come from land already owned by the state. The cost estimate for purchasing
18 fee-title interest in 60,273 acres of land across five different restoration opportunity areas (ROAs) is
19 \$293.9 million. The estimate derives from the weighted average value of land within each of the five
20 ROAs in which CM4 will be implemented.¹³ Calculation details are provided in Appendix 8.A,
21 *Implementation Costs Supporting Materials*. Transaction and contingency costs add an additional
22 \$82.6 million to the estimate, bringing the total cost for land acquisition to \$376.5 million.

¹³ Land requirements for each ROA were derived from preliminary tidal marsh restoration footprints based on modeling conducted for the effects analysis (Chapter 5, *Effects Analysis*, and Appendix 5.E, *Habitat Analysis*).

1 **Construction.** Tidal natural community restoration is estimated to cost \$1.53 billion. A breakdown
2 of restoration costs by major construction element is provided in Table 8-9.

- 3 • **Grading and fill costs.** Restoration costs, especially in the West Delta, are strongly influenced
4 by the amount of mass grading and fill required to achieve desired elevations for tidal and
5 subtidal areas. The cost estimate assumes restoration will not occur in the most deeply subsided
6 parts of the Delta. Mass grading and fill assumptions used to estimate restoration cost for each
7 ROA are as follows.

8 ○ **Suisun Marsh.** The cost estimate assumes no mass grading will be required. Suisun Marsh
9 has a relatively high potential for estuarine deposition to raise elevations from subtidal to
10 intertidal compared to the Delta ROAs. In addition, because of the regional geomorphic
11 setting of Suisun Marsh, the tide signal is not expected to be as compressed as modeled in
12 the long term, resulting in a relatively high extent of intertidal area created without fill
13 placement.

14 ○ **West Delta.** Restoration areas on subsided West Delta islands will be filled with
15 hydraulically placed dredged material to create a mix of approximately 20% intertidal and
16 80% subtidal area in all except the most deeply subsided areas (deeper than approximately
17 9 feet below mean lower low water (MLLW). Dutch Slough site mass grading will consist of
18 land-based fill placement (from local borrow and the Ironhouse Sanitary parcel), per the
19 current DWR restoration plan (Philip Williams & Associates 2006). Existing artificial fill
20 above intertidal elevations will be removed at no cost to the project. West Delta fill costs are
21 based on estimated costs of placing dredged material and the planning-level cost estimate
22 for Dutch Slough.

23 ○ **Cache Slough, South Delta, and Cosumnes-Mokelumne.** For these ROAs, the cost estimate
24 assumes no mass grading will be required. Some cut and fill may be required. To estimate
25 the volume of fill required, it is assumed that lands with elevations up to 1 foot above mean
26 higher high water (MHHW) will be lowered to the MHHW elevation. The cut material will
27 then be placed in shallow subtidal areas to raise them up to the MLLW elevation. Costs for
28 the Cache Slough ROA are based on the assumption that earthmoving will be phased over
29 several decades, requiring interim stockpiling of fill material on one or more parcels. Cut
30 and fill areas are broadly categorized based on anticipated haul distances, and the need for
31 interim stockpiling. Unit costs for cut and fill operations are based on grading and fill costs
32 for a sample of regional tidal marsh restoration projects.

- 33 • **Temporary and permanent levees.** Temporary and permanent levees will be required to
34 protect lands adjacent to the restoration areas. The cost estimate for levees is based on a total of
35 44 miles of permanent levees along the upland edges of the ROAs, 32 miles of permanent levees
36 on subsided areas in the interiors of the ROAs, and 50 miles of temporary levees that will need
37 to be breached or removed as restoration progresses. The typical levee height for permanent
38 levees was calculated as the difference between the Federal Emergency Management Agency
39 100-year flood elevation and a typical ground elevation, plus an allowance for settlement,
40 freeboard, and future sea level rise. Typical ground elevation was estimated by ROA and by
41 levee type. Settlement was estimated for each levee type within an ROA as a function of levee
42 height and approximate depth of underlying peat soils. A crest width of 16 feet was assumed for
43 all levees, with average side slopes of 5:1 and 2:1 (horizontal : vertical) on the outboard and
44 inboard sides, respectively. Unit costs for levee fill were derived from costs for similar
45 constructed projects and ranged from \$5 to \$31 per cubic yard, depending on anticipated soil

1 strength and distance of fill material source. It was assumed that the fill necessary for levee
 2 construction would be obtained from sources within the ROA. For island levees, it was assumed
 3 that material would be imported from offsite locations by barge and conveyor system.

- 4 • **Restoration and vegetation.** A unit cost of \$3,700 per acre was applied to each ROA's footprint
 5 area to estimate the cost of restoration elements other than mass grading and levees. is the unit
 6 is cost was derived from data on costs for large-scale tidal marsh restorations that have been
 7 completed (or are in final stages of design) in the San Francisco Bay, including Napa Salt Ponds,
 8 South Bay Salt Ponds (multiple sites), Eden Landing Ecological Reserve, Bahia Wetlands,
 9 Petaluma Marsh, Cooley Landing, Outer Bair Island, and Blacklock Marsh (Suisun Bay). Projects
 10 located in San Francisco Bay were used as analogues because of the lack of large-scale tidal
 11 marsh restoration projects within the Delta to serve as reference sites.
- 12 • **Contingency.** Each restoration site will have its own unique characteristics, causing actual
 13 construction costs to differ from the estimates set out in this section. Factors that may affect
 14 actual costs include the relocation of existing utilities, improvements necessary for site access,
 15 and accommodation for a phased approach to construction. A 35% contingency was applied to
 16 direct construction costs to account for these unknowns.

17 **Table 8-9. Cost Estimate for Tidal Natural Communities Restoration**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long- Term (Yrs 11– 15)	Late Long- Term (Yrs 16– 50)	
Capital Costs				
Land Acquisition				
Fee-title costs	\$7.4	\$8.8	\$5.0	\$293.9
Due diligence & transaction costs	\$0.5	\$0.6	\$0.4	\$19.8
Subtotal	\$7.8	\$9.3	\$5.4	\$313.8
Contingency (20%)	\$1.6	\$1.9	\$1.1	\$62.8
Total Land Acquisition	\$9.4	\$11.2	\$6.5	\$376.5
Construction				
Permitting, planning, design, CM	\$8.0	\$9.5	\$5.5	\$318.4
Mass grading	\$1.0	\$1.1	\$0.7	\$38.4
Temporary levees	\$6.5	\$7.7	\$4.4	\$257.7
Long-term levees	\$8.3	\$9.8	\$5.6	\$329.1
Restoration & vegetation establishment	\$7.1	\$8.4	\$4.9	\$283.7
Subtotal	\$30.8	\$36.5	\$21.1	\$1,227.4
Contingency	\$7.7	\$9.1	\$5.2	\$305.8
Total Construction	\$38.4	\$45.6	\$26.3	\$1,533.1
Total Capital	\$47.8	\$56.8	\$32.8	\$1,909.7
Notes: The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
^a In undiscounted 2012 dollars				
CM = construction management				

1 **8.2.3.5 CM5 Seasonally Inundated Floodplain Restoration**

2 Under *CM5 Seasonally Inundated Floodplain Restoration*, the Implementation Office will provide for
 3 the restoration of 10,000 acres of seasonally inundated floodplain along the San Joaquin River
 4 downstream of Vernalis and along Old and/or Middle Rivers. CM5 provides flexibility for restoration
 5 actions to occur along any major channel in the north, east, and south Delta. To estimate
 6 implementation cost, the following assumptions about the location of floodplain restoration were
 7 adopted.

- 8 • Approximately 7,000 acres of floodplain will be restored along the San Joaquin River between
 9 Vernalis and French Camp Slough by setting back approximately 40 miles of existing levees.
- 10 • An additional 3,000 acres of floodplain will be restored along Old and/or Middle Rivers by
 11 setting back approximately 17 miles of existing levees.
- 12 • In restoration areas, existing levees will be set back an average of 1,450 feet from the channel
 13 margin.

14 Given these location assumptions, land acquisition is estimated to cost \$74.3 million. Levee setback
 15 and floodplain revegetation is estimated to cost \$867.7 million. Costs are summarized in Table 8-10,
 16 and are based on the following data and assumptions.

17 **Land acquisition.** Land acquisition and related expenditures for CM5 are estimated to cost \$74.3
 18 million. The cost estimate is based on purchasing fee-title interest in 5,330 acres needed for levee
 19 footprints, graded benches and other waterside restoration features, at a cost of \$33.5 million, and
 20 securing an additional 5,775 acres in the restored floodplain through flood easement, at a cost of
 21 \$21.5 million. Both estimates are based on the weighted average value of land within the floodplain
 22 restoration zones used for cost estimation.¹⁴ Calculation details are provided in Appendix 8.A,
 23 *Implementation Costs Supporting Materials*. Transaction and contingency costs add an additional
 24 \$19.3 million to the estimate, bringing the total cost for land acquisition to \$74.3 million.¹⁵

25 **Construction.** The cost estimate for construction of levee setbacks and revegetation is \$867.7
 26 million. A breakdown of levee setback costs by major construction element is provided in Table
 27 8-10.

- 28 • **Levee setback cost.** The direct construction cost estimate for 57 miles of levee setbacks is
 29 \$528.9 million. The estimate is based on the cost of similar setback levees recently constructed
 30 along the Feather and Bear rivers. Direct construction cost for these projects averaged \$9.3
 31 million per mile. The estimate includes allowances for removing existing levees, excavating and
 32 backfilling borrow pits, surfacing roads, and excavating floodplain swales and benches.
- 33 • **Revegetation cost.** The cost estimate for floodplain revegetation is \$49.6 million. A total of
 34 4,830 acres are estimated to require revegetation at an average cost of \$10,270 per acre. The

¹⁴ Easement costs are set to 60% of fee-title value, per Section 8.2.2.4. Easement costs for floodplain restoration are valued lower than conservation easements because these easements will often come in the form of flood easements, which have fewer restrictions than conservation easements and therefore should cost less.

¹⁵ The cost analysis assumes that fee-title and easement purchases would have similar transaction costs per acre, which would average 10% of the fee-title value of the land. Because easement cost is set to 60% of fee-title value, the calculation of due diligence and transaction cost in Table 8-10 is $(\$33.5 + \$21.5/0.6) \times 0.1 = \$6.9$ million.

1 average per acre cost is based on revegetation costs for similar setback levee projects recently
2 constructed on the Feather and Bear rivers.

- 3 • **Permitting, planning, design, engineering, and construction management.** Allowances for
4 permitting, planning, design, engineering, and construction management are the same as those
5 used for the projects on the Feather and Bear rivers --18% of direct cost for permitting,
6 planning, design, and engineering and 7% of direct cost for construction management.

7 **Flood control cost share.** Cost sharing with state flood management programs may be possible. For
8 purposes of estimating total Plan implementation cost, it is assumed BDCP will be responsible for
9 between 50 and 75% of total CM5 costs. The 50% costs share is based on BDCP paying for roughly
10 one-third of levee setback costs and all the costs for land acquisition and revegetation. The 75% cost
11 share is based on BDCP paying for roughly two-thirds of levee setback costs and all the costs for land
12 acquisition and revegetation. Under the two cost share scenarios, BDCP cost for CM5 ranges
13 between \$471 and \$706.5 million. The summary of total BDCP cost presented in Section 8.2.7,
14 *Summary of Estimated Costs*, uses the more conservative 75% cost share assumption.

15 **Table 8-10. Cost Estimate for Seasonally Inundated Floodplain Restoration**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Land Acquisition				
Fee-title costs	\$0.00	\$0.67	\$0.86	\$33.5
Easement costs	\$0.00	\$0.43	\$0.55	\$21.5
Due diligence & transaction costs	\$0.00	\$0.14	\$0.18	\$6.9
Subtotal	\$0.00	\$1.24	\$1.59	\$61.9
Contingency (20%)	\$0.00	\$0.25	\$0.32	\$12.4
Total Land Acquisition	\$0.00	\$1.49	\$1.91	\$74.3
Construction				
Setback levee construction	\$0.00	\$10.58	\$13.60	\$528.9
Revegetation	\$0.00	\$0.99	\$1.28	\$49.6
Subtotal	\$0.00	\$11.57	\$14.87	\$578.47
Permitting, planning, design, CM	\$0.00	\$2.08	\$2.68	\$104.1
Construction management	\$0.00	\$0.81	\$1.04	\$40.5
Subtotal	\$0.00	\$14.46	\$18.59	\$723.1
Contingency (20%)	\$0.00	\$2.89	\$3.72	\$144.6
Total Construction	\$0.00	\$17.35	\$22.31	\$867.7
Total Capital	\$0.00	\$18.84	\$24.22	\$942.0
BDCP Cost Share				
50%	\$0.00	\$9.42	\$12.11	\$471.0
75% ^b	\$0.00	\$14.13	\$18.17	\$706.5
Notes: The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
^a In undiscounted 2012 dollars				
^b The cost summary tables in Section 8.2.7, <i>Summary of Estimated Costs</i> , use the more conservative 75% cost share assumption.				

16

1 8.2.3.6 CM6 Channel Margin Enhancement

2 With *CM6 Channel Margin Enhancement*, the Implementation Office will provide for the
3 enhancement of 20 linear miles of channel margin in the Delta. For the cost analysis, it is assumed
4 that channel margin enhancement will entail creating low benches that support emergent
5 vegetation and higher elevation benches that support riparian vegetation along existing levees.
6 Large woody material (e.g., tree trunks and stumps) may be anchored into constructed low benches
7 or in existing riprapped levees to provide similar habitat functions.

8 The cost estimate for CM6 is \$120.2 million. Table 8-11 provides a breakdown of the cost estimate,
9 which is based on the following data and assumptions.

10 **Land acquisition.** Channel margin enhancement projects are not expected to require significant
11 amounts of land acquisition. Some land acquisition may be required to accommodate channel
12 margin restoration in highly constrained channels where levees may need to be set back about 100
13 feet or less. These setbacks would also mitigate the loss of channel margin along the Sacramento
14 River due to construction of the three CM1 conveyance intakes in the north Delta. To account for this
15 possibility, it is assumed that 5.2 miles of the 20 miles of channel margin enhancement would entail
16 setting back levees approximately 100 feet. This linear distance equates to twice the amount of
17 channel margin that would be lost to the construction of the three intakes in the north Delta, which
18 is twice the amount needed to mitigate that loss. An estimated 63 acres would be needed for these
19 levee setbacks.¹⁶ The cost estimate to acquire this land in fee-title, including allowances for due
20 diligence, other transaction costs, and contingency is \$0.52 million.

21 **Construction.** The cost estimate for construction of channel margin enhancements is \$119.7
22 million. Cost estimates for setback levee construction and channel margin enhancements in areas
23 where setback levees will not be required are based on the following information.

- 24 ● **Levee construction.** The cost estimate for 5.2 miles of setback levees is \$72.4 million. Levee
25 construction cost assumptions are the same as those for *CM5 Seasonally Inundated Floodplain*
26 *Restoration*. Because the levee cost estimate includes allowances for graded benches and other
27 waterside habitat enhancements, separate channel margin enhancement costs were not
28 estimated for stretches of channel where setback levees would be constructed.
- 29 ● **Channel margin enhancement.** On the remaining 14.8 miles of channel margin where setback
30 levees would not be constructed the cost estimate for channel margin enhancements is \$47.3
31 million. The estimate is based on an average cost of \$2.13 million per mile plus a 20% allowance
32 for permitting, design, engineering, and construction management, and a 20% cost contingency.
33 The average cost per mile for direct construction is based on an analysis of 95 bank stabilization
34 projects planned for the Sacramento River and its tributaries (U.S. Army Corps of Engineers
35 2009). Each sampled project included a conceptual design cross section and budget-level cost
36 estimate for soil cover, instream woody material, fascines, landscape materials, and in some
37 instances wetland construction. The allowance for indirect costs as a percentage of direct
38 construction cost is taken directly from the original budget-level cost estimates.

¹⁶ 63 acres = 100 feet × 5.2 miles × 5,280 feet/mile × 1 acre/43,560 square feet.

1 **Table 8-11. Cost Estimate for Channel Margin Improvements**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Land Acquisition				
Fee-title cost	\$0.02	\$0.04	\$0.00	\$0.39
Due diligence & transaction costs	\$0.00	\$0.00	\$0.00	\$0.04
Subtotal	\$0.02	\$0.04	\$0.00	\$0.43
Contingency (20%)	\$0.00	\$0.01	\$0.00	\$0.09
Total Land Acquisition	\$0.03	\$0.05	\$0.00	\$0.52
Setback Levee Construction				
Direct Construction	\$2.41	\$4.82	\$0.00	\$48.25
Permitting/Design/Engineering	\$0.43	\$0.87	\$0.00	\$8.68
Construction Management	\$0.17	\$0.34	\$0.00	\$3.38
Subtotal	\$3.02	\$6.03	\$0.00	\$60.31
Contingency	\$0.60	\$1.21	\$0.00	\$12.06
Total Setback Levee Construction	\$3.62	\$7.24	\$0.00	\$72.37
Channel Margin Enhancement				
Direct Construction	\$1.02	\$1.07	\$0.46	\$31.54
Permitting/Design/Engineering	\$0.18	\$0.19	\$0.08	\$5.68
Construction Management	\$0.07	\$0.07	\$0.03	\$2.21
Subtotal	\$1.28	\$1.33	\$0.57	\$39.42
Contingency	\$0.26	\$0.27	\$0.11	\$7.88
Total Channel Margin Enhancement	\$1.53	\$1.60	\$0.68	\$47.30
Total Capital	\$5.18	\$8.89	\$0.68	\$120.19
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				

2

3 **8.2.3.7 CM7 Riparian Natural Community Restoration**

4 With *CM7 Riparian Natural Community Restoration*, the Implementation Office will provide for the
5 restoration of 5,000 acres of riparian forest and scrub in areas of restored tidal marsh, floodplain,
6 and channel margin.¹⁷ Establishment of riparian natural community will rely on both natural
7 recruitment and active planting. Nonnative vegetation in riparian restoration areas will be
8 controlled during the first three years of native riparian establishment.

¹⁷ Costs for the protection of existing riparian natural communities to meet protection requirements (i.e., without restoration) are described in *CM3 Natural Communities Protection and Restoration*.

1 The cost estimate for riparian natural community land acquisition and restoration is \$47.6 million. A
2 breakdown of the estimate is provided in Table 8-12, which is based on the following cost
3 estimation methods and assumptions.

4 **Land acquisition.** The cost estimate of land acquisition, including transaction costs and
5 contingency, is \$12.2 million. Most riparian natural community restoration (4,029 acres out of a
6 total of 5,000) is expected to occur on lands acquired for seasonally inundated floodplains (CM5)
7 and for channel margins (CM6). Riparian natural community restoration in these areas will not
8 require additional acquisition of land. Estimated costs are for 971 acres of riparian natural
9 community restoration in Conservation Zone 7 (CZ7). This acreage is in addition to land acquisition
10 in CZ7 for *CM4 Tidal Natural Communities Restoration*. Acquired land would be a mixture of pasture,
11 hay, and field crop acreage with an average fee-title cost of \$9,500 per acre, based on the common
12 assumption fee-title values in Table 8-3.

13 **Construction and planting.** Estimated cost for restoration of riparian habitat is \$35.4 million. The
14 estimate is based on the following data and assumptions.

- 15 • **Natural recruitment in tidal marsh restoration areas.** Natural recruitment of riparian forest
16 and scrub is assumed to occur above the tidal range from MHHW to MHHW+2.5 feet at sites that
17 support suitable soils. Natural recruitment is assumed to occur in up to 20% of areas with
18 generally suitable soils, and in up to 40% of areas with more fluvial disturbance (e.g., portions of
19 the Cosumnes-Mokelumne ROA), where there is greater potential for fluvial inundation and
20 scour to refresh soil surfaces.
- 21 • **Active planting in tidal marsh restoration areas.** Active planting of riparian forest and scrub
22 is assumed to occur in areas adjacent to naturally recruited vegetation in order to increase
23 riparian patch size and enhance riparian quality. It is assumed that active planting acreage
24 would equal 30% of natural recruitment acreage in each ROA. A plant density of 170 plants per
25 acre is assumed, consistent with an over-planting approach designed to rapidly establish native
26 riparian species and reduce the need for replanting. A 70% survivorship rate is assumed over
27 the 3-year establishment period. Active planting is estimated to cost \$4,200 per acre (2012
28 dollars), including management, field preparation, irrigation installation, and planting costs. The
29 unit cost is derived from riparian establishment costs for comparable projects in the Central
30 Valley.
- 31 • **Weed control during establishment period.** The cost estimate assumes control of nonnative
32 vegetation during the 3-year establishment period will be required and will occur in both
33 natural recruitment and active planting areas. It is assumed that weed control would occur on
34 100% of active planting areas and 50% of natural recruitment areas. Weed control costs are
35 estimated at \$1,400 per acre/year (2012 dollars). Per acre costs are derived from weed control
36 costs for comparable projects in the Central Valley. Weed control in natural recruitment areas is
37 expected to cost 40% more than in active planting areas due to more varied and difficult
38 conditions.
- 39 • **Active planting in floodplain and channel margin restoration areas.** Establishment of
40 riparian natural community in restored floodplain is assumed to occur primarily in the
41 South Delta ROA along the San Joaquin, Old, and Middle Rivers. Establishment of riparian
42 habitat in these areas is expected to require active planting. Natural recruitment is not

1 expected to result in high-value riparian natural community.¹⁸ Unit planting and weed
 2 control costs in floodplain and tidal marsh restoration areas are expected to be the same.

3 **Table 8-12. Cost Estimate for Riparian Natural Community Restoration**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Land Acquisition				
Fee-title costs	\$0.15	\$0.11	\$0.21	\$9.3
Due diligence & transaction costs	\$0.01	\$0.01	\$0.02	\$0.9
Subtotal	\$0.16	\$0.12	\$0.23	\$10.2
Contingency (20%)	\$0.03	\$0.02	\$0.05	\$2.0
Total Land Acquisition	\$0.20	\$0.15	\$0.27	\$12.2
Habitat Establishment				
Construction & planting	\$0.48	\$0.75	\$0.16	\$14.0
Weed control during establishment	\$0.34	\$0.58	\$0.26	\$15.5
Subtotal	\$0.83	\$1.33	\$0.42	\$29.5
Contingency (20%)	\$0.17	\$0.27	\$0.08	\$5.9
Total Establishment	\$0.99	\$1.59	\$0.50	\$35.4
Total Capital	\$1.19	\$1.74	\$0.77	\$47.6
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				

4

5 **8.2.3.8 CM8 Grassland Natural Community Restoration**

6 With *CM8 Grassland Natural Community Restoration*, the Implementation Office will provide for the
 7 restoration of up to 2,500 acres of grassland natural community in Conservation Zones 1, 8, and/or
 8 11.¹⁹ Of this total, 500 acres is intended to partially satisfy the 3,000 acres of rice or rice equivalent
 9 requirement, per Table 8-1. The cost estimate for grassland natural community land acquisition and
 10 restoration is \$18.4 million. A breakdown of CM8 costs is provided in Table 8-13. The cost estimate
 11 is based on the following cost estimation methods and assumptions. Estimated costs for grassland
 12 natural community restoration are summarized in

¹⁸ Some funds for active planting in floodplain and channel margin restoration areas could be shifted to other conservation measures if subsequent monitoring shows that natural recruitment in these areas creates good riparian habitat.

¹⁹ Costs for the protection of existing grassland natural communities to meet protection requirements (i.e., without restoration) are described in *CM3 Natural Communities Protection and Restoration*.

Land acquisition. The cost estimate for land acquisition and related expenditures for CM8 is \$10.8 million. The cost estimate is based on purchasing fee-title interest in 2,500 acres of rangeland in three separate Conservation Zones needed for grassland restoration at a cost of \$8.15 million.²⁰ Calculation details are provided in Appendix 8.A, *Implementation Costs Supporting Materials*. Transaction and contingency costs add an additional \$2.65 million to the estimate, bringing the total cost for land acquisition to \$10.8 million.

Construction and planting. Restoration of grassland habitat is estimated to cost \$7.6 million. The estimate is based on grassland natural community construction and planting costs for comparable restoration projects occurring in and around the Delta (Gause pers. comm.). An average cost of \$1,272 per acre for grading, disking, and seeding is used to estimate establishment cost. An average cost of \$318 per acre is used to estimate annual weed management cost during a 4-year establishment period.²¹

Table 8-13. Cost Estimate for Grassland Natural Community Restoration

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Land Acquisition				
Fee-title costs	\$0.42	\$0.26	\$0.08	\$8.1
Due diligence & transaction costs	\$0.04	\$0.03	\$0.01	\$0.8
Subtotal	\$0.46	\$0.29	\$0.08	\$9.0
Contingency (20%)	\$0.09	\$0.06	\$0.02	\$1.8
Total Land Acquisition	\$0.55	\$0.35	\$0.10	\$10.8
Habitat Establishment				
Construction & planting	\$0.16	\$0.10	\$0.03	\$3.2
Weed control during establishment	\$0.16	\$0.10	\$0.03	\$3.2
Subtotal	\$0.32	\$0.21	\$0.06	\$6.4
Contingency (20%)	\$0.06	\$0.04	\$0.01	\$1.3
Total Establishment	\$0.39	\$0.25	\$0.07	\$7.6
Total Capital	\$0.94	\$0.60	\$0.17	\$18.4

Notes: The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.
^a In undiscounted 2012 dollars

14

²⁰ Of the 2,500 acres, 500 acres will contribute to the 3,000 acre requirement for rice or rice equivalent habitat, per Table 8-1.

²¹ Herbicide choice and type of weeds can greatly affect price. If the sites can be treated for weeds prior to planting using a combination of cultural and chemical control methods, the costs for future weed control may be reduced by half.

1 **8.2.3.9 CM9 Vernal Pool and Alkali Seasonal Wetland Complex** 2 **Restoration**

3 With *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, the Implementation Office
4 will restore the vernal pool and alkali seasonal wetland complex in Conservation Zones 1, 8, or 11 to
5 achieve no net loss of vernal pool alkali wetland acreage from covered activities. The restored vernal
6 pool and alkali seasonal wetland complex will consist of pools and swales within a larger matrix of
7 grasslands. The Implementation Office will select specific restoration sites in Conservation Zones 1,
8 8, or 11 based on the suitability of available lands for restoration, biological value, and practicability
9 considerations. Costs are presented for land acquisition, construction and planting, and weed
10 management during the establishment period.²²

11 Restoration of vernal pool and alkali wetland complex is estimated to cost \$1.7 million. A
12 breakdown of the cost estimate is provided in Table 8-14. The cost estimate is based on the
13 following data and assumptions.

14 **Land acquisition.** The cost estimate for land acquisition and related expenditures for CM9 is \$0.6
15 million. The cost estimate is based on purchasing fee-title interest in 67 acres of rangeland needed
16 for vernal pool and alkali seasonal wetland restoration at a cost of \$0.5 million. Calculation details
17 are provided in Appendix 8.A, *Implementation Costs Supporting Materials*. Transaction and
18 contingency costs add an additional \$0.1 million to the estimate, bringing the total cost for land
19 acquisition to \$0.6 million.

20 **Construction and planting.** Restoration of vernal pool and alkali wetland complex is estimated to
21 cost \$1.1 million. The estimate assumes that 15% of acquired land would be used for vernal pool
22 and wetland complex restoration and 85% would be composed of supporting grassland natural
23 community. An average cost of \$34,448 per acre was used to estimate the cost to restore vernal pool
24 and seasonal wetland areas. An average cost of \$1,272 per acre was used to estimate the cost of
25 grassland natural community restoration. Both estimates are based on costs for comparable
26 restoration projects occurring in and around the Delta (Gause pers. comm.). Weed management is
27 expected to be needed on 15% of restored area over the four year establishment period at average
28 cost of \$344 per acre.

²² Costs for the protection of existing vernal pool and alkali seasonal wetland natural communities to meet protection requirements (i.e., without restoration) are described in *CM3 Natural Communities Protection and Restoration*.

1 **Table 8-14. Cost Estimate for Vernal Pool Complex Establishment**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Land Acquisition				
Fee-title costs	\$0.03	\$0.02	\$0.00	\$0.5
Due diligence & transaction costs	\$0.00	\$0.00	\$0.00	\$0.0
Subtotal	\$0.04	\$0.02	\$0.00	\$0.5
Contingency (20%)	\$0.01	\$0.00	\$0.00	\$0.1
Total Land Acquisition	\$0.04	\$0.03	\$0.00	\$0.6
Habitat Establishment				
Construction & planting	\$0.06	\$0.04	\$0.00	\$0.9
Weed control during establishment	\$0.00	\$0.00	\$0.00	\$0.0
Subtotal	\$0.06	\$0.04	\$0.00	\$0.9
Contingency	\$0.01	\$0.01	\$0.00	\$0.2
Total Establishment	\$0.08	\$0.05	\$0.00	\$1.1
Total Capital	\$0.12	\$0.08	\$0.00	\$1.7
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				

2

3 **8.2.3.10 CM10 Nontidal Marsh Restoration**

4 With *CM10 Nontidal Marsh Restoration*, the Implementation Office will provide for the restoration of
5 up to 2,200 acres of nontidal marsh to provide giant garter snake habitat and restoration of 500
6 acres of managed wetland for sandhill crane habitat.²³ Of the 2,200 acres of nontidal marsh
7 restoration, 1,000 acres are intended to partially satisfy the 3,000 acres of rice or rice equivalent
8 requirement, per Table 8-1. Restored nontidal marsh natural community will be distributed in two
9 blocks, one in Conservation Zone 2 (677 acres) and the other in Conservation Zone 4 or 5 (1,523
10 acres). Additionally, managed wetland will be distributed in two 250-acre blocks (one in
11 Conservation Zone 5 and the other in Conservation Zone 6).

12 Nontidal marsh and managed wetland is estimated to cost \$52.7 million. A breakdown of the cost
13 estimate is provided in Table 8-15. The cost estimate is based on the following data and
14 assumptions.

15 **Land acquisition.** Purchase of fee-title interest in land for nontidal marsh and managed wetland
16 restoration is estimated to cost \$30.5 million. The cost estimate is based on purchasing fee-title

²³ Costs for the protection of existing nontidal marsh natural community to meet protection requirements (i.e., without restoration) are described in *CM3 Natural Communities Protection and Restoration*.

1 interest in 2,200 acres of cropland in three separate Conservation Zones at a cost of \$23.1 million.²⁴
 2 Calculation details are provided in Appendix 8.A, *Implementation Costs Supporting Materials*.
 3 Transaction and contingency costs add an additional \$7.4 million to the estimate, bringing the total
 4 cost for land acquisition to \$30.5 million.

5 **Construction and planting.** Restoration of nontidal marsh and managed wetland is estimated to
 6 cost \$22.2 million. Average per- acre restoration costs were derived from construction and
 7 revegetation costs for comparable restoration projects occurring in and around the Delta (Gause
 8 pers. comm.). An average restoration and revegetation cost of \$6,625/acre was estimated, including
 9 allowances for planning, permitting, and management. The estimate assumes that two-thirds of
 10 restored area will be dedicated to aquatic natural communities and one-third will be supporting
 11 upland natural communities. The cost estimate also includes allowances for four wells for backup
 12 water supply at a cost of roughly \$146,000 per well.

13 **Table 8-15. Cost Estimate for Nontidal Freshwater Marsh Restoration**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Land Acquisition				
Fee-title costs	\$0.89	\$0.41	\$0.35	\$23.1
Due diligence & transaction costs	\$0.09	\$0.04	\$0.03	\$2.3
Subtotal	\$0.97	\$0.45	\$0.38	\$25.4
Contingency	\$0.19	\$0.09	\$0.08	\$5.1
Total Land Acquisition	\$1.17	\$0.54	\$0.46	\$30.5
Habitat Establishment				
Construction & planting	\$0.81	\$0.30	\$0.25	\$18.5
Subtotal	\$0.81	\$0.30	\$0.25	\$18.5
Contingency	\$0.16	\$0.06	\$0.05	\$3.7
Total Establishment	\$0.97	\$0.36	\$0.30	\$22.2
Total Capital	\$2.14	\$0.90	\$0.76	\$52.7

Notes: The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.
^a In undiscounted 2012 dollars

15 8.2.3.11 CM11 Natural Communities Enhancement and Management

16 With *CM11 Natural Communities Enhancement and Management*, the Implementation Office will
 17 provide for the development and implementation of management plans for all conservation lands
 18 established under the BDCP. These plans will provide for the maintenance of the habitat functions of
 19 protected existing natural communities and restored natural communities in both the permit and
 20 post-permit terms of Plan implementation. They will also address mitigation of recreation impacts

²⁴ Of the 2,200 acres, 1,000 acres will contribute to the 3,000 acre requirement for rice or rice equivalent habitat, per Table 8-1.

1 associated with construction of the water conveyance facility and protection and restoration of
2 natural communities in the Plan area.

3 Capital costs for CM11 are estimated at \$138.1 million. Operating costs are estimated at \$236.6
4 million. The cost estimates are summarized in Table 8-16, and are based on the following data and
5 assumptions.

6 **Reserve management.** Data on management costs for managed natural reserves in the western
7 United States was used to estimate land management costs as a function of total area under
8 management.²⁵ Estimated annual management costs average \$124 per acre in the near-term (years
9 1 through 10), \$69 per acre in the early long-term (years 11 through 15), and \$48 per acre in the
10 late long-term (years 16 through 50) of Plan implementation. Estimated costs are inclusive of O&M,
11 administration, and capital replacement. Adaptive management and monitoring costs for reserve
12 lands are accounted for in Section 8.2.5, *Monitoring and Research Action Costs*. A 10% contingency is
13 added to the cost estimate to account for additional cost uncertainties.²⁶ Total estimated cost for
14 reserve management, including contingency, is \$217.9 million.

15 **New recreation assets.** To provide new recreation opportunities in the BDCP reserve system and
16 to mitigate temporary recreation impacts from BDCP construction, the Implementation Office will
17 establish 25 miles of new recreational trails, 15 trailhead facilities, and six picnic areas at various
18 locations throughout the reserve system. It will also construct one new two-lane boat launch facility
19 and refurbish an existing boat launch facility. Construction of the new trails, trailheads, and picnic
20 areas has an estimated cost of \$8.2 million. The boat launch facilities are expected to cost \$4.1
21 million. These cost estimates are based on the following assumptions:

- 22 • Construction of new trails is estimated to cost an average of approximately \$19,900 per mile.
23 The estimate is based on a statistical analysis of project costs for 37 trail construction projects
24 funded by California Department of Parks and Recreation between 2009 and 2012. The unit cost
25 estimate assumes natural surface trails with an average construction length of 5 miles per trail
26 segment.²⁷ An allowance of \$1,000 per mile is added to the unit construction cost for trail
27 signage and other non-structural trail enhancements.
- 28 • Construction of new trailhead facilities is estimated to cost an average of \$318,000 per facility.
29 Trailhead facilities are assumed to include parking areas, entrance gate and kiosk, signage,
30 restrooms, and emergency phones. The source of the estimate is the East Contra Costa County
31 HCP/NCCP (appendix G), updated to 2012 dollars using the Army Corps of Engineers recreation
32 facilities construction cost index.
- 33 • Construction of new picnic areas is assumed to cost one-fifth the cost of a new trailhead facility.
- 34 • Construction of the new boat launch facility is expected to cost \$2.7 million. The cost estimate is
35 based on a statistical analysis of project costs for 14 boat launch facility construction projects
36 funded by the California Department of Boating and Waterways. The cost estimate assumes a

²⁵ Emphasis was placed on lands managed for HCP purposes.

²⁶ A 10% contingency is the default contingency level used by the Center for Natural Lands Management Property Analysis Record cost model.

²⁷ Trail costs exhibit significant economies of scale due to lump sum costs of planning, design, equipment and materials staging. Unit costs may be lower if trail segments average more than 5 miles, and higher if they average less than 5 miles.

1 boat launch facility with two launch lanes, two boarding floats, restrooms, and vehicle and
2 trailer parking areas.

- 3 ● Refurbishing the existing boat launch facility is assumed to cost one-half the cost of the new boat
4 launch facility.
- 5 ● Construction cost estimates for recreation assets include a 20% allowance of direct construction
6 cost for permitting, design, engineering, and inspection, and a 20% cost contingency.

7 **Recreation assets management.** Annual O&M costs for the trails, trailhead facilities, picnic areas,
8 and boat launch facilities are estimated at 5% of original construction costs.²⁸ The O&M cost
9 assumption for recreation assets is taken from the East Contra Costa County HCP/NCCP (appendix
10 G). For purposes of cost estimation, recreation O&M costs begin to accrue in the five-year period
11 after original construction.

12 **Nonwasting endowment funding.** The Implementation Office will establish a nonwasting
13 endowment or similar funding mechanism to fund the costs of ongoing land management activities
14 that will be required after the expiration of the 50-year permit term. The annual funding
15 requirement during the permit term is estimated at \$2.5 million per year (in 2012 constant dollars)
16 based on the following assumptions.

- 17 ● Management costs in the post-permit term (2012 dollars) will average \$8.6 million per year.²⁹
18 This includes costs of \$7.8 million per year for land management and monitoring and a cost
19 contingency of \$0.8 million to account for additional cost uncertainties.
- 20 ● An average nominal rate of return on the endowment fund of 5%, which is consistent with
21 historical rates of return on conservative bond portfolios.³⁰
- 22 ● Endowment funding commences in year 1 of Plan implementation and is fully funded by the end
23 of the permit term. No contributions are made to the fund in the post-permit term.
- 24 ● An average inflation rate of 2.0 % during the post-permit period.

25 Estimated cost for establishment of the endowment fund during the permit term is \$125.8 million in
26 undiscounted 2012 dollars.

²⁸ O&M for signage, which is assumed to have shorter useful life, is estimated at 10% of original construction cost.

²⁹ Monitoring costs assume that monitoring frequency will be at least once every 3 years. Costs for this activity are subsumed within the O&M component of the management cost estimate. Costs for specialized follow-up surveys or site visits on an estimated 3% of the acreage annually to verify compliance are also estimated. These surveys are estimated to require 2 hours of labor per 40-acre parcel (including travel time).

³⁰ A more aggressive investment strategy could reduce the annual funding requirement, but would also increase the risk the endowment will not be fully funded by the end of the permit period.

1 **Table 8-16. Cost Estimate for Reserve Management and Endowment**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Recreation Trails & Facilities				
Direct construction	\$0.15	\$0.15	\$0.10	\$5.7
Permitting/Design/Eng/CM	\$0.03	\$0.03	\$0.02	\$1.1
Subtotal	\$0.18	\$0.19	\$0.12	\$6.8
Contingency @ 20%	\$0.04	\$0.04	\$0.02	\$1.4
Total Recreation Trails	\$0.22	\$0.22	\$0.14	\$8.2
Boat Launch Facilities				
Direct construction	\$0.00	\$0.57	\$0.00	\$2.9
Permitting/Design/Eng/CM	\$0.00	\$0.11	\$0.00	\$0.6
Subtotal	\$0.00	\$0.68	\$0.00	\$3.4
Contingency @ 20%	\$0.00	\$0.14	\$0.00	\$0.7
Total Boat Launch Facilities	\$0.00	\$0.82	\$0.00	\$4.1
Endowment funding	\$2.52	\$2.52	\$2.52	\$125.8
Total Capital	\$2.74	\$3.56	\$2.66	\$138.1
O&M Costs				
Recreation Trails & Facilities O&M	\$0.03	\$0.11	\$0.31	\$11.8
Recreation Boat Launch O&M	\$0.00	\$0.00	\$0.20	\$6.8
Reserve Management	\$1.21	\$2.76	\$5.48	\$217.9
Total O&M	\$1.24	\$2.87	\$5.99	\$236.6
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
O&M = operations and maintenance				

2

3 **8.2.3.12 CM12 Methylmercury Management**

4 With *CM12 Methylmercury Management*, the Implementation Office will provide for actions to
5 minimize the potential for bioaccumulation of mercury that could occur in areas of restoration
6 actions, including site characterization of mercury prior to acquisition, restoration design
7 modification to address unacceptable concentrations of mercury in substrate, long-term monitoring,
8 and adaptive management. Methylmercury management costs fall into three broad categories:

- 9 • **Site characterization and soil sampling to identify mercury hotspots in the ROAs.** Results
10 of site characterization studies and soil sampling will be used to inform site selection and
11 restoration design for tidal and floodplain natural communities (*CM4 Tidal Natural Communities*
12 *Restoration* and *CM5 Seasonally Inundated Floodplain Restoration*, respectively). The costs
13 associated with site characterization and soil sampling are presented in this section.

- 1 ● **Modification of site selection and restoration design to address potential methylmercury**
2 **impacts.** Site selection and/or restoration design may need to be modified to attenuate
3 methylmercury impacts. Costs associated with these modifications fall within the cost
4 contingencies for the tidal and floodplain natural communities conservation measures (*CM4*
5 *Tidal Natural Communities Restoration* and *CM5 Seasonally Inundated Floodplain Restoration*,
6 respectively), and therefore are not listed in this section in order to avoid double-counting costs.
- 7 ● **Ongoing Monitoring of Mercury Methylation in the Plan Area.** Costs for ongoing mercury
8 monitoring are subsumed within the cost estimate for monitoring, research, and adaptive
9 management (Section 8.2.5, *Monitoring and Research Action Costs*) and are not listed in this
10 section in order to avoid double-counting costs.

11 The cost estimate for site characterization and soil sampling is \$2.2 million. Costs are summarized in
12 Table 8-17. The cost estimate is based on the following data and assumptions.

13 **Preacquisition site characterization.** Preacquisition surveys for mercury, grain size, and total
14 organic content will be conducted for *CM4 Tidal Natural Communities Restoration* (65,000 acres)
15 and *CM5 Seasonally Inundated Floodplain Restoration* (10,000 acres). For cost estimation, the
16 midpoint of a range of sample densities from regional surveys (Heim et al. 2010) is used (one
17 sample per 185 acres). Some sites may require an increased sample density. Survey costs are based
18 on an estimate of \$208,000 (2012 dollars) for a 2-week survey to collect, analyze, and provide
19 report of results for 175 samples.

20 **Project design surveys.** More detailed mercury surveys may be required for designing specific
21 restoration plans. Approximate acreages that may require project design surveys are based on the
22 tidal restoration acreage amounts described for *CM4 Tidal Natural Communities Restoration*. Project
23 design surveys for mercury will be conducted for approximately 40,400 acres of restoration area at
24 one sample per 50 acres and will include collection and analysis of composite samples representing
25 the 0- to 12-inch depth interval and, on a more limited basis, the 12-inch to 14- or 16-inch depth
26 interval.

27 **Contingency.** The extent of survey work that may be required depends on many uncertainties that
28 will not be resolved until planning and design of *CM4* and *CM5* are further advanced. To account for
29 the substantial uncertainty associated with costs for site characterization and design surveys, a 50%
30 cost contingency is added to the cost estimate.

1 **Table 8-17. Cost Estimate for Methylmercury Site Characterization and Project Design Surveys**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Preconstruction site surveys	\$0.03	\$0.04	\$0.03	\$1.5
Contingency (50%)	\$0.02	\$0.02	\$0.01	\$0.7
Total Capital	\$0.05	\$0.06	\$0.04	\$2.2

Notes:
^aIn undiscounted 2012 dollars
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.

2

3 **8.2.3.13 CM13 Invasive Aquatic Vegetation Control**

4 With *CM13 Invasive Aquatic Vegetation Control*, the Implementation Office will provide for the
5 control of Brazilian waterweed (*Egeria densa*), water hyacinth, South American spongeplant
6 (*Limnobium laevigata*), and other invasive aquatic vegetation (IAV) throughout the Delta. To
7 implement this conservation measure, the Implementation Office will apply existing control
8 methods tested and developed by the California Department of Boating and Waterways *Egeria densa*
9 and Water Hyacinth Control Programs (California Department of Boating and Waterways 2011) The
10 primary control methods employed will be the application of herbicides as specific as possible to
11 these species and site conditions. In addition, limited mechanical removal to control water hyacinth
12 will be conducted. Other methods of removal could be implemented as dictated by site-specific
13 conditions and intended outcome.

14 The cost estimate for IAV control is \$270.3 million. Estimated costs are summarized in Table 8-18.
15 These estimates are based on the following data and assumptions.

- 16 • Treatment is expected to range between 1,700 and 2,300 acres annually. The cost estimate uses
17 the midpoint of this range.
- 18 • On average, treatment is estimated to cost \$2,650 per acre. The estimate is derived from data on
19 costs of aquatic vegetation removal between 2003 and 2005 (California Department of Boating
20 and Waterways 2006).³¹

³¹ This provides a conservative estimate of average cost. More recently, California Department of Boating and Waterways successfully treated 3,000 acres of *Egeria* in Franks Tract at an average cost of \$2,300 per acre (2011).

- 1 • Treatment starts by year 2 of Plan implementation and effective control of *Egeria* occurs by year
2 20.³²

3 **Table 8-18. Cost Estimate for Invasive Aquatic Vegetation Control**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
O&M Costs				
Labor	\$1.75	\$1.93	\$1.11	\$65.8
Materials	\$2.44	\$2.71	\$1.55	\$92.1
Environmental monitoring	\$1.78	\$1.98	\$1.13	\$67.4
Subtotal	\$5.96	\$6.62	\$3.79	\$225.2
Contingency (20%)	\$1.19	\$1.32	\$0.76	\$45.0
Total O&M	\$7.15	\$7.95	\$4.54	\$270.3
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
O&M = operations and maintenance; IAV = invasive aquatic vegetation				

4

5 **8.2.3.14 CM14 Stockton Deep Water Ship Channel Dissolved Oxygen**
6 **Levels**

7 With *CM14 Stockton Deep Water Ship Channel Dissolved Oxygen Levels*, which will occur in the
8 Stockton Deep Water Ship Channel, the Implementation Office will maintain dissolved oxygen
9 concentrations at levels that will not adversely affect covered fish species during periods when these
10 fish are present in the channel. The Implementation Office will operate and maintain an oxygen
11 aeration facility in the channel to increase dissolved oxygen concentrations between Turner Cut and
12 Stockton to meet total maximum daily load (TMDL) objectives established by the Central Valley
13 Regional Water Quality Control Board (above 6.0 milligrams per liter [mg/L] from September 1
14 through November 30 and above 5.0 mg/L at all times).

15 Estimated costs are summarized in Table 8-19. These estimates are based on the following data and
16 assumptions.

- 17 • **Facility capital replacement.** The existing diffuser, built in 2007 at a cost of \$3.7 million, will
18 need to be replaced by year 10 of Plan implementation (McLaughlin pers. comm.). Using the
19 construction cost of the existing facility and a 15-year facility lifecycle, the annualized capital

³² Analysis suggests with an initial high investment in treatment, it may be feasible to bring *Egeria* under control within 5 to 11 years (see Section 3.4.13, *Conservation Measure 13 Invasive Aquatic Vegetation Control* and Figure 3.4-29, *Projected Changes in Delta-Wide Extent of Egeria under Low and High treatment Amounts and Two Different Rates of Egeria Increase*, in Chapter 3, *Conservation Strategy*). Under less favorable conditions, up to 18 years may be required. This longer timeframe is used to provide a conservative basis for cost estimation.

1 replacement cost is \$0.31 million/yr. Total capital replacement cost over the 50-year permit
2 term is \$12.4 million.

- 3 • **Facility O&M.** Operating costs are variable and may range between \$10,000 and \$300,000 per
4 year, depending on channel flow and other factors. Historically, the facility has averaged 50 days
5 of operation per year. At this rate of operation, annual operating cost is \$160,000 (McLaughlin
6 pers. comm.).³³ In 2010, DWR signed a joint agreement with the Port of Stockton for operations
7 of the aeration facility. The agreement expires in 2013 and has two option years. In 2012, DWR
8 reached agreement on funding under this agreement with the State Water Contractors, San
9 Joaquin River Group Authority, San Luis & Delta Mendota Water Authority, and the San Joaquin
10 Valley Drainage Authority. It is unknown whether the options to the agreement will be exercised
11 in 2013, or whether the agreement will be extended beyond its original term of up to 5 years
12 (Pedlar pers. comm.). Therefore, it is assumed that BDCP will provide full funding for the
13 operating costs of the aeration facility starting in 2014. Estimated facility O&M cost over the
14 permit period is \$7.9 million, or about \$0.16 million annually.
- 15 • A 20% contingency is added to the estimate to account for uncertainties associated with the
16 estimates of both capital and operating costs.

17 **Table 8-19. Cost Estimate for Stockton Deep Water Ship Channel Dissolved Oxygen Levels**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Capital replacement costs	\$0.00	\$0.29	\$0.29	\$11.8
Contingency	\$0.00	\$0.06	\$0.06	\$2.4
Total Capital	\$0.00	\$0.35	\$0.35	\$14.1
O&M Costs				
Facility O&M	\$0.16	\$0.16	\$0.16	\$7.9
Contingency	\$0.03	\$0.03	\$0.03	\$1.6
Total O&M	\$0.19	\$0.19	\$0.19	\$9.5
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
O&M = operations and maintenance				

18

³³ This is a conservative operating cost estimate. Recent changes to the City of Stockton's Regional Wastewater Treatment Facility have resulted in improved water quality in the ship channel. If ship channel water quality improves further because of San Joaquin River restoration or Delta improvements, average operating days per year may fall below 50.

1 **8.2.3.15 CM15 Localized Reduction of Predatory Fishes**

2 With *CM15 Localized Reduction of Predatory Fishes*, the Implementation Office will address the local
3 effects of nonnative predators on covered fish species by supporting focused predator reduction in
4 high predator density locations. The Implementation Office will conduct focused predator reduction
5 using a variety of methods in locations in the Delta that are known to have high densities of
6 predators (predator hotspots).

7 The cost estimate for localized reduction of predatory fishes is \$105 million. A cost breakdown is
8 provided in Table 8-20. The cost estimate is based on the following data and assumptions.

- 9 • The cost estimate for focused predator control assumes full program implementation. As
10 explained in Chapter 3, Section 3.4.15, *CM15 Localized Reduction of Predatory Fishes*, the
11 implementation of this conservation measure will begin with a pilot program that may,
12 depending on results, later be scaled up to become a continuing program. There is great
13 uncertainty about the eventual scope and cost of the program. Assumptions and cost estimation
14 presented here represent an estimate of the level of effort needed to maintain boat crews in the
15 field for a certain number of days per year. It is possible that more boat crews or days in the
16 field would be needed, that a different technical approach would be used to achieve predator
17 reduction, or that focused reduction techniques would be deemed ineffective. These possible
18 outcomes cannot be predicted until the results of the pilot program become available. Labor
19 categories for CDFW staff are applied for cost estimating purposes only; equivalent staff from
20 other agencies or outside parties may also be used.
- 21 • Focused predator control costs are based on the following program assumptions.
 - 22 ○ Predator reduction would occur 5 days a week at 13 locations and weekly at four locations
23 in the Delta from the beginning of October through the end of June.
 - 24 ○ Four boat crews would be required to cover the 17 predator hotspots.
 - 25 ○ A boat crew would consist of one Environmental Scientist and two Fish and Wildlife
26 Technicians. Boat crews would be supervised by two Senior Environmental Scientists.
27 Estimated salary and benefit costs for the 12 crew and 2 supervisor positions are \$1.05
28 million per year.
 - 29 ○ Each crew would have a dedicated boat and pickup truck. Vehicle and equipment cost is
30 estimated at \$100,000 per crew. Vehicles would be replaced every 10 years, on average.
31 Estimated capital expenditure for vehicles and equipment for four crews over the 50-year
32 permit period is \$2.34 million.
 - 33 ○ Annual operating cost for the four boats would be \$0.16 million. Operating costs are based
34 on hourly vessel operating costs for CDFW 20- to 25-foot boats used for Interagency
35 Ecological Program surveys.³⁴
 - 36 ○ An administrative and overhead cost multiplier of 0.23 is applied to direct capital, labor, and
37 equipment costs, per CDFW guidance, to account for general overhead and incidental costs
38 that CDFW will incur to support the predator reduction unit. The annual allowance for
39 general overhead is \$0.29 million.

³⁴ Fuel, maintenance, repairs, and haul out costs are included in the estimate (CDFW VesselOpCosts2009.xls).

- The structure removal program will remove an average of 20 structures annually at an average cost of \$8,300 per structure. The unit cost is derived from structure removal costs reported by the Contra Costa County Sheriff Department’s Delta Abandoned Structure and Vessel Removal Program (Powell pers. comm.).
- The vessel removal program will remove an average of 10 vessels annually at an average cost of \$3,300 per vessel. The unit cost is set to the average cost of removing 408 abandoned vessels from the Delta between 2002 and 2004 (California Department of Boating and Waterways 2010).

Estimated capital and O&M costs for predator control are \$2.8 million and \$102.2 million, respectively, in undiscounted 2012 dollars.

Table 8-20. Cost Estimate for Localized Reduction of Predatory Fishes

Conservation Measure Cost	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Focused predator reduction	\$0.05	\$0.05	\$0.05	\$2.3
Contingency (20%)	\$0.01	\$0.01	\$0.01	\$0.5
Total Capital	\$0.06	\$0.06	\$0.06	\$2.8
O&M Costs				
Focused predator reduction	\$1.50	\$1.50	\$1.50	\$75.2
Abandoned vessel removal	\$0.03	\$0.03	\$0.03	\$1.7
Abandoned structure removal	\$0.17	\$0.17	\$0.17	\$8.3
Subtotal	\$1.70	\$1.70	\$1.70	\$85.1
Contingency (20%)	\$0.34	\$0.34	\$0.34	\$17.0
Total O&M	\$2.04	\$2.04	\$2.04	\$102.2

Notes:
^a In undiscounted 2012 dollars
 The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.
 O&M = operations and maintenance

8.2.3.16 CM16 Nonphysical Fish Barriers

With *CM16 Nonphysical Fish Barriers*, the Implementation Office will provide funding for the installation and operation of nonphysical barriers at the heads of various Delta channels to redirect outmigrating juvenile salmonids. Potential locations for nonphysical barriers are described in Chapter 3, *Conservation Strategy*, and include the Head of Old River, the Delta Cross Channel, Georgiana Slough, Turner Cut, Columbia Cut, the Delta Mendota Canal intake, and the Clifton Court Forebay. Final locations for the nonphysical barriers may differ from the potential sites listed in Chapter 3, and will be determined by engineering feasibility, fishery benefit, and cost-effectiveness.

1 Estimated capital and O&M costs for nonphysical barriers are \$763.0 million and \$508.7 million,
2 respectively. Estimated costs are summarized in Table 8-21. These estimates are based on the
3 following cost estimation methods and assumptions.

- 4 • **Number and timing of barriers.** Seven barriers will be installed by year 10 of Plan
5 implementation: three by year 5 and four more by year 10. All seven barriers are assumed to
6 remain in operation for the remainder of the permit term.
- 7 • **Barrier equipment.** Feasibility and cost of nonphysical barriers are highly location-specific,
8 depending on channel length and depth, flow velocities, debris loads, and other factors. The cost
9 estimate uses the average cost of \$3 million per year from the two DWR pilot projects completed
10 to date. Costs for equipment and O&M are estimated to account for 60 and 40% of total costs,
11 respectively. The two DWR pilots—one at Head of Old River and the other at the mouth of
12 Georgiana Slough—had average annual costs of \$1.3 and \$5.1 million, respectively. The higher
13 costs for Georgiana Slough are due to several design and site-specific factors: Georgiana Slough
14 has deeper water, higher velocities, more piles, and greater length than Head of Old River; the
15 barrier at Georgiana Slough used the largest sound drivers made and required much more
16 power and air to operate; the flow conditions and channel geometry of Georgiana Slough
17 resulted in much higher construction costs; the Georgiana Slough barrier was designed to repel
18 fish under both normal and reverse flows. There are no tidal reversals at the Head of Old River
19 location. In both locations, the equipment was designed for a short-term pilot. Permanent
20 installations may need more robust designs to withstand high flow velocities and debris loads.
21 This could result in higher construction costs than indicated by the pilots. Permanent
22 installations, however, may have lower operating costs.³⁵
- 23 • **Contingency.** Until further design studies can be completed, barrier costs will remain highly
24 uncertain. A 35% contingency is added to the cost estimate to account for this uncertainty and
25 to account for costs associated with design, permitting, and inspection. The higher contingency
26 is in line with the contingencies used for the most uncertain cost elements for *CM1 Water*
27 *Facilities and Operation* and *CM4 Tidal Natural Communities Restoration*, but is less than the cost
28 contingency used for *CM2 Yolo Bypass Fisheries Enhancement*.

³⁵ Whereas the pilot projects relied on more costly portable generators, permanent installations would likely have dedicated power sources. Additionally, permanent installations are not expected to require complete removal at the end of each season, which may further reduce operating costs relative to the pilot projects.

1 **Table 8-21. Cost Estimate for Nonphysical Barriers Program**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Barrier equipment costs	\$6.12	\$12.60	\$12.60	\$565.2
Contingency	\$2.14	\$4.41	\$4.41	\$197.8
Total Capital	\$8.26	\$17.01	\$17.01	\$763.0
O&M Costs				
Barrier O&M	\$4.08	\$8.40	\$8.40	\$376.8
Contingency	\$1.43	\$2.94	\$2.94	\$131.9
Total O&M	\$5.51	\$11.34	\$11.34	\$508.7

Notes:
^a In undiscounted 2012 dollars
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.
O&M = operations and maintenance

2

3 **8.2.3.17 CM17 Illegal Harvest Reduction**

4 With *CM17 Illegal Harvest Reduction*, the Implementation Office will provide funds to CDFW to hire
5 and equip 23 additional staff (17 additional game wardens and six supervisory and administrative
6 staff) in support of the existing field wardens assigned to the Delta-Bay Enhanced Enforcement
7 Program (DBEEP). These staff increases will be supported for the duration of the BDCP permit term.
8 It is expected that it will take 2 to 3 years to achieve the staff increases, with the full increase in
9 enforcement efforts associated with CM17 beginning in year 3.

10 The cost estimate for illegal harvest reduction is \$286.6 million or approximately \$5.7 million
11 annually over the 50-year permit period. A cost breakdown is provided in Table 8-22. The cost
12 estimate is based on the following data and assumptions.

- 13 • The Implementation Office will provide funds for 23 additional DBEEP staff, including 17 Fish
14 and Game Wardens, two Fish and Game Lieutenants (Specialist grade), one Fish and Game
15 Lieutenant (Supervisor grade), one Fish and Game Captain, one Associate Government Program
16 Analyst, and one Staff Programmer Analyst (Specialist grade). Estimated salary and benefit costs
17 for the 23 positions are \$2.21 million per year, including a \$0.3 million per year allowance for
18 overtime costs.
- 19 • Direct operating costs are estimated at \$1.92 million per year. The estimate was prepared by
20 CDFW and includes allowances for boat slips, fuel, minor equipment, uniforms, and general
21 office costs, plus a \$0.5 million per year allowance for special unit investigations.
- 22 • Purchase costs for vehicles, boats, and other major equipment are estimated at \$900,000. The
23 estimate was prepared by CDFW. It is assumed for cost estimation that vehicles and major
24 equipment would be replaced every 10 years, on average. Estimated capital expenditure over
25 the 50-year permit period is \$5.3 million.

- 1 • An administrative and overhead cost multiplier of 0.23 is applied to direct capital, labor, and
- 2 operating costs, per CDFW guidance, to account for general overhead and incidental costs that
- 3 CDFW will incur to support the enforcement unit. The annual allowance for general overhead is
- 4 \$0.97 million.
- 5 • A 10% contingency is added to the estimate to account for uncertainties associated with the
- 6 estimates of both capital and operating costs.

7 **Table 8-22. Cost Estimate for Illegal Harvest Reduction**

Conservation Measure Costs	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Vehicles & equipment	\$0.11	\$0.11	\$0.11	\$5.3
Contingency	\$0.01	\$0.01	\$0.01	\$0.5
Total Capital	\$0.12	\$0.12	\$0.12	\$5.8
O&M Costs				
Salary and benefits	\$2.21	\$2.21	\$2.21	\$110.5
Direct operating cost	\$1.92	\$1.92	\$1.92	\$96.1
General overhead	\$0.97	\$0.97	\$0.97	\$48.7
Subtotal	\$5.11	\$5.11	\$5.11	\$255.3
Contingency	\$0.51	\$0.51	\$0.51	\$25.5
Total O&M	\$5.62	\$5.62	\$5.62	\$280.8
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
O&M = operations and maintenance				

8

9 **8.2.3.18 CM18 Conservation Hatcheries**

10 With *CM18 Conservation Hatcheries*, the Implementation Office will provide for the support of

11 existing and establishment of new conservation propagation programs for delta and longfin smelt.

12 The conservation measure includes the development of a U.S. Fish and Wildlife Services (USFWS)

13 delta and longfin smelt conservation hatchery to house a delta smelt refugial population and provide

14 a source of delta and longfin smelt for supplementation or reintroduction, should reintroduction

15 become an adopted conservation strategy. The conservation measure also supports the expansion of

16 the refugial population of delta smelt and establishment of a refugial population of longfin smelt at

17 the University of California, Davis Fish Conservation and Culture Laboratory to serve as a population

18 safeguard in case of a catastrophic event in the wild.

19 The cost estimate to construct the two facilities is \$32.9 million. The cost estimate to operate the

20 facilities is \$313.7 million, or about \$6.3 million annually over the 50-year permit period. Costs are

21 summarized in Table 8-23, and are based on the following data and assumptions.

Facility construction. Construction of the two facilities is estimated to cost \$27.5 million. Both facilities are in preliminary planning stages and costs are uncertain. The cost of the new USFWS facility is expected to range between \$16.5 and \$28.0 million (Clarke pers. comm.). The midpoint of the range, \$22.25 million, is used for cost estimation. UC Davis has estimated expanding the smelt Refugium will cost \$5.2 million (Lindberg pers. comm.). For cost estimation, it is assumed that expansion of the UC Davis smelt refugium will be completed by year 4 and construction of the USFWS hatchery will be completed by year 7 of Plan implementation.

Operation costs. O&M costs for USFWS facility, including costs for staffing, general operations, and research and monitoring, are expected to range between \$4.1 and \$6.8 million annually (Clarke pers. comm.). The midpoint of the range, \$5.45 million, is used for cost estimation. These costs are assumed to be incurred starting in year 7 of Plan implementation. UC Davis has estimated that O&M costs of the expanded smelt refugium will average \$2.1 million annually while the USFWS hatchery is under construction. Once the USFWS is fully operational, operating costs at the Refugium are anticipated to decrease to \$0.8 million annually (Lindberg pers. comm.). For cost estimation it is assumed the USFWS will be fully operational by year 9 of Plan implementation.

Contingency. A 20% contingency is added to the construction cost estimates and a 10% contingency is added to the O&M cost estimates to account for uncertainties associated with the estimates of both capital and operating costs.

Table 8-23. Cost Estimate for Conservation Hatcheries

Conservation Measure Costs	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
USFWS Hatchery	\$2.23	\$0.00	\$0.00	\$22.3
UC Davis Smelt Refugium	\$0.52	\$0.00	\$0.00	\$5.2
Subtotal	\$2.75	\$0.00	\$0.00	\$27.5
Contingency (20%)	\$0.55	\$0.00	\$0.00	\$5.5
Total Capital	\$3.29	\$0.00	\$0.00	\$32.9
O&M Costs				
USFWS Hatchery	\$2.18	\$5.45	\$5.45	\$239.8
UC Davis Smelt Refugium	\$1.21	\$0.83	\$0.83	\$45.4
Subtotal	\$3.39	\$6.28	\$6.28	\$285.2
Contingency (10%)	\$0.34	\$0.63	\$0.63	\$28.5
Total O&M	\$3.73	\$6.91	\$6.91	\$313.7
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
USFWS = U.S. Fish and Wildlife Service; UC = University of California; O&M = operations and maintenance				

1 **8.2.3.19 CM19 Urban Stormwater Treatment**

2 With *CM19 Urban Stormwater Treatment*, the Implementation Office will oversee a program to
 3 provide funding for grants to entities such as the Sacramento Stormwater Quality Partnership,
 4 and/or counties and cities whose stormwater contributes to Delta waterways under National
 5 Pollutant Discharge Elimination System MS4 (municipal) stormwater permits, to implement actions
 6 from and in addition to their respective stormwater management plans. Proposed actions will be
 7 reviewed by technical staff in the Implementation Office or by outside experts. Projects will be
 8 funded if the Implementation Office determines that they are expected to benefit covered species.

9 The Implementation Office will make available up to \$50 million for grants, with a maximum grant
 10 amount of \$5 million for individual projects. Interagency agreements and program development are
 11 expected to take 2 years. For cost estimation, it is assumed the program will start awarding grants
 12 by year 3 of Plan implementation and that \$50 million in grants will have been awarded by year 15
 13 of Plan implementation. Program administration costs are subsumed in the cost estimate for the
 14 Implementation Office and therefore not reported here. Estimated costs for urban stormwater
 15 treatment are \$50 million (Table 8-24).

16 **Table 8-24. Cost Estimate for Urban Stormwater Treatment**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Capital Grant outlays	\$2.50	\$5.00	\$0.00	\$50.0
Notes: In undiscounted 2012 dollars. The 50-year total expenditures are more precise than the annual averages				

17

18 **8.2.3.20 CM20 Recreational Users Invasive Species Program**

19 With *CM20 Recreational Users Invasive Species Program*, the Implementation Office will fund a Delta
 20 Recreational Users Invasive Species Program designed to implement actions to prevent the
 21 introduction of new aquatic invasive species and reduce the spread of existing aquatic invasive
 22 species via recreational watercraft, trailers, and other mobile recreational equipment used in
 23 aquatic environments within the Plan Area.

24 The program will consist of two components: (1) education and outreach, and (2) watercraft
 25 inspection. Development of education and outreach will be governed by the *California Aquatic
 26 Invasive Species Management Plan* (California Department of Fish and Game 2008), and will include
 27 the following elements.

- 28 ● IAV education programs for marina, boat ramp, and property owners within the Plan Area.
- 29 ● Installation of interpretive displays at appropriate marinas, boat ramps, and other fishing or
 30 boating access sites in the Plan Area.
- 31 ● Installation of interpretive displays along major roadways into the Plan Area (e.g., at highway
 32 rest stops and on billboards).

- 1 Distribution of printed materials (e.g., posters, brochures, and articles) to recreational users, boat
 2 dealers, recreational retailers (e.g., bait and tackle shops), and waterfront and shoreline property
 3 owners in the Plan Area.
- 4 Development of the watercraft inspection program will be governed by the *Uniform Minimum*
 5 *Protocols and Standards for Watercraft Interception Programs for Dreissenid Mussels in the Western*
 6 *United States* (UMPS II) (Zook and Phillips 2012). The program is expected to include both Level 2
 7 highway spot check stations and Level 3 off highway inspection and cleaning stations capable of
 8 providing comprehensive watercraft and equipment inspection, decontamination, and quarantine of
 9 suspect watercraft.
- 10 • The capital cost estimate for the 50-year permit period is \$5.1 million. The operating cost
 11 estimate for the 50-year permit period is \$206.3 million, or about \$4.1 million annually.
 12 Estimated costs are summarized in Table 8-25, and are based on the following data and
 13 assumptions. The program will operate 7 Level 2 highway spot check stations from June through
 14 September and 9 Level 3 off highway inspection stations from March through October.
 - 15 • The program will commission up to 30 interpretive displays and 10 billboards for installation at
 16 rest stops, marinas, boat ramps, and other appropriate locations in the Plan Area, at an average
 17 cost of \$3,745 per display and \$21,344 per billboard.³⁶ On average, interpretive displays and
 18 billboards will be replaced every 10 and 20 years, respectively. Estimated capital cost for
 19 signage over the 50-year permit period is \$1.38 million.
 - 20 • Of the nine Level 3 inspection stations, six will be mobile and three will be semi-permanent.
 21 Each mobile station will be equipped with a mobile decontamination unit. Each semi-permanent
 22 station will be equipped with a stationary decontamination unit. New portable and stationary
 23 decontamination units are estimated to cost \$15,600 and \$104,000, respectively. Portable units
 24 will be replaced every 5 years, on average. Stationary units will be replaced every 10 years, on
 25 average. Estimated capital expenditure for decontamination units over the 50-year permit
 26 period is \$2.85 million.
 - 27 • Total staffing requirement for the education/outreach and inspection programs is 40 full-time
 28 equivalent positions, including 1.5 positions for education/outreach, 13.5 positions for highway
 29 spot check stations, and 25 positions for off highway inspection stations.³⁷ Estimated annual
 30 cost for salaries and benefits is \$2.65 million.³⁸

³⁶ Interpretive display average cost is based on a sample of costs for six interpretive display projects in five states. A total of 146 separate interpretive displays were represented in the sample. Costs ranged from a low of \$1,600 to a high of \$5,250 per display, inclusive of planning, graphic design, fabrication, and installation costs. Billboard average cost is based on planning, permitting, construction, and installation costs for a 25-foot-high, 14-foot-by-48-foot A-framed wood single-faced billboard. Permitting, construction, and installation costs are from billboard cost and depreciation schedules published by Oregon Department of Revenue (2007).

³⁷ Based on California Department of Food and Agriculture guidelines for highway inspection stations, each spot check station would need to be staffed by two people for 16 hours per day for 4 months of the year (7 stations x 2 staff x 16 hrs/day x 30.4 days/mo x 4 mo x 1 FTE/2080 hrs = 13 FTE (rounded to nearest 0.5 FTE) (Cline pers. comm.). Using staffing estimates prepared by the Western Regional Panel on Aquatic Nuisance Species (2010) for Level 3 inspection stations, off highway inspection stations would require 2.8 FTE positions per station, or a total of 25 FTE (rounded to nearest 0.5 FTE) for 9 stations.

³⁸ Salary costs for inspection station staff are drawn from salary cost estimates prepared by the Western Regional Panel on Aquatic Nuisance Species (2010) for Level 3 inspection stations. Salary costs for education program staff are equivalent to salary costs for 1 FTE Fish and Wildlife Interpreter and 0.5 FTE Staff Environmental Scientist positions.

- 1 • Station operating costs for vehicles, equipment, repairs, and other incidental costs will average
- 2 \$3,525 per month (Cline pers. comm.). The Level 2 spot check stations will operate 4 months a
- 3 year and the Level 3 inspection stations will operate 8 months per year. Estimated station
- 4 operating cost is \$0.35 million annually.
- 5 • An allowance of \$30,000 per year is included for printing and related costs.
- 6 • An administrative and overhead cost multiplier of 0.23 is applied to direct capital, labor, and
- 7 operating costs, per CDFW guidance, to account for general overhead and incidental costs that
- 8 agency or agencies overseeing the program will incur to support the education and inspection
- 9 programs. The annual allowance for general overhead is \$0.72 million.
- 10 • A 20% contingency is added to the capital cost estimates and a 10% contingency is added to the
- 11 operating cost estimates to account for uncertainties associated with the estimates.

12 **Table 8-25. Cost Estimate for Recreational Users Invasive Species Program**

Conservation Measure Costs	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Signage	\$0.03	\$0.03	\$0.03	\$1.4
Inspection stations	\$0.06	\$0.06	\$0.06	\$2.9
Subtotal	\$0.08	\$0.08	\$0.08	\$4.2
Contingency	\$0.02	\$0.02	\$0.02	\$0.8
Total Capital	\$0.10	\$0.10	\$0.10	\$5.1
O&M Costs				
Salaries & benefits	\$2.65	\$2.65	\$2.65	\$132.5
Inspection stations	\$0.35	\$0.35	\$0.35	\$17.6
Printing	\$0.03	\$0.03	\$0.03	\$1.5
General overhead	\$0.72	\$0.72	\$0.72	\$35.9
Subtotal	\$3.75	\$3.75	\$3.75	\$187.5
Contingency	\$0.38	\$0.38	\$0.38	\$18.8
Total O&M	\$4.13	\$4.13	\$4.13	\$206.3
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
O&M = operations and maintenance				

13

14 **8.2.3.21 CM21 Nonproject Diversions**

15 *CM21 Nonproject Diversions*, the Implementation Office will provide funding for actions that will

16 minimize the potential for entrainment of covered fish due to operation of unscreened nonproject

17 diversions. This includes funding studies to inventory and prioritize unscreened nonproject

1 diversions for remediation and funding up to \$50 million of remediation projects at an estimated
2 average rate of 100 cfs annually. The Implementation Office will also provide post construction
3 monitoring to ensure effectiveness. Costs for post construction monitoring are subsumed within the
4 cost estimate for monitoring and research (Section 8.2.5, *Monitoring and Research Action Costs*) and
5 therefore are not included here. Similarly, costs for program oversight and reporting are subsumed
6 in the Implementation Office cost estimate (Section 8.2.4, *Plan Administration Costs*). This section
7 provides cost estimates for the inventory and prioritization studies and funding of diversion
8 remediation.

9 Diversion remediation costs counted under this conservation measure are estimated at \$56.7
10 million. The cost estimate is summarized in Table 8-26 and is based on the following data and
11 assumptions.

- 12 ● A technical team will be assembled to monitor diversions, prioritize them for remediation, and
13 determine the most cost-effective approach for each diversion. Monitoring and prioritization is
14 expected to require 3 years to complete at an estimated cost of \$5.6 million (Meier pers. comm.).
- 15 ● Remediation may be done either by screening, relocating, or eliminating unscreened diversions.
16 It is assumed a diversion would be relocated or eliminated only if this were less expensive than
17 screening it. Screening cost is used for cost estimation since it provides the most conservative
18 basis for cost estimation.
- 19 ● Screening costs rise steeply with diversion size, due to increasing complexity of design and
20 construction. Data from existing screening programs was used to estimate average screening
21 costs for three size categories: (1) 100 cfs or less, (2) 100 to 250 cfs, and (3) greater than 250
22 cfs. Estimated screening costs for the three categories are \$8,700/cfs, \$33,300/cfs, and
23 \$111,800/cfs.³⁹ Existing inventories of unscreened Delta diversions indicate that 90% of
24 unscreened capacity is from small diversions of 100 cfs or less, 5% is from medium diversions of
25 100 to 250 cfs, and 5% is from large diversions of more than 250 cfs. Given these proportions,
26 the average screening cost per cfs is \$15,100 (rounded to nearest \$100). A 20% contingency is
27 added to the estimate to account for uncertainties associated with remediation costs. The
28 average screening cost with contingency is \$18,120/cfs.
- 29 ● Remediation of unscreened diversions will begin by year 6 of Plan Implementation at an average
30 rate of 100 cfs/yr. Diversion remediation expenditures are capped at \$50 million. For cost
31 estimation, it is assumed the program will remediate 2,759 cfs of diversion capacity by year 35
32 of Plan implementation, at which point the program will reach its capital expenditure cap.

³⁹ Average screening costs for diversions less than 100 cfs and between 100 and 250 cfs were derived from data compiled by PG&E and CDFW. Average screening cost for diversions greater than 250 cfs is set to the midpoint of the cost range provided by CDFW (Schoyer pers. comm.).

1 **Table 8-26. Cost Estimate for Nonproject Diversions**

Conservation Measure Costs	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Capital Costs				
Diversion remediation	\$0.76	\$1.51	\$0.76	\$41.7
Contingency	\$0.15	\$0.30	\$0.15	\$8.3
Total Capital	\$0.91	\$1.81	\$0.91	\$50.0
O&M Costs				
Inventory & prioritization study	\$0.56	\$0.00	\$0.00	\$5.6
Contingency	\$0.11	\$0.00	\$0.00	\$1.1
Total O&M	\$0.67	\$0.00	\$0.00	\$6.7

Notes:
^a In undiscounted 2012 dollars
 The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.
 O&M = operations and maintenance

2

3 **8.2.3.22 CM22 Avoidance and Minimization Measures**

4 With *CM22 Avoidance and Minimization Measures*, the Implementation Office will implement
 5 measures designed to avoid and minimize potential impacts on covered species. The specific actions
 6 associated with avoidance and minimization measures are discussed in detail in Appendix 3.C,
 7 *Avoidance and Minimization Measures*. To ensure that all Plan costs were accounted for, avoidance
 8 and minimization measures were screened to determine which would entail additional costs beyond
 9 the estimated costs of Plan implementation presented in other cost categories. Most avoidance and
 10 minimization measure costs are subsumed within conservation measure implementation costs. The
 11 list of avoidance and minimization measures and the results of the screening process are presented
 12 in the assumptions of Appendix 8.A, *Implementation Costs Supporting Materials*. This section
 13 presents cost estimates for the subset of avoidance and minimization measures, including costs for
 14 planning, preconstruction, and construction surveys, which are expected to entail additional
 15 implementation costs. These additional costs, including 20% contingency, are summarized in Table
 16 8-27. The assumptions and methods used to estimate these costs are presented in Appendix 8.A.

1 **Table 8-27. Cost Estimate for Avoidance and Minimization Measures**

AMM Costs Not Counted Elsewhere	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
O&M Costs				
Planning and construction surveys	\$1.15	\$0.50	\$0.27	\$23.6
Other costs not counted elsewhere	\$0.32	\$0.12	\$0.08	\$6.7
Contingency	\$0.29	\$0.12	\$0.07	\$6.1
Total O&M	\$1.77	\$0.74	\$0.43	\$36.3
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
O&M = operation and maintenance				

2

3 **8.2.3.23 Property Tax and Assessment Revenue Replacement**

4 New Delta conveyance facilities are required to offset loss of local property tax and assessment
5 revenues resulting from location, construction, mitigation, or operation of water conveyance
6 facilities must be offset by the Implementation Office (Water Code 85089). Although not legally
7 required to do so, the Implementation Office will also offset the loss of local property tax and
8 assessment revenue resulting from fee-title acquisition of land for the reserve system during the
9 permit term. Estimated property tax and assessment revenue offsets over the 50-year permit period
10 for conveyance and the reserve system are \$49.3 and \$176.7 million, respectively. The cost estimate
11 is summarized in Table 8-28 and is based on the following data and assumptions.

- 12 • Acquisition of fee-title interest in private land is assumed to result in loss of local property tax
13 and assessment revenues. Surface and subsurface easement acquisition is not expected to have a
14 significant impact of local property tax and assessment revenue and therefore is excluded from
15 the analysis (Meyer, 2001).
- 16 • An assessment rate of 1.5% per dollar of assessed value is used to estimate property tax and
17 assessment revenue impacts. The assessment rate is based on an analysis by DHCCP (2009)
18 which examined property tax and assessment burdens on parcels expected to be inside the
19 conveyance facility footprint. Total assessment rate varied by county, ranging between 1.25%
20 and 1.75% of assessed value. The cost estimate uses the midpoint of the range.
- 21 • Because assessed property value is generally lower than market value, the assessment rate
22 could not be directly applied to estimated fee-title acquisition costs. The rate was therefore re-
23 expressed in terms of fee-title value by calculating the ratio of assessed value to estimated
24 market value for the parcels included in the DHCCP study and then multiplying the 1.5%
25 average assessment rate by this ratio. This resulted in an average assessment ratio of 1.0% per
26 dollar of market value. The assessment rate as a percent of market value was then applied to the
27 fee-title land acquisition cost estimates (including the 20% contingency) for each conservation
28 measure.

1 **Table 8-28. Cost Estimate for Property Tax and Assessment Revenue Replacement**

Property Tax and Assessment Revenue Replacement	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Fee-title Acquisition Cost				
Land for Conveyance Facility	\$10.26	\$0.00	\$0.00	\$102.6
Land for Conservation Reserve	\$15.22	\$15.58	\$9.67	\$568.7
Total	\$25.49	\$15.58	\$9.67	\$671.3
Property Tax and Assessment Revenue Offset	\$0.00	\$0.01	\$0.15	\$5.2
Land for Conveyance Facility	\$0.82	\$1.03	\$1.03	\$49.3
Land for Conservation Reserve	\$0.83	\$1.99	\$4.53	\$176.7
Total	\$1.65	\$3.02	\$5.55	\$226.0

Notes:
^a In undiscounted 2012 dollars
 The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.
 O&M = operations and maintenance

2

3 **8.2.4 Plan Administration Costs**

4 This section presents estimated costs for program administration. Program administration costs
 5 include expenditures related to staff, facilities, equipment, vehicles, and associated overhead
 6 necessary to support the Implementation Office. Associated overhead costs include staff benefits,
 7 insurance, legal and financial assistance, and travel. For the purpose of the cost analysis, the
 8 Implementation Office is assumed to be located in Sacramento, California. This assumption provides
 9 a conservative basis from which to estimate program administration costs. Administrative costs
 10 associated with management of the land reserve during and after the permit term are included in
 11 the cost estimate for *CM11 Natural Communities Enhancement and Management* and are not
 12 included here. Additionally, administrative costs that may be incurred by entities other than the
 13 Implementation Office (e.g., supporting entities; see Chapter 7, *Implementation Structure*) are not
 14 included in the program administration cost estimate.

15 Estimated costs are summarized in Table 8-29. These estimates are based on the following cost
 16 estimation methods and assumptions.

17 **Staff and related costs.** The Implementation Office staff costs are based on a staffing plan
 18 developed for the BDCP and the salary and benefit assumptions described in Section 8.2.2, *Common*
 19 *Assumptions for Cost Estimation* (Appendix 8.A, *Implementation Costs Supporting Materials*). Staffing
 20 costs include allowances for benefits, travel, and training. Staffing levels assumed for the cost
 21 estimate vary over the permit term, from a low of 41 FTE positions to a maximum of 57 FTE
 22 positions by year 21 of Plan implementation.

1 **Office space and related costs.** Office space and related costs include the office rental costs,
 2 utilities, general office equipment, staff -assigned office equipment, geographic information system
 3 (GIS) hardware and software, and public outreach materials. Cost assumptions for each of these
 4 items are as follows.

- 5 • *Office space and utilities.* An office space requirement of 250 square feet per FTE is assumed.
 6 Unfurnished office space is estimated to cost \$2.65 per square foot per month, including
 7 utilities.⁴⁰
- 8 • *General office equipment.* This category includes copy machines, telephone systems, printers, fax
 9 machines, and specialized equipment such as digital cameras, trunked radio systems, and
 10 publications and subscriptions. It also includes common area office furniture. Annual costs are
 11 estimated by amortizing the purchase cost of each type of equipment or furniture over its useful
 12 life.⁴¹ Some items are assumed to include annual service contract costs. See Appendix 8.A,
 13 *Implementation Costs Supporting Materials* for details.
- 14 • *Staff -assigned office equipment.* This category includes cubicle office furniture, computers, cell
 15 phones, and office supplies. Annual costs are estimated by multiplying the number of FTE staff
 16 positions by the amortized cost of equipment. Some items are assumed to include annual service
 17 contract costs. See Appendix 8.A, *Implementation Costs Supporting Materials* for specific staff-
 18 assigned equipment cost assumptions.
- 19 • *GIS hardware and software.* This category includes a dedicated GIS/database server, tablet
 20 personal computer, plotter, global positioning system (GPS) unit, GIS software, and related
 21 computer software. Annual costs are based on the estimated purchase cost for each item
 22 amortized over its useful life. Some items are assumed to include annual service contract costs.
 23 See Appendix 8.A, *Implementation Costs Supporting Materials* for specific GIS equipment cost
 24 assumptions.
- 25 • *Public outreach costs.* This category includes an annual allowance for printed material, public
 26 meetings, and focus groups, including costs for design, layout, printing, postage, web services,
 27 and facilities rental. Annual public outreach costs are assumed to vary over the term of the
 28 BDCP. See Appendix 8.A, *Implementation Costs Supporting Materials* for specific public outreach
 29 cost assumptions.

30 **Vehicle and related costs.** Vehicle costs include the costs for owned and rented vehicles as well as
 31 allowances for fuel, maintenance, and insurance. Owned vehicle annual costs are based on the
 32 vehicle's estimated purchase cost amortized over its useful life plus an annual allowance for fuel,
 33 maintenance, and insurance. Annual costs for rented vehicles are based on a daily rental rate
 34 multiplied by the number of rental days per year per 1,000 acres of natural community under
 35 management. See Appendix 8.A, *Implementation Costs Supporting Materials* for specific vehicle
 36 quantity and cost assumptions.

37 **Legal, accounting, and insurance costs:** Insurance requirements for the Implementation Office are
 38 assumed to include directors' and officers' insurance, general liability insurance, and professional

⁴⁰ The assumption is made that office space markets are sufficiently competitive and that rental rates provide a reasonable proxy of square footage costs of office space whether it is purchased, leased, or newly constructed. The rental rate assumption is approximately 125% of current office rental rates in downtown Sacramento. The 25% premium is added to account for the currently depressed commercial real estate market in Sacramento.

⁴¹ This is equivalent to assuming general office equipment and furniture is leased by the Implementation Office.

1 liability insurance. Liability insurance is assumed to total \$39,000 per year.⁴² The Implementation
 2 Office is assumed to require outside legal and accounting assistance throughout the term of the
 3 BDCP.⁴³ Outside legal costs are calculated by multiplying an hourly rate by annual hours of
 4 assistance. The amount of outside legal assistance needed by the Implementation Office is assumed
 5 to vary over the term of the BDCP. Accounting assistance costs are based on an annual lump sum
 6 allowance for auditing and other financial services. See Appendix 8.A, *Implementation Costs*
 7 *Supporting Materials* for specific legal and accounting assistance cost assumptions.

8 Total estimated costs are \$336.4 million.

9 **Table 8-29. Cost Estimate for Implementation Office**

Conservation Measure Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
O&M Costs				
Labor	\$4.93	\$5.78	\$5.15	\$258.5
Overhead & operations	\$1.73	\$1.81	\$1.47	\$77.9
Total O&M	\$6.66	\$7.59	\$6.62	\$336.4

Notes:
^a In undiscounted 2012 dollars
 The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.
 O&M = operations and maintenance

11 8.2.5 Monitoring and Research Action Costs

12 This section provides cost estimates for monitoring actions described in Appendix 3.D, *Monitoring*
 13 *and Research Actions*. Monitoring and potential research actions are organized by conservation
 14 measure. Cost estimates for these monitoring actions were derived in a bottom-up fashion, by
 15 segregating each action into its components (e.g., staff time, equipment costs) and estimating
 16 component costs. For each monitoring action, cost estimate assumptions associated with the
 17 monitoring action are listed in bullet format in Appendix 8.A, *Implementation Costs Supporting*
 18 *Materials*. These assumptions pertain to the effort needed to complete the monitoring objectives
 19 (e.g., staff hours, equipment, parcel sizes, number of survey plots and survey intervals) and the level
 20 of personnel expertise required (e.g., senior level engineer, midlevel biologist). For descriptions and
 21 hourly rate assumptions for staff functions see Section 8.2.4, *Plan Administration Costs*. Solicitation
 22 and coordination of science input are maintained by the Program Manager and Science Manager;
 23 costs of these positions are covered by the administration costs along with the costs of the support

⁴² Vehicle and employee health/disability/workers compensation insurance costs are calculated separately from liability insurance costs. Vehicle insurance costs are included in the vehicle cost estimate, while employee insurance costs are captured by the benefits multiplier applied to wage and salary costs.

⁴³ These services would be in addition to legal counsel and budget analyst positions in the Implementing Office. See Appendix 8.A, *Implementation Costs Supporting Materials* for details.

1 staff of biologists and data managers. This includes costs for synthesizing and communicating
2 monitoring results. As outlined in Chapter 7, Section 7.3.4, *Coordination of Adaptive Management*
3 *and Monitoring Program*, and Chapter 3, Section 3.6, *Adaptive Management and Monitoring Program*,
4 the Adaptive Management Team will be responsible for overseeing and managing the biological
5 monitoring and research program, with input and advice coming from independent scientists
6 through the Delta Science Program and other science programs.

7 As discussed above, costs for monitoring and research actions were estimated based on the
8 potential actions identified in Chapter 3, *Conservation Strategy*. However, these potential actions are
9 necessarily incomplete. Actual monitoring and research actions will be determined during
10 implementation, so many of these specific actions and their costs cannot be estimated at this time.
11 To account for these future costs, actual monitoring and research costs of the Interagency Ecological
12 Program (IEP), U.S. Geological Survey (USGS), and Reclamation monitoring programs that overlap
13 with the BDCP were included to reach the grand total estimates of BDCP monitoring and potential
14 research costs found in Table 8-30 and Table 8-31.⁴⁴ For cost estimation purposes, it has been
15 assumed that half of these costs will be associated with monitoring and half with potential research
16 actions. In addition, existing monitoring program costs such as those of IEP were used to estimate
17 BDCP monitoring and research costs for the monitoring and research actions described in Chapter 3,
18 *Conservation Strategy*. Appendix 8.A, *Implementation Costs Supporting Materials* provides more
19 detail on IEP and other monitoring program costs and their use in developing cost estimates for
20 BDCP monitoring and potential research actions.

21 Estimated costs for effectiveness and compliance monitoring and potential research actions are
22 summarized in Table 8-30 and Table 8-31, respectively.

⁴⁴ These assumptions were made only for the purpose of the cost estimate; the Implementation Office will be responsible for ensuring that existing monitoring efforts provide the required data, statistical and sampling rigor to meet BDCP needs, regardless of who performs the monitoring or research actions.

1 **Table 8-30. Cost Estimate for Effectiveness and Compliance Monitoring**

Monitoring Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
O&M Costs				
Effectiveness Monitoring				
CM1 Water Facilities and Operation	\$0.01	\$0.26	\$0.25	\$10.2
CM2 Yolo Bypass Fisheries Enhancement	\$0.29	\$0.21	\$0.19	\$10.7
CM3 Natural Communities Protection and Restoration	\$0.03	\$0.03	\$0.05	\$2.1
CM4 Tidal Natural Communities Restoration	\$0.86	\$1.25	\$1.37	\$62.8
CM5 Seasonally Inundated Floodplain Restoration	\$0.00	\$0.09	\$0.18	\$6.6
CM6 Channel Margin Enhancement	\$0.03	\$0.06	\$0.09	\$3.5
CM7 Riparian Natural Community Restoration	\$0.08	\$0.11	\$0.23	\$9.3
CM8 Grassland Natural Community Restoration	\$0.04	\$0.09	\$0.06	\$3.0
CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration	\$0.04	\$0.05	\$0.02	\$1.3
CM10 Nontidal Marsh Restoration	\$0.11	\$0.11	\$0.15	\$6.8
CM11 Natural Communities Enhancement and Management	\$1.33	\$2.33	\$3.80	\$158.0
CM12 Methylmercury Management	\$0.13	\$0.03	\$0.03	\$2.6
CM13 Invasive Aquatic Vegetation Control	\$0.06	\$0.06	\$0.06	\$2.8
CM14 Stockton DWSC DO Levels	\$0.24	\$0.18	\$0.09	\$6.6
CM15 Localized Reduction of Predatory Fishes	\$0.43	\$0.15	\$0.15	\$10.3
Subtotal	\$3.66	\$5.02	\$6.71	\$296.5
Contingency @ 20%	\$0.73	\$1.00	\$1.34	\$59.3
Total Effectiveness Monitoring	\$4.39	\$6.02	\$8.05	\$355.8
Compliance Monitoring				
CM1 Water Facilities and Operation	\$0.06	\$0.11	\$0.07	\$3.6
CM2 Yolo Bypass Fisheries Enhancement	\$0.03	\$0.06	\$0.06	\$2.7
CM6 Channel Margin Enhancement	\$0.00	\$0.00	\$0.00	\$0.1
Subtotal	\$0.10	\$0.17	\$0.13	\$6.3
Contingency @ 20%	\$0.02	\$0.03	\$0.03	\$1.3
Total Compliance Monitoring	\$0.11	\$0.20	\$0.15	\$7.6
Monitoring Costs of Existing IEP and Related Programs that Overlap with the BDCP	\$2.86	\$2.86	\$2.86	\$142.9
Total Monitoring	\$7.36	\$9.08	\$11.06	\$506.2
Notes:				
^a In undiscounted 2012 dollars				
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				
DWSC = Deep Water Ship Channel; DO = dissolved oxygen; IEP = Interagency Ecological Program				

2

1 **Table 8-31. Cost Estimate for Potential Research**

Research Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
O&M Costs				
CM1 Water Facilities and Operation	\$2.00	\$2.25	\$0.32	\$42.5
CM2 Yolo Bypass Fisheries Enhancement	\$0.18	\$0.45	\$0.11	\$8.0
CM3 Natural Communities Protection and Restoration	\$0.00	\$0.00	\$0.00	\$0.0
CM4 Tidal Natural Communities Restoration	\$0.86	\$0.86	\$0.86	\$42.9
CM5 Seasonally Inundated Floodplain Restoration	\$0.00	\$0.01	\$0.02	\$0.9
CM7 Riparian Natural Community Restoration	\$0.10	\$0.10	\$0.10	\$4.8
CM11 Natural Communities Enhancement and Management	\$0.10	\$0.10	\$0.10	\$5.0
CM12 Methylmercury Management	\$2.04	\$2.65	\$1.92	\$100.9
CM13 Invasive Aquatic Vegetation Control	\$0.29	\$0.34	\$0.09	\$7.9
CM15 Localized Reduction of Predatory Fishes	\$0.19	\$0.22	\$0.04	\$4.4
CM16 Nonphysical Fish Barriers	\$0.06	\$0.05	\$0.05	\$2.6
Subtotal	\$5.81	\$7.02	\$3.62	\$219.8
Contingency (20%)	\$1.16	\$1.40	\$0.72	\$44.0
Research Costs of Existing IEP and Related Programs that Overlap with the BDCP	\$2.86	\$2.86	\$2.86	\$142.9
Total Research	\$9.83	\$11.28	\$7.20	\$406.6

Notes:

^a In undiscounted 2012 dollars

The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.

IEP = Interagency Ecological Program

2

3 **8.2.6 Changed Circumstances Costs**

4 The changed circumstances provisions of the BDCP are intended to address reasonably foreseeable
5 events that may impede or prevent the benefits expected from the conservation measures. Chapter
6 6, Section 6.4.2, *Changed Circumstances*, identifies a broad range of potential changed circumstances.
7 As noted in Section 6.4.2, responses to changed circumstances will largely be developed and
8 implemented as part of the adaptive management program. However, responses to certain changed
9 circumstances are expected to result in additional implementation costs, if such responses become
10 necessary. This section describes these costs and their derivation. The funds budgeted for changed

1 circumstances represent a limit on the Permittees'⁴⁵ obligations to provide funding for remediation
2 of changed circumstances as part of the BDCP.

3 To allow for the ability to respond to changed circumstances should they occur, the Implementation
4 Office should maintain a reserve fund for covering costs of changed circumstances. This fund should
5 grow over time in proportion to the size of the reserve system and the restoration program. This is
6 because the risk of certain changed circumstances (e.g., failure of levees connected to tidal marsh
7 and floodplain restoration) and cost of remedial measures increases as greater portions of the
8 conservation strategy are implemented. The incremental funding for changed circumstances
9 presented in this section considers this.

10 For purposes of cost estimation, the changed circumstances described in Chapter 6, Section 6.4.2,
11 *Changed Circumstances*, are divided into two categories. First, costs are described for changed
12 circumstances for which responses are already accounted for in the cost estimates of one or more
13 conservation measures. Second, changed circumstances are described for which new
14 implementation costs are expected.

15 **Changed circumstances for which response costs are accounted for directly or implicitly in**
16 **the estimated costs of conservation measures or program administration.** This category
17 includes changed circumstances related to climate change, flooding, failure of water operations
18 infrastructure, nonnative invasive species, new species listings, and toxic or hazardous spills.

- 19 • *Climate change.* The Plan already anticipates the effects of climate change in the conservation
20 strategy and the effects analysis, so no additional actions are required to remediate climate
21 change effects on covered species and natural communities in the reserve system or in the
22 operation of CM1. Because these responses to the anticipated effects of climate change are
23 already built into the Plan and its cost assumptions, no additional remedial actions or costs are
24 included.
- 25 • *Flooding.* A changed circumstance related to flooding is defined as any flood event on a
26 conservation site caused by excessive precipitation, up to a 200-year flood event in magnitude, if
27 the flooding is determined to cause permanent loss of ecological benefits provided by the
28 conservation measures. Responses to flooding will include measures to repair or replace the
29 restoration site once floodwater recedes. The cost contingencies included in the conservation
30 measure cost estimates are deemed sufficient to accommodate restoration site repair or
31 replacement.
- 32 • *Nonnative invasive species and diseases.* Responses to new nonnative invasive species or diseases
33 that may affect covered species will be determined through the adaptive management process
34 and may include measures to reduce or control the adverse effect of new nonnative invasive
35 species or diseases and/or implementation of alternative conservation measures that provide
36 equivalent levels of benefit to applicable covered species. The cost contingencies included in the
37 conservation measure cost estimates, which range from 20 to 50%, are deemed sufficient to
38 accommodate changes in design or implementation required to control adverse effects of new
39 nonnative invasive species. If the presence of new nonnative invasive species or diseases
40 necessitates implementation of alternative conservation measures, it is expected that costs
41 would be comparable to the costs of the measures being replaced.

⁴⁵ The Permittees are the California Department of Water Resources and the participating state and federal water contractors

- 1 • *New species listing.* If a new species is listed that is not covered by the BDCP, the Implementation
2 Office will evaluate the potential effects of covered activities on this species and implement
3 measures to avoid effects on the newly listed species until take authorization can be secured.
4 The costs of the evaluation are included in program administration costs previously described.
5 Similarly, expected costs of avoidance measures are assumed in the costs of CM22 and in the
6 construction costs of relevant natural community conservation measures.
- 7 • *Toxic or hazardous spills.* Cost liability is assumed to rest with the party responsible for the spill
8 event. Thus, spill events that are not attributable to covered activities will not result in
9 additional cost. Construction activity is considered the most likely source of a spill event caused
10 by a covered activity. In such situations, the construction contingencies and bonding/insurance
11 requirements of contractors are expected to cover any costs of spill remediation.
- 12 • *Vandalism in reserve.* Costs associated with repairing or replacing structures in the reserve
13 system that are vandalized are subsumed within the cost estimates and cost contingencies for
14 those structures.

15 **Changed circumstances for which responses are expected to result in additional**
16 **implementation costs.** This category includes changed circumstances related to failure of levees
17 constructed as part of the BDCP and damage to reserve lands caused by nonprescribed fire.

18 Estimated costs for changed circumstances expected to result in incremental costs of
19 implementation are summarized in Table 8-32. These estimates are based on the following cost
20 estimation methods and assumptions.

- 21 • *Failure of levees constructed as part of the BDCP.*⁴⁶ Both tidal natural community restoration and
22 floodplain development involve modification of existing and/or construction of new levees.
23 Notwithstanding the integrity of constructed levees, the Implementation Office may encounter
24 circumstances in which these levees subsequently fail. In such an event, the Implementation
25 Office may be responsible for undertaking actions to restore the functions of natural
26 communities degraded or lost because of failure. For cost estimating purposes, the response is
27 assumed to include repair of the damaged levee and restoration or replacement of damaged
28 natural communities. Because of differences in geographic location, land use, and levee design,
29 expected costs of levee failure are estimated separately for levees connected to tidal natural
30 community restoration and floodplain development as follows.
 - 31 ○ *Levees constructed for tidal natural communities restoration.* A probabilistic model of levee
32 failure is used to estimate the likelihood of a levee failure in each permit year. Failure due to
33 both flood and seismic events is considered. Risk of failure due to flood events is estimated
34 by converting a 1:100-year level of flood protection into an expected rate of failure per mile
35 of constructed levee. Seismic failure rates per mile are assumed similar to those for existing
36 levees within the relevant ROA, as estimated by the Delta Risk Management Strategy Phase
37 1 report (California Department of Water Resources 2008).⁴⁷ The flood and seismic failure

⁴⁶ The Implementation Office is not responsible for the repair of levee failures by levees not constructed or maintained by BDCP.

⁴⁷ Seismic levee failure probabilities for Delta islands and tracts within each ROA were taken from Table 13-3 of the *Final Delta Risk Management Strategy Phase 1 Report*. These island failure probabilities were converted to seismic failure rates per mile of levee using data on island levee miles reported in Table 13-1 of the *Final Delta Risk Management Strategy Phase 1 Report*. The average of these probabilities was used to estimate the seismic risk per mile of BDCP constructed levees in each ROA.

1 rates per mile are added together to get the composite rate of failure per mile. The
 2 composite rate is then multiplied by the number of miles of BDCP constructed levees in each
 3 permit year to get the probability of a levee failure for each permit year. A low and high
 4 estimate of levee repair cost is used to calculate the expected cost of levee repair in each
 5 permit year. The estimate assumes repair costs for tidal natural community levees would be
 6 roughly half the average cost of repair for a significant levee failure, as reported by
 7 Suddeth et al. (2010).⁴⁸ Repair costs are set to half the average cost reported by Suddeth et
 8 al. on the assumption that it will not be necessary to repair every breach or reclaim all
 9 flooded land in tidal natural community zones. It is also assumed that a failed tidal natural
 10 community levee would require reconstruction of an average of 10% of the affected tidal
 11 natural community at a cost of \$6,400 per acre.⁴⁹ Expected costs over the 50-year permit
 12 term are approximately 10 to 15% of the tidal natural community construction cost for *CM4*
 13 *Tidal Natural Communities Restoration*.

- 14 ○ *Levees constructed for floodplain development*. A probabilistic model of levee failure similar
 15 to the one developed for tidal natural communities is used to estimate the probability of
 16 floodplain levee failure in each permit year, and is based on the average cost of repair for a
 17 significant levee failure, as reported by Suddeth et al. (2010). Additionally, it is assumed that
 18 damages to land and assets protected by a breached floodplain levee would equal 10% of
 19 the flooded island's or tract's land and asset value. The two costs are multiplied by the
 20 probability of failure for each permit year to estimate the expected cost of floodplain levee
 21 failure of the 50-year permit term. This cost is then allocated between the BDCP and
 22 state/federal flood agencies according to the cost share percentages used to calculate the
 23 low and high cost estimates for *CM5 Seasonally Inundated Floodplain Restoration*.
- 24 ● *Wildfire*. Most natural communities in the Plan Area, including valley/foothill riparian and
 25 wetland natural communities and cultivated lands, are typically not prone to wildfire. The
 26 nonaquatic lands within the Plan Area are primarily characterized by intensively managed
 27 cultivated lands and grasslands, which generally do not provide the conditions for uncontrolled
 28 or extensive fire events. In an event of a wildfire, the Implementation Office will conduct a
 29 detailed assessment within 3 months of the event to identify appropriate post-fire restoration
 30 and rehabilitation actions. Such actions, which may include natural communities restoration,
 31 nonnative invasive species control, or erosion management, will be undertaken to ensure
 32 reestablishment of covered plants and other native vegetation through active or passive means,
 33 as appropriate. In addition, appropriate erosion control structures and applications (e.g.,
 34 seeding) will be put in place before the upcoming rainy season.

35 The Implementation Office will also implement a postfire monitoring plan for a 2-year period
 36 following the fire. If over the course of the monitoring period it is determined that vegetation is
 37 not recovering sufficiently in the burned area to reestablish the original functions of the affected
 38 natural communities, the Implementation Office will develop and implement a natural
 39 community restoration plan to restore natural community functions of the affected areas. These
 40 actions are most likely to be required for a wildfire on restored riparian areas. Fire in riparian

⁴⁸ Suddeth et al. estimate the average cost of repair, which includes costs of mobilization, breach stabilization, breach closure, and island pump-out, averages \$26.5 million (2012 dollars), based on data compiled by the Delta Risk Management Strategy, DWR, and interviews with various Delta engineers.

⁴⁹ The per-acre cost is derived from the tidal habitat construction cost estimate developed for CM4 and includes the habitat restoration costs other than land acquisition, levee construction, and major grading.

1 acreage is more likely to go unchecked and may result in significant impairment of natural
 2 community function. If it is determined through monitoring that burned riparian vegetation is
 3 not recovering at a sufficient rate through natural processes, active reestablishment may be
 4 required. These costs are not expected to exceed 5% of the initial cost of riparian natural
 5 community establishment estimated for *CM7 Riparian Natural Community Restoration*.

6 The expected cost for changed circumstances is \$183.9 million.

7 **Table 8-32. Cost Estimate for Changed Circumstances**

Conservation Measure Capital Cost Items	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Repair/Replacement of Constructed Habitat				
Tidal habitat levees	\$0.73	\$1.55	\$3.47	\$136.6
Floodplain levees	\$0.00	\$0.00	\$1.02	\$35.8
Riparian habitat damaged by fire	\$0.07	\$0.18	\$0.28	\$11.6
Total Capital Costs	\$0.80	\$1.73	\$4.78	\$183.9
Notes: ^a In undiscounted 2012 dollars The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.				

8

9 **8.2.7 Summary of Estimated Costs**

10 **8.2.7.1 Undiscounted Average Annual and 50-Year Total Costs of Plan**
 11 **Implementation**

12 Estimated capital and operating costs of Plan Implementation over the 50-year permit period are
 13 summarized in Table 8-33 and Table 8-34, respectively. Average annual expenditures by Plan
 14 Implementation period are summarized in the first three columns, followed by the 50-year total cost
 15 of implementation in the last column of each table. Dollar amounts are shown in undiscounted 2012
 16 constant dollars. The total estimated capital outlay over the 50-year permit period is approximately
 17 \$20 billion, while the total estimated operating outlay is approximately \$4.9 billion, in undiscounted
 18 2012 constant dollars.

19 **8.2.7.2 Present Value of Average Annual and 50-Year Total Costs of Plan**
 20 **Implementation**

21 Estimated capital and operating costs of Plan Implementation discounted to present value are
 22 summarized in Table 8-35 and Table 8-36, respectively. Future values were discounted to the

1 present using a 3% real discount rate.⁵⁰ The present value of estimated capital outlays over the 50-
 2 year permit period is approximately \$15.4 billion, while the present value of estimated operating
 3 outlays is approximately \$2.3 billion.

4 **Table 8-33. Undiscounted Capital Outlays by Plan Implementation Phase and Element**

BDCP Plan Implementation Elements	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Water conveyance facilities (CM1)	\$1,457.1	\$0.0	\$0.0	\$14,570.9
Natural communities restoration and protection (CM2-CM11)	\$146.7	\$98.6	\$63.1	\$4,170.0
Other stressors (CM12-CM22)	\$15.3	\$24.5	\$18.6	\$926.7
Changed circumstances	\$0.8	\$1.7	\$4.8	\$183.9
Total Capital Outlays	\$1,619.9	\$124.8	\$86.5	\$19,851.4

Notes:
^a In undiscounted 2012 dollars
 The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.

5

6 **Table 8-34. Undiscounted O&M Outlays by Plan Implementation Phase and Element**

BDCP Plan Implementation Elements	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Water conveyance facilities (CM1)	\$0.0	\$25.1	\$38.0	\$1,456.0
Natural communities restoration and protection (CM2-CM11)	\$1.2	\$2.9	\$6.0	\$236.6
Other stressors (CM12-CM22)	\$30.8	\$38.9	\$35.2	\$1,734.5
Local government revenue replacement	\$1.7	\$3.0	\$5.6	\$226.0
Monitoring and research measures	\$17.2	\$20.4	\$18.3	\$912.8
Plan administration	\$6.7	\$7.6	\$6.6	\$336.4
Total Operating Outlays	\$57.5	\$97.9	\$109.6	\$4,902.3

Notes:
^a In undiscounted 2012 dollars
 The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.

7

⁵⁰ Given current inflation expectations, a 3% real discount rate is roughly equivalent to a 5% nominal cost of borrowing.

1 **Table 8-35. Present Value of Capital Outlays by Plan Implementation Phase and Element**

BDCP Plan Implementation Elements	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Water conveyance facilities (CM1)	\$1,225.8	\$0.0	\$0.0	\$12,258.0
Natural communities restoration and protection (CM2-CM11)	\$125.1	\$67.0	\$28.2	\$2,571.7
Other stressors (CM12-CM22)	\$12.8	\$16.7	\$7.4	\$471.2
Changed circumstances	\$0.7	\$1.2	\$1.7	\$72.4
Present Value of Capital Outlays	\$1,364.4	\$84.9	\$37.3	\$15,373.4

Notes:
^a Discounted to present value with 3% real discount rate.
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.

2

3 **Table 8-36. Present Value of O&M Outlays by Plan Implementation Phase and Element**

BDCP Plan Implementation Elements	Average Annual Expenditure by Plan Implementation Period (Millions) ^a			50-Year Permit Term Total Expenditure (Millions) ^a
	Near Term (Yrs 1–10)	Early Long-Term (Yrs 11–15)	Late Long-Term (Yrs 16–50)	
Water conveyance facilities (CM1)	\$0.0	\$17.1	\$14.6	\$595.2
Natural communities restoration and protection (CM2-CM11)	\$1.0	\$2.0	\$2.2	\$96.3
Other stressors (CM12-CM22)	\$25.9	\$26.5	\$14.0	\$882.0
Local government revenue replacement	\$1.4	\$2.1	\$2.1	\$96.2
Monitoring and research measures	\$14.6	\$13.9	\$7.2	\$466.0
Plan administration	\$5.7	\$5.2	\$2.7	\$177.0
Present Value of Operating Outlays	\$48.5	\$66.7	\$42.7	\$2,312.8

Notes:
^a Discounted to present value with 3% real discount rate.
The 50-year total expenditures are more precise than the annual averages and may not sum directly from the annual averages due to rounding error.

4

1 **8.3 Funding Sources**

2 **8.3.1 Scope and Purpose of Funding Sources**

3 This section identifies the potential sources that may be available to support the funding of the
4 implementation actions identified in the previous sections. Consistent with the goals of the NCCPA
5 and ESA, the BDCP has been designed to mitigate for the effects of the activities proposed in this
6 Plan, provide for the conservation and management of threatened and endangered species in the
7 Plan Area, help prevent species from becoming threatened or endangered, and improve ecosystem
8 health. To achieve these important goals, the Plan will be funded by the Authorized Entities, which
9 will include funding from public sources, through state and federal agencies, and other public
10 funding sources. Funding will be provided by the participating state and federal water contractors
11 for construction and operation of the new water facilities, as well as for mitigation necessary to
12 address impacts to terrestrial and aquatic impacts associated with construction and operation.
13 Funding from a variety of state and federal sources will be available for the actions in the
14 conservation strategy. Initial state funding will largely come from a new water bond currently on the
15 2014 statewide ballot. Certain federal funding is expected to come from the same authorities that
16 have been used in the past to support Delta restoration efforts. However, it is anticipated that
17 additional federal legislation will be required to authorize the continued use of certain federal funds
18 and to extend or broaden fund availability. Such legislation could also provide for new federal
19 funding sources.

20 Every effort has been made to identify potential funding sources and make reasonable assumptions
21 about the applicability of those funding sources to the BDCP so that all expected costs have been
22 addressed. For instance, many of the state and federal funding sources have specific authorities that
23 dictate the programs, projects, and in some cases geographic locations in which funds are allocated.
24 Every effort has been made to assess these authorities and their applicability to the BDCP.
25 Additionally, some funding sources have cost-sharing requirements; this chapter assumes that
26 matching funds will be available. Cost-sharing requirements have been taken into account in the
27 development of potential funding estimations. As referenced above, additional funding sources that
28 have not been identified in this section may become available during the 50-year life of the BDCP.

29 It is important to note that this chapter is not a financing plan for the state or federal water
30 contractors or any other party. Separate financing plans, funding agreements, legislative authority,
31 and other documents will be needed to enable the use of certain funding sources. This chapter
32 provides an overview of potential funding sources to support the implementation of the BDCP as
33 well as the level of past financial support at the state and federal level for similar Delta activities.

34 **8.3.2 Summary of Funding Sources**

35 Table 8-37 provides a summary of all potential funding sources for the BDCP by entity, source, and
36 Plan component. Each of these funding sources is described below, along with assumptions
37 regarding applicability to the conservation measures (Table 8-38,

38 Table 8-39, and Table 8-40). Some funding sources are highly specific in the types of projects or
39 activities that they fund, while others are more broadly defined. These limitations are important
40 determinants of overall funding adequacy. Furthermore, some funding sources have a relatively
41 short expected lifespan, while others may provide funding through the 50-year permit term.

1 **Table 8-37. Summary of Estimated Funding by Entity, Sources, and Plan Component^a**

Potential Funding Source ^b	Estimated Funding by Plan Component (in millions \$) ^c						Total	%
	Program Administration	Monitoring, Research, Adaptive Management, and Remedial Measures	Water Facilities and Operation (CM1)	Natural Community Protection and Management (CM3, CM11) ^d	Natural Community Restoration (CM2, CM4–CM10, CM12, CM22)	Other Stressors Conservation (CM13–CM21)		
Participating State and Federal Water Contractors	\$31	\$113	\$16,027	\$266	\$269	\$224	\$16,930	68.4%
State Funding Sources								
New Water Bond (2014)	-	-	-	\$184	\$900	\$430	\$1,514	6.1%
Second Water Bond	-	-	-	\$205	\$1,200	\$840	\$2,245	9.1%
Proposition 1E	-	-	-	-	\$100	-	\$100	0.4%
Proposition 84	-	-	-	-	\$42	\$21	\$63	0.3%
Wildlife Conservation Board	-	-	-	\$10	\$40	-	\$50	0.2%
Interagency Ecological Program (state funding)	-	\$55	-	-	-	-	\$55	0.2%
Delta Stewardship Council	-	\$90	-	-	-	-	\$90	0.4%
Ecosystem Restoration Program ^e	-	-	-	-	-	-	-	0.0%
Environmental Enhancement Fund ^e	-	-	-	-	-	-	-	0.0%
Fisheries Restoration Grant Program ^f	-	-	-	-	-	-	-	0.0%
Subtotal State Funding	-	\$145	-	\$399	\$2,282	\$1,291	\$4,117	16.6%
Federal Funding Sources								
<i>Existing and New Federal Authorizations</i>								
Central Valley Project Improvement Act Restoration Fund (Reclamation)	-	-	-	\$50	-	\$50	\$100	0.4%
CA Bay-Delta Restoration Appropriations (Reclamation) ^f	\$100	\$640	-	-	\$602	\$1,027	\$2,369	9.6%
CA Bay-Delta Restoration Appropriations (USFWS) ^f	\$60	\$10	-	\$96	\$96	-	\$261	1.1%
CA Bay-Delta Restoration Fund (EPA) ^f	-	-	-	-	\$238	-	\$238	1.0%
CA Bay-Delta Restoration Appropriations (USGS) ^f	-	\$175	-	-	-	-	\$175	0.7%
CA Bay-Delta Restoration Appropriations (NRCS) ^f	-	-	-	-	\$102	-	\$102	0.4%
CA Bay-Delta Restoration Appropriations (NMFS) ^f	-	\$15	-	-	-	-	\$15	0.1%
Regional Ecosystem Conservation (NMFS)	-	-	-	-	\$5	\$5	\$10	0.0%
Estuary Restoration Act (NMFS)	-	-	-	-	\$3	\$2	\$5	0.0%

Potential Funding Source ^b	Estimated Funding by Plan Component (in millions \$) ^c						Total	%
	Program Administration	Monitoring, Research, Adaptive Management, and Remedial Measures	Water Facilities and Operation (CM1)	Natural Community Protection and Management (CM3, CM11) ^d	Natural Community Restoration (CM2, CM4–CM10, CM12, CM22)	Other Stressors Conservation (CM13–CM21)		
<i>Existing Federal Grants</i>								
Wetlands Reserve Program (NRCS)	-	-	-	\$125	-	-	\$125	0.5%
Cooperative Endangered Species Conservation Fund(USFWS)	-	-	-	\$50	-	-	\$50	0.2%
Environmental Quality Incentives Program (NRCS)	-	-	-	\$50	-	-	\$50	0.2%
Land and Water Conservation Fund	-	-	-	\$25	-	-	\$25	0.1%
National Coastal Wetlands conservation grants (USFWS)	-	-	-	-	\$5	-	\$5	0.0%
Restoration Partnership Grants (NMFS)	-	-	-	-	\$7	\$3	\$10	0.0%
San Francisco Bay Area Water Quality Improvement Fund (EPA)	-	-	-	-	\$5	-	\$5	0.0%
Subtotal Federal Funding	\$160	\$840	-	\$396	\$1,062	\$1,087	\$3,545	14.3%
Other Funding Sources								
Interest income	\$145	-	-	-	-	\$20	\$165	0.7%
Summary								
Total Funding	\$336	\$1,098	\$16,027	\$1,061	\$3,613	\$2,623	\$24,758	100.0%
Total Cost ^g	\$336	\$1,097	\$16,027	\$1,061	\$3,610	\$2,623	\$24,754	-
Difference (funding minus cost)	\$0	\$1	\$0	\$0	\$3	\$0	\$4	0.0%
Notes:								
<p>^a In most cases, funding amounts are estimates only based on funding history, overlap with BDCP goals, and assessment of competitiveness of BDCP projects. Where a range is provided in the text, the midpoint of the range is used for this table unless otherwise described. Funding estimates from state and federal agencies do not represent commitments and are subject to grant awards, annual appropriations from Congress, and passage of water bonds by the voters of California. Totals may not sum directly from components due to rounding error.</p> <p>^b See text for explanation of funding source, including legal citations for federal and state funding.</p> <p>^c See text for rationale of funding estimate. Where funding sources apply to multiple Plan components, funding is allocated proportional to cost across applicable components, unless there is a basis to allocate funds differently. Allocations are estimates of potential funding and do not imply dedicated or guaranteed funding.</p> <p>^d Includes property tax revenue replacement for land acquired in fee title from private parties.</p> <p>^e Funding may be provided from this source but it is not assumed due to the uncertainty in funding to support the BDCP.</p> <p>^f See Table 8-55, <i>Potential Funding from California Bay-Delta Restoration Appropriations, by Federal Agency and Plan Component</i>, for details on funding.</p> <p>^g Excludes EIR/EIS mitigation costs.</p>								

1 **Table 8-38. Potential Funding Source by Conservation Measure—Water Facilities and Operation, Yolo Bypass Enhancement, and Avoidance Measures**

Potential Funding Sources ^a	CM1: Water Facilities and Operation	CM2: Yolo Bypass Fisheries Enhancement	CM22: Avoidance and Minimization Measures ^b
Authorized Entity Funding			
DWR—revenue bonds	X		X
State water contractors	X		X
Central Valley Project Improvement Act Restoration Fund (Reclamation)	X ^c		X
California Bay-Delta Restoration appropriations—water ^{and re} lated resources		X	
Federal water contractors	X		X
Other State Funding Sources			
Ecosystem Restoration Program (CDFW)			X
New Water Bonds			X
Proposition 1E			X
Proposition 84	X		X
Other Federal Funding Sources			
California Bay-Delta Restoration appropriations (all federal agencies ^d)		X	X
Estuary Restoration Act (NMFS)		X	
Restoration partnership grants (NMFS)		X	
Investigations, energy, and water development appropriations (USACE)	X	X	X
Other Funding Sources	X		
Interest income	X	X	X
Notes:	X		
^a See text for rationale of funding availability. This table notes potential funding sources and does not imply dedicated or guaranteed funding. ^b Avoidance and minimization measures are applied to many conservation measures (including restoration) to avoid and minimize effects on the covered species. These measures would be incorporated into most of the projects conducted under other conservation measures, so would be funded by a wide range of sources. ^c Applicable for refuge water provided by Reclamation (not facility construction). ^d All federal agencies includes appropriations to Reclamation, USACE, NRCS, NMFS, USGS, USFWS, and EPA. DWR = California Department of Water Resources; CDFW = California Department of Fish and Wildlife; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service; USACE = U.S. Army Corps of Engineers; Reclamation = Bureau of Reclamation; NRCS = Natural Resources Conservation Service; USGS = U.S. Geological Survey; EPA = U.S. Environmental Protection Agency			

2

1 **Table 8-39. Potential Funding Source by Conservation Measure—Habitat Protection, Restoration, and Management**

Potential Funding Sources ^a	CM3: Natural Communities Protection and Restoration	CM4: Tidal Natural Communities Restoration	CM5: Seasonally Inundated Floodplain Restoration	CM6: Channel Margin Enhancement	CM7: Riparian Natural Community Restoration	CM8: Grassland Natural Community Restoration	CM9: Vernal Pool and Alkali Seasonal Wetland Complex Restoration	CM10: Nontidal Marsh Restoration	CM11: Natural Communities Enhancement and Management	CM12: Methylmercury Management
Authorized Entity Funding										
DWR—biological opinions for long-term coordinated operations of SWP		X								X
State Funding Sources										
New Water Bonds	X	X	X	X	X	X	X	X	X	X
Proposition 1E		X	X	X	X	X	X	X		X
Proposition 84	X	X	X	X	X	X	X	X		X
Wildlife Conservation Board	X	X	X	X	X					
Federal Funding Sources										
Central Valley Project Improvement Act Restoration Fund (Reclamation)	X	X	X	X	X	X	X	X		X
California Bay-Delta Restoration appropriations—water and related resources				X	X	X		X		X
California Bay-Delta Restoration appropriations (all federal agencies)	X	X	X	X	X					X
Regional Ecosystem Conservation (NMFS)		X	X	X	X					X
Estuary Restoration Act (NMFS)		X	X	X	X					X
Wetlands Reserve Program (NRCS)	X	X	X	X	X	X	X	X	X	
Cooperative Endangered Species Conservation Fund (USFWS)	X	X ^c	X ^c			X ^c	X ^c	X ^c		
Environmental Quality Incentives Program (NRCS)	X	X	X	X	X	X	X	X	X	
Land and Water Conservation Fund	X									
National Coastal Wetlands Conservation Grants (USFWS)	X	X	X	X	X			X	X	X
Restoration Partnership Grants (NMFS)		X	X	X	X					X
San Francisco Bay Area Water Quality Improvement Fund (EPA)		X	X	X	X			X		
Other Funding Sources										
Interest income	X	X	X ^b	X	X	X	X	X	X	X
Endowment (post permit)										
Notes:										
^a See text for rationale of funding availability. This table notes potential funding sources and does not imply dedicated or guaranteed funding.										
^b All federal agencies includes appropriations to Reclamation, USACE, NRCS, NMFS, USGS, USFWS, and EPA										
^c Applicable to land acquisition that might be needed to support restoration.										
DWR = California Department of Water Resources; CDFW = California Department of Fish and Wildlife; USFWS = U.S. Fish and Wildlife Service; NMFS = National Marine Fisheries Service; NRCS = Natural Resources Conservation Service; USGS = U.S. Geological Survey; EPA = U.S. Environmental Protection Agency										

2

1 **Table 8-40. Potential Funding Source by Conservation Measure—Other Aquatic Stressors**

Potential Funding Sources ^a	CM13: Invasive Aquatic Vegetation Control	CM14: Stockton Deep Water Ship Channel Dissolved Oxygen Levels ^c	CM15: Localized Reduction of Predatory Fishes	CM16: Nonphysical Fish Barriers	CM17: Illegal Harvest Reduction	CM18: Conservation Hatcheries	CM19: Urban Stormwater Treatment	CM20: Recreational Users Invasive Species Program	CM21: Nonproject Diversions
Authorized Entity Funding									
Central Valley Project Improvement Act Restoration Fund (Reclamation)	X		X					X	X
CA Bay-Delta Restoration appropriations—water and related resources	X		X		X				
State Funding Sources									
New Water Bonds	X	X	X	X	X	X	X	X	X
Proposition 1E							X		
Proposition 84	X	X					X		
Federal Funding Sources									
CA Bay-Delta Restoration appropriations (all federal agencies)	X	X	X	X	X	X	X	X	X
Regional Ecosystem Conservation (NMFS)	X		X	X					X
Estuary Restoration Act (NMFS)	X		X	X					X
Restoration Partnership Grants (NMFS)			X	X					
Other Funding Sources									
Interest income	X	X	X	X	X	X	X	X	X
<p>Notes:</p> <p>^a See text for rationale of funding availability. This table identifies potential funding sources and does not imply dedicated or guaranteed funding.</p> <p>^b All federal agencies includes appropriations to Reclamation, USACE, NRCS, NMFS, USGS, USFWS, and EPA.</p> <p>^c Funding for the operation and maintenance of the Stockton Deep Water Ship Channel Aeration Facility is being provided through 2013 under a 3-year joint agreement with the Port of Stockton, San Joaquin River Group Authority, the San Luis and Delta Mendota Water Authority, the San Joaquin Valley Drainage Authority, and DWR. This funding agreement has two option years (2014 and 2015) that may be exercised. Because of the limited term of this funding source, it is not included as part of the long-term funding strategy.</p> <p>CDFW = California Department of Fish and Wildlife; NMFS = National Marine Fisheries Service; USACE = U.S. Army Corps of Engineers; NRCS = Natural Resources Conservation Service; USGS = U.S. Geological Survey; USFWS = U.S. Fish and Wildlife Service; EPA = U.S. Environmental Protection Agency</p>									

1 Funding sources are described in the order of their proportions: participating state and federal
2 water contractors are described first, followed by all state funding, federal funding, and other
3 funding sources. Funding sources are then followed by a list of contingencies in the event that costs
4 or funding sources are substantially different from those predicted in this chapter.

5 **8.3.3 State Water Project**

6 Following approval of the BDCP, the Authorized Entities will begin implementation of the alternative
7 conveyance measure in accordance with the BDCP. DWR's participation will rely on its authority to
8 construct state water facilities or projects is derived from the Central Valley Project Act of 1933
9 (CVPA) (Water Code 11100 *et seq.*), the Burns Porter Act (California Water Resources Development
10 Bond Act) (Water Code 12930–12944), the Davis-Dolwig Act (Water Code 11900–11925), and other
11 special acts of the State Legislature.

12 Although the federal government has built certain facilities described in the CVPA, that act
13 authorizes DWR to build facilities described in the CVPA and to issue bonds. The CVPA describes
14 specific facilities that have been and may be built by DWR (including, particularly, Water Code
15 11260 and 11270) and allows DWR to administratively add other units to the SWP (Water Code
16 11290) and develop power facilities (Water Code 11295).

17 As noted above, funding of *CM1 Water Facilities and Operation* will come from the state and federal
18 water contractors. For the purposes of this chapter, it is assumed that the water facilities of CM1 will
19 be owned by the state, and that the costs of constructing and operating the facility will be shared by
20 the participating state and federal water contractors.⁵¹ The actual funding share that is provided by
21 the state versus federal water contractors for CM1 will be determined near the time that permits are
22 issued for the BDCP.

23 Since the early 1960s, when DWR and state water contractors entered into their long-term water
24 supply contracts, SWP planning and capital costs, operation, maintenance, and interest have been
25 paid for by 29 (originally 30) participating public water agencies pursuant to the terms of the water
26 supply contracts. The Burns-Porter Act, approved in 1960, expressly authorized the State of
27 California to enter into contracts for the sale, delivery, or use of water made available by the SWP.

28 The SWP water supply contracts were executed at different times in the 1960s and the termination
29 dates range from 2035 to 2042, with most contracts terminating around 2035. The contracts may be
30 amended and extended by agreement or other means. The contracts also will remain in effect until
31 any bonds issued to finance construction costs of the SWP have been repaid (California Department
32 of Water Resources 2011).

33 Under these contracts, state water contractors receive annual allocations of water and provide
34 funding for the principal and interest on bonds that initially funded the SWP's construction and that
35 continue to be issued to provide funding for additional facilities (California Department of Water

⁵¹ Costs for certain jointly developed facilities are shared by both the SWP and CVP. In 1961, the federal government entered into an agreement with the state to construct and operate San Luis Unit joint-use facilities, including San Luis Reservoir. These facilities are owned by the federal government, but costs are shared approximately 55% by the state and 45% by the federal government (California Department of Water Resources 2011). Other existing agreements have been developed over the years to provide for sharing of costs and obligations between the SWP and CVP, including the 1986 Coordinated Operation Agreement.

1 Resources 2012). The annual allocations establish a maximum level of water deliverable under the
2 contract and actual water delivery varies depending upon many factors, including hydrologic
3 conditions and environmental restrictions. Payments made by state water contractors cover fixed
4 costs (such as debt service on project financing that is not directly proportional to the quantity of
5 water delivered) and variable costs (such as for power needed to operate the SWP).

6 Any new water facilities associated with the BDCP could be paid for through a similar mechanism:
7 DWR-issued bonds to be repaid with revenues from the participating SWP water contractors
8 Individual water contractors may also issue their own revenue bonds or they may do so collectively
9 through a joint powers authority (Section 8.3.5.1, *New Water Bonds*). Existing water contracts would
10 need to be amended to include the new costs of the BDCP assigned to the state water contractors
11 and the repayment schedule. See Section 8.3.4, *Participating State and Federal Water Contractors*, for
12 a description of how the participating state and federal water contractors will fund their respective
13 contributions to *CM1 Water Facilities and Operation*. These sources will also provide funding for
14 other state water contractor obligations under the Plan.

15 The issuance of water system revenue bonds has been the primary mechanism used by DWR to
16 obtain financing for construction of SWP facilities. From 1960 to October 2011, DWR had issued 36
17 series of water system revenue bonds totaling nearly \$7 billion (California Department of Water
18 Resources 2011:ii). A revenue bond is a municipal bond secured by the revenue from a specific
19 project (e.g., a power plant). Unlike state general obligation bonds, revenue bonds are secured by
20 specified revenues rather than taxes and the amount of funding that can be raised is limited by
21 project revenue.

22 Water system revenue bonds are secured by a pledge of revenues received by DWR from state water
23 contractors. Pursuant to the state CVPA, DWR issues water system revenue bonds.⁵² (See General
24 Bond Resolution of the State of California Department of Water Resources Resolution No. DWR-WS-
25 1, July 1, 1986). Under the General Bond Resolution, *revenues* include the receipts to DWR under the
26 water supply contracts resulting from the construction, acquisition, or operation of the water
27 system projects; income from investments held in the revenue fund; and certain other moneys
28 received by DWR under the water supply contracts deemed to be revenue by DWR and pledged
29 toward the repayment of water system revenue bonds issued by DWR (California Department of
30 Water Resources 2011:ii). Under the resolution, DWR has agreed to the following commitments.

- 31 ● To charge amounts under the water supply contracts sufficient to provide funding for all water
32 system project costs (e.g., costs of project facility construction).
- 33 ● That revenues received by DWR in each year of water system operating expenses, after
34 deduction of the costs of maintenance and operation (excluding depreciation but including
35 appropriate amounts of operating and replacement reserves), must be at least equal to the sum
36 of 1.25 times the debt service payable from revenues on all bonds outstanding in such year.

⁵² CVP water system revenue bonds are issued by DWR pursuant to the state CVPA to finance SWP facilities (Water Code sections 11700 –11784). The state CVPA was originally enacted in 1933 to provide revenue bond funding for the proposed CVP that the state intended to build. But due to state financing difficulties during the 1930s, the federal government built, funded, and operates certain of the facilities that are known as the federal CVP. However, since the 1960s, the state CVPA has provided and continues to provide the basis for issuing revenue bonds for the SWP, hence the name of the bonds. Despite the name, the bonds are not used for the federal CVP operated by Reclamation.

1 This second requirement also applies as a condition to the issuance of additional bonds (California
2 Department of Water Resources 2011:ii).

3 DWR may issue additional water system revenue bonds in addition to outstanding bonds to finance
4 the costs allocated to any water system project, including the cost of planning, construction, or
5 acquisition, or to refund bonds if, among other things, DWR certifies that the following actions will
6 occur.

7 • After the issuance of such bonds, estimated revenues in each year will not be less than the sum
8 of:

9 ○ 1.25 times debt service to be paid from revenues, plus

10 ○ estimated water system operating expenses.

11 • The debt service reserve account is to be funded at 50% of the maximum annual debt service.

12 • The state treasurer must have received evidence that the issuance of the additional bonds will
13 not result in the lowering of any rating then assigned to any then outstanding bonds by any
14 nationally recognized rating agency (California Department of Water Resources 2011: 6).

15 In addition to water system revenue bonds, DWR has also funded SWP facilities by issuing
16 \$1.5 billion of revenue bonds secured by the revenues of DWR from SWP power-generating facilities
17 (California Department of Water Resources 2011: i).

18 Revenue bonds are not the only type of bonds that have been used to fund the SWP. The Burns-
19 Porter Act authorized the sale of \$1.75 billion in state general obligation bonds to help finance the
20 original construction of the SWP (\$12.9 billion to \$18.2 billion in 2011 dollars⁵³). A general
21 obligation bond differs from a revenue bond. A state general obligation bond is a state bond backed
22 by the credit and “taxing power” of the state, rather than a pledge of revenue from a specific project,
23 as is the case with a revenue bond. The amount of funding that can be raised through the issuance of
24 state general obligation bonds is limited by voter-approved bond acts. As of September 1, 2011,
25 nearly \$168 million in state general obligation bonds remain available. DWR’s activities under the
26 BDCP would qualify for these funds, as would other competing state programs.

27 DWR provides interim funding prior to issuance of revenue bonds by issuing commercial paper
28 notes. DWR has authorized the issuance of its water revenue commercial paper notes, in an amount
29 not to exceed \$139.7 million outstanding at any one time. Proceeds from the sale of these notes are
30 used to finance water system projects prior to permanent financing from the sale of bonds. As of
31 February 16, 2012, approximately \$100 million in water revenue commercial paper notes is still
32 available for issuance by DWR (California Department of Water Resources 2011:ii).

33 The Davis-Dolwig Act (Water Code 11900–11925) established the state policy that the costs of
34 preservation (considered similar to mitigation) of fish and wildlife are to be paid by water supply

⁵³ The low end of the range is calculated using the change in the consumer price index from 1960 to 2011. The high end of the range uses a wage index of production worker compensation. Because the cost of the SWP was a combination of materials (which tend to inflate according to the consumer price index) and labor, the actual 2011 cost is likely somewhere in between this range.

1 contractors,⁵⁴ and recreation and enhancement of fish and wildlife are to be paid by appropriations
2 from the general fund.

3 **8.3.4 Participating State and Federal Water Contractors**

4 **8.3.4.1 SWP and CVP Funding Responsibilities**

5 State and federal water contractors that are participating in the development of the BDCP have
6 committed to fund construction, operation, and construction-related mitigation costs for
7 implementation of *CM1 Water Facilities and Operation*, the new water conveyance facilities.
8 Specifically, funding from the SWP water contractors will be provided through agreements with
9 DWR, as described in Section 8.3.3, *State Water Project*. It is anticipated that the CVP water
10 contractors will also have necessary funding agreements. Specifically, the water contractors will
11 fund the following activities under CM1.

- 12 • Construction, including engineering and design.
- 13 • Avoidance and minimization measures associated with facility construction (a portion of
14 *CM22 Avoidance and Minimization Measures*).
- 15 • Operating costs of the new facility, including monitoring.
- 16 • All mitigation costs associated with the permanent and temporary impacts of construction and
17 operations of the facility, as described below.

18 As described in Section 8.2.3, *Conservation Measure Costs*, undiscounted construction costs of CM1
19 are estimated at \$14.5 billion in 2012 dollars and undiscounted operating costs are estimated at
20 \$1.46 billion, bringing the total to \$16.0 billion (undiscounted). The discounted construction costs of
21 CM1 (i.e., present value costs accounting for both inflation and the time value of money) are \$12.714
22 billion in 2012 dollars, with operating costs of \$730 million, for a total of \$13.4 billion (discounted).

23 Proposed funding provided by the state and federal water contractors is summarized in Table 8-41.

⁵⁴ As discussed above, under the likely BDCP funding framework, water contractor payment will occur in response to DWR issuance of water system revenue bonds that are secured by a pledge of revenues received by DWR from water supply contractors.

1 **Table 8-41. BDCP Funding Provided by Participating State and Federal Water Contractors (millions, 2012 undiscounted \$)**

Cost Item	Total Capital Cost	Total Operational Cost (over 50-year Permit Term)	Total Cost	% Paid by Contractors	Amount Paid by Contractors	Rationale
CM1 Water Facilities and Operations	\$14,570.9	\$1,456.0	\$16,026.9	100.0%	\$16,026.9	Participating water contractors have committed to full funding of CM1.
CM3 Natural Communities Protection and Restoration	\$460.1	\$0.0	\$460.1	20.2%	\$92.8	Assumes % share of reserve system proportional to impact of water facility construction (CM1) and impact of mitigation/conservation ^a share of tidal wetland restoration (CM4).
CM4 Tidal Natural Communities Restoration	\$1,909.6	\$0.0	\$1,909.6	12.6%	\$240.6	Long-term average annual exports from the Delta are assumed the same as current exports because they are close to the midpoint when evaluating the range of exports that could occur under the decision tree. The 8,000 acres of tidal wetland restoration required by the USFWS OCAP BiOp (for today's exports) is also considered the mitigation/conservation share for BDCP water operations under dual conveyance. An additional 160 acres account for direct loss of tidal habitat from construction. The mitigation/conservation share is calculated as the proportion relative to all restoration under CM4 (8,160 acres / 65,000 acres = 12.6%).
CM6 Channel Margin Enhancement	\$120.2	\$0.0	\$120.2	13.0%	\$15.6	Mitigation/conservation to offset channel margin removed by north Delta intakes (2.6 miles) at 1:1. Ratio based on low-value habitat lost and high-quality habitat gained through restoration.
CM7 Riparian Natural Community Restoration	\$47.6	\$0.0	\$47.6	2.7%	\$1.3	Proportion of restoration based on mitigation/conservation for CM1 construction and mitigation/conservation share of CM4 construction, based on typical ratio of 1:1 (additive to preservation in CM3). Proportion = 133 acres / 5,000 acres total restoration.
CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration	\$1.7	\$0.0	\$1.7	9.0%	\$0.2	Proportion of restoration based on mitigation/conservation for indirect impacts of CM1 construction, based on typical ratio of 2:1 (additive to preservation in CM3). Proportion = 6 acres / 67 acres total restoration.

Cost Item	Total Capital Cost	Total Operational Cost (over 50-year Permit Term)	Total Cost	% Paid by Contractors	Amount Paid by Contractors	Rationale
CM10 Nontidal Marsh Restoration	\$52.7	\$0.0	\$52.7	4.0%	\$2.1	Proportion of restoration based on mitigation/conservation for CM1 construction and mitigation share of CM4 construction, based on mitigation ratio of 1:1 (additive to preservation in CM3). Proportion = 107 acres / 2,700 acres total restoration.
CM11 Natural Communities Enhancement and Management	\$138.1	\$236.6	\$374.7	20.2%	\$75.6	Same as proportional share of CM3.
CM15 Localized Reduction of Predatory Fishes	\$2.8	\$102.2	\$105.0	40.7%	\$42.8	Focused predator reduction assumed to occur on a regular basis (daily or weekly between October and May) at 13 locations in the Delta. Mitigation share assumes cost of actions at six of these locations (46%), which are directly related to impacts of new north Delta facilities and existing SWP and CVP operations ^b . Includes 20% contingency.
CM16 Nonphysical Fish Barriers	\$763.0	\$508.7	\$1,271.7	14.3%	\$181.7	Assumed cost to install and operate the first of seven barriers.
CM22 Avoidance and Minimization Measures	\$0.0	\$36.3	\$36.3	24.4%	\$8.9	Most costs of avoidance and minimization measures are assumed as part of compliance monitoring. Contractor share of remaining costs account for species surveys, preconstruction monitoring, planning surveys, and construction monitoring associated with CM1 construction, and restoration mitigation.
Program administration	\$0.0	\$336.4	\$336.4	9.4%	\$31.5	Proportion of program administration costs associated with mitigation/conservation.
Monitoring and research	\$0.0	\$912.8	\$912.8	8.3%	\$75.4	Proportion of monitoring costs associated with mitigation/conservation.
Property tax revenue replacement	\$0.0	\$226.0	\$226.0	43.3%	\$97.7	Mitigation share of each applicable conservation measure (CM1, CM3, CM4, CM5, CM8, CM9, and CM10); costs applied to the property tax revenue replacement cost of each conservation measure. These costs are highest per acre for CM1 because of higher average land values and a longer period of revenue replacement than for other restoration actions.

Cost Item	Total Capital Cost	Total Operational Cost (over 50-year Permit Term)	Total Cost	% Paid by Contractors	Amount Paid by Contractors	Rationale
Changed circumstances	\$184.0	\$0.0	\$184.0	20.2%	\$37.1	Related to ESA Section 10 assurances. Pays for remedial actions on conservation measures related to reserve system and restoration, but needed only if changed circumstances occur. Cost estimate based on reasonable probability that remedial actions would be needed. Contractor mitigation share tied to share of CM3 (and CM11). Funding could be provided gradually.
Total					\$16,930.2	
Other Costs^c						
EIR/EIS Mitigation ^d	\$0.0	\$141.8	\$141.8	65.2%	\$92.5	Accounts for EIR/EIS mitigation measures and their estimated proportion associated with CM1 construction: Replacing additional lost Important Farmland (AG-1; 8%), air quality (AQ-2, 3, 4, 12; 99%), cultural resources (CUL-1 to 7; 29%), bat surveys (BIO-385; 75%).
Notes:						
<p>^a The mitigation/conservation share includes mitigation for the direct and indirect impacts of water facility construction and operation, as well as a share of the conservation and management of the covered species.</p> <p>^b Funding for predator reduction for mitigation purposes is assumed to be needed at each of the three north Delta intakes, at Clifton Court, at release site for fish salvaged from Clifton Court, and at the South Delta facilities. Mitigation share excludes the cost of structure or vessel removal.</p> <p>^c Contributions by state and federal water contractors to the Supplemental Adaptive Management Fund (Section 8.3.4.1.3, <i>Supplemental Adaptive Management Fund</i>) are not included in this table.</p> <p>^d The costs of the majority of EIR/EIS mitigation are accounted for in other costs of implementing the BDCP. The EIR/EIS mitigation costs identified in this table are in addition to the costs of the conservation measures. See Appendix 8.A, <i>Implementation Costs Supporting Material</i>, Section 8.A.6, <i>EIR/EIS Mitigation Measures</i> for details. USFWS = U.S. Fish and Wildlife Service; OCAP = operational criteria and plan; BiOp = biological opinion; SWP = State Water Project; CVP = Central Valley Project; ESA = Endangered Species Act</p>						

1 **8.3.4.1.1 Construction Costs**

2 Table 8-42 shows the estimated annual capital costs of CM1. Key assumptions used in these
3 calculations are a 2% inflation rate and a construction start date of 2015.

4 **Table 8-42. Capital Costs—Cost of Conveyance Facilities Funded by State and Federal Water**
5 **Contractors (\$ millions)**

	Planning/Permitting/Engineering Phase					Construction Phase (In-Service December 2025)					Total Cost
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Remaining cost	14,571	14,862	14,832	14,800	14,768	13,003	10,763	8,478	6,147	3,770	-
+ inflation (2.00% annually)	291	297	297	296	295	260	215	170	123	75	2,320
- Scheduled construction expenditure	-	328	328	328	2,061	2,500	2,500	2,500	2,500	2,530	15,575
= Remaining project costs	14,862	14,832	14,800	14,768	13,003	10,763	8,478	6,147	3,770	1,316	-

6

7 **8.3.4.1.2 Mitigation and Conservation Costs for Construction and Operation**

8 Mitigation required to offset the direct and indirect effects of construction activities and operation of
9 the water facility will be funded by state and federal water contractors. Because the NCCPA requires
10 that the Plan provide for the conservation and management of the covered species, the state and
11 federal water contractors will also share in those costs. For the purposes of the cost estimate, the
12 costs considered as mitigation/conservation for the impacts of facility construction are listed in
13 Table 8-41 along with the rationale for each mitigation calculation. These costs add \$903 million
14 (undiscounted) to CM1 costs. Most of the mitigation/conservation is associated with the direct
15 footprint impacts of the construction of the water conveyance facility (*CM1 Water Facilities and*
16 *Operation*). However, some additional mitigation/conservation is associated with water facility
17 operation. (The majority of the mitigation for operation of the water conveyance facility has been
18 built into the operations criteria themselves; see CM1 discussion in Chapter 3, *Conservation Strategy*
19 for details). Residual mitigation for water facility operations is addressed in Table 8-41 for those
20 impacts that cannot be addressed by operations directly (e.g., predator reduction at SWP and CVP
21 facilities).

22 Mitigation/conservation costs for the state and federal water contractors associated with ESA and
23 NCCPA compliance have been estimated at \$903.3 million.⁵⁵ This overlaps with some funding
24 committed through the coordinated long-term operation of the CVP and SWP biological opinions
25 (BiOps). For example, the long-term operation BiOps currently require ongoing monitoring and
26 studies for predator control, nonphysical fish barriers, and 8,000 acres of tidal and subtidal natural
27 community restoration. The actual conservation credit for the BDCP for mitigation actions
28 accomplished under the BiOps (and any overlap in funding) will be determined during
29 implementation.

⁵⁵ This excludes any additional costs associated with mitigation identified in the EIR/EIS, or any other mitigation costs associated with other laws or regulations.

8.3.4.1.3 Supplemental Adaptive Management Fund

The BDCP provides for the creation of a Supplemental Adaptive Management Fund, as described in Chapter 3, Section 3.4.23, *Supplemental Adaptive Management Fund*. This fund, which will be at least \$450 million, will be used to support adaptive management changes to CM1, as well as to any other conservation measure, determined to be necessary during Plan implementation. Funding for the Supplemental Adaptive Management Fund will be jointly provided by the Authorized Entities, the State of California, and the United States. The components of the fund and the process by which it would be made available to support changes to conservation measures through the adaptive management process are described in Chapter 3, Section 3.4.23, *Resources to Support Adaptive Management*.

8.3.4.2 Financing through Bonds

The state and federal water contractors could issue either general obligation or revenue bonds⁵⁶ to finance the costs of *CM1 Water Facilities and Operation*. State and federal water contractors are more likely to issue revenue bonds to finance their contribution to the BDCP because they can issue them on their own rather than general obligation bonds that require voter approval. Additionally, revenue bonds may be a preferable financing mechanism because they do not count towards the authorized debt limit of the issuing entity. However, revenue bonds carry a higher interest rate than a general obligation bond because they are backed only by the assets provided by project revenues.

Revenue bonds for the BDCP may be issued by a variety of sources. DWR may issue bonds for the BDCP as it does to finance the construction of other SWP facilities, which would then be repaid by participating SWP contractors. Individual water contractors may also issue their own revenue bonds or they may do so collectively through a joint powers authority, such as the State and Federal Contractors Water Agency (SFCWA). SFCWA is a Joint Powers Authority that was formed in 2009 by state water contractors and member agencies of the San Luis & Delta-Mendota Water Authority. SFCWA may be used as a funding vehicle for the BDCP, issuing revenue bonds on behalf of its membership and backstopped by the participating members (water contractors).

If SFCWA issues revenue bonds, 70% of all SFCWA directors must approve of the project. In addition, the specific bonds must be approved by 70% of the directors who represent the contractors who are participating members of the project. Given the economic benefits to water contractors, described later in this section and in Section 8.3.4.4.1, *Willingness to Provide Funding*, it is anticipated that most SWP contractors and members of the San Luis & Delta-Mendota Water Authority would participate in the issuance of necessary revenue bonds.

8.3.4.2.1 Debt Financing

One scenario under consideration to finance the BDCP costs identified for the state and federal water contractors (Section 8.3.4.1, *SWP and CVP Funding Responsibilities*) is the issuance of a series of four revenue bonds, each with a term of 40 years. The costs of CM1 would be financed with tax-exempt, long-term debt. The four series are described below and in Table 8-43.

- **1st bond series:** fund first 2 years of construction.

⁵⁶ Only water contractors with property tax revenue are able to issue general obligation bonds. For example, Metropolitan Water District of Southern California issued a \$39.5 million general obligation bond in 2010. Revenue bonds are an available tool for all water contractors.

- 1 • **2nd and 3rd bond series:** fund year 3 and years 4 and 5 of construction, respectively.
- 2 • **4th bond series:** fund the balance of the construction expenditures.

3 **Table 8-43. Potential Financing Plan with Series of Four Revenue Bonds**

Component	1st Bond Series	2nd Bond Series	3rd Bond Series	4th Bond Series
Approximate delivered date	June 1, 2015	June 1, 2017	June 1, 2018	June 1, 2020
Last maturity	2055	2057	2058	2060
Face value	\$3,793,000,000	\$3,667,000,000	\$5,611,000,000	\$2,504,000,000
All-in true interest cost	6.135%	6.133%	6.132%	6.134%
Cost of issuance	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
Underwriter's discount	\$6/bond	\$6/bond	\$6/bond	\$6/bond
Capitalized interest	2 Years	1 Year	2 Years	2 Years

Source: Southern California Water Committee 2012

4

5 As shown in Table 8-43, each bond issue would have a period of capitalized interest to mitigate the

6 debt service during the 9-year construction period. The financing interest rates are assumed at a

7 95% confidence interval of interest rates over the past decade rather than the historically low

8 interest rates of 2012. The annual debt service would average approximately \$1.1 billion from 2021

9 through 2055.

10 The data in Table 8-43 assume that the bonds will be issued by SFCWA, DWR, or a collection of state

11 and federal water contractors. The financing plan is considered viable because it funds a project that

12 provides value statewide and all proposed participating water contractors have sufficient financial

13 capacity to fund their portions. The SWP has strong ratings, in part, due to the strength of the

14 participating contractors. Several of the state water contractors have bond ratings greater than that

15 of the State and so interest savings could be realized through direct bond issuance by the

16 contractors (Houston and Thomas pers. comm.).

17 **8.3.4.3 History of Financing Large Water Infrastructure Projects in**

18 **California**

19 The history of the water contractors funding large water infrastructure projects of the scale of the

20 BDCP provides evidence that funding the BDCP is feasible. This history also illustrates that the

21 funding mechanisms available have been used successfully for similar projects. Projects described

22 include the SWP itself, as well as many capital projects funded and built by individual water

23 agencies. Costs for these projects are summarized in Table 8-44. Estimated BDCP capital costs for

24 the water facility are included for comparison. *Per capita* costs for BDCP water conveyance facilities

25 compare favorably with those of other large-scale water projects in California.

1 **Table 8-44. Costs of Large-Scale Water Projects in California, Sorted by *Per Capita* Costs**

Project	Agency	Date Completed	Capital Cost (millions) ^a	Population within Service Area (millions)	Project Cost <i>per Capita</i>
Diamond Valley Reservoir/Inland Feeder	Metropolitan Water District	2000	\$2,087	18	\$116
State Water Project	State of California	1965	\$1,750	13	\$134
Freeport Project	East Bay Municipal Utility District	2010	\$517	1.3	\$398
Emergency Storage Project	San Diego County Water Agency	Est. 2014	\$1,500	2.8	\$536
Capital Improvement Program	Santa Clara Valley Water District	Ongoing	\$1,000	1.8	\$556
BDCP Water Conveyance Facilities (CM1)	CA Department of Water Resources	Est. 2025	\$14,509	25	\$580
Los Vaqueros Reservoir Expansion Project	Contra Costa Water District	2012	\$570	0.55	\$1,036
Coastal Branch Aqueduct	Department of Water Resources and Central Coast Water Authority	1997	\$575	0.43	\$1,337
Hetch Hetchy Aqueduct Improvement Project	San Francisco Public Utilities Commission	Ongoing	\$4,600	2.5	\$1,840
Notes:					
^a In dollars at the time project completed or today's dollars if project not yet completed. BDCP costs are undiscounted 2012 dollars.					
Sources: Maher pers. comm.; Southern California Water Committee 2012; Bureau of Reclamation 2010					

2

3 To date, the most expensive water infrastructure project undertaken in California is the SWP. In
4 1960, when the SWP began, the assessed value of land in the service area was \$6 billion and the
5 population served was 13 million. The water systems revenue General Obligation bond was valued
6 at \$1.75 billion.⁵⁷ Of this amount, the Metropolitan Water District of Southern California's share was
7 approximately half, at \$875 million; this share was roughly 15% of the assessed value of all land and
8 buildings in the district service area at the time.

9 About 78% of the costs of constructing the SWP have been financed by the sale of general obligation
10 and revenue bonds. These bonds are being repaid in full by SWP beneficiaries, rather than the
11 general taxpayer. The SWP beneficiaries are responsible for all water supply-related costs, including
12 those pertaining to the operations and maintenance of SWP facilities. Each of the 29 contractors
13 pays the same per-acre-foot rate for the costs related to the construction and operation of facilities
14 used to store and convey the SWP water supply. Supplementary to that amount, each beneficiary
15 provides funding for a transportation charge to cover the cost of facilities needed to convey water to
16 its service area. Contractors more distant from the Delta provide more funding than contractors
17 close to the Delta because of the capital cost of the California Aqueduct and increased pumping and

⁵⁷ In 2011 dollars, this bond would be worth \$12.9 billion to \$18.2 billion, depending on the method of calculation.

1 O&M costs. State water contractors provide funding for principal and interest for state funds
2 allocated towards construction of new facilities under this program.

3 **8.3.4.4 Funding Assurances from Participating State and Federal Water** 4 **Contractors**

5 The most credible assurances of funding from the participating state and federal water contractors
6 result from an economic benefits analysis, described below, and two primary conclusions of the
7 analysis.

- 8 • The costs of CM1 and associated mitigation and conservation are affordable by the ratepayers of
9 the urban and agricultural agencies receiving federal and state water supplies delivered through
10 the Delta.
- 11 • The benefits of the preferred project to these ratepayers will exceed the total costs of CM1 and
12 associated mitigation and conservation. Thus, the relevant water contractors have an underlying
13 economic incentive to implement CM1.

14 The state and federal water contractors (or, more precisely, their ratepayers) are responsible for a
15 total present value cost of \$13.5 billion⁵⁸ for BDCP under the most realistic BDCP cost allocation
16 scenarios. This comes to an annual financing cost to the contractors of around \$1 billion for BDCP,
17 and it is reasonable to assume they have the ability to pay these costs. These costs are small in
18 relation to the personal income that is generated each year in the regions receiving SWP and CVP
19 water supplies delivered through the Delta. Table 8-45 shows total annual personal income of
20 approximately \$1 trillion in the relevant counties. Thus, on a gross level, the annual costs of
21 financing CM1 under the assumptions listed above are only about 1/1,000 of personal income,
22 which is far below the cost thresholds typically used for evaluating ability to pay.

⁵⁸ These costs only include costs assigned to the state and federal contractors and are the incremental cost of BDCP as compared to the cost to contractors under the scenario without BDCP. These costs are discounted to year 2012 at a 3% real discount rate.

1 **Table 8-45. Personal Income in California Counties Receiving Water from the State and Federal**
 2 **Water Projects**

County	Personal Income (thousands of dollars)
Alameda	72,757,457
Contra Costa	58,382,965
Fresno	28,839,098
Kern	24,955,092
Kings	4,070,793
Los Angeles	410,674,615
Merced	7,016,934
Orange	39,787,994
Riverside	64,376,498
San Benito	1,968,266
San Bernardino	60,463,094
San Diego	141,678,210
San Joaquin	21,133,128
Santa Barbara	18,629,574
Santa Clara	103,636,350
Stanislaus	16,079,357
Ventura	36,858,409
Total	1,111,307,834

Source: California Department of Finance 2008

3
 4 Not only is BDCP affordable, but the benefits to the ratepayers will exceed the total cost to
 5 contractors. A study by The Brattle Group (2013) (Appendix 9.A, *Economic Benefits of the BDCP and*
 6 *Take Alternatives*) considers three broad categories of benefits to the state and federal water
 7 contractors that can be quantified economically: water supply, water quality, and seismic risk
 8 reduction. Water supply benefits result from the difference in urban and agricultural water supplies
 9 under the BDCP as opposed to taking no action. Water quality benefits are quantified for changes in
 10 salinity; other water quality changes are treated qualitatively. Reduced seismic risks result from the
 11 relative resilience of the post-BDCP Delta infrastructure to levee failures and island flooding.

12 Taken together, the three categories of benefits to the state and federal water contractors measured
 13 in The Brattle Group (2013) study may be worth in excess of \$18 billion in present value. These
 14 expected benefits are larger than the costs of \$13.5 billion assigned to the state and federal
 15 contractors. For this reason, the BDCP is likely to be a project that the contractors have an economic
 16 incentive to implement and finance.

17 **8.3.4.4.1 Willingness to Provide Funding**

18 Assurances of funding from the state and federal water contractors ultimately derive from the direct
 19 economic benefits of the BDCP to their customers. The financial support of the state and federal
 20 contractors is essential in order to implement the Plan. There is no inducement for water agencies to
 21 participate if costs of the Plan exceed costs without BDCP. The best assurance of contractor funding
 22 for the BDCP proposed action is if there is a business case to be made for it; that is, if the present

1 value of the economic benefits of the BDCP are sufficiently higher than the present value of the costs
2 that are assumed to be assigned to the contractors.⁵⁹

3 Appendix 9.A, *Economic Benefits of the BDCP and Take Alternatives*, compares state and federal
4 project yields obtained following implementation of the covered activities, to a condition where they
5 are not implemented. As explained in more detail in Chapter 9, *Alternatives to Take*, deliveries under
6 the BDCP for the state and federal projects combined are expected to have a mean annual yield of
7 4.718 million acre-feet (MAF) in the Early Long Term. Deliveries without BDCP are expected to be an
8 average of 3.45 MAF annually, again at the Early Long Term.

9 The BDCP would reduce the frequency and magnitude of water shortages, reduce the need to invest
10 in water supply alternatives, improve water quality, and reduce seismic risk, relative to an
11 equivalent scenario without BDCP (see Appendix 9.A for details).

12 Benefits from the change in state and federal project deliveries are enjoyed by the customers of the
13 state and federal water contractors receiving supplies from the Delta, which supply water to
14 residences, commercial and industrial customers, and agriculture. In the agencies receiving SWP
15 supplies, urban demand is projected to be 5.64 MAF in 2025 (the year CM1 would become
16 operational) and is estimated to grow to 6.18 MAF by 2050. By 2025, shortages in the urban
17 agencies receiving SWP deliveries are predicted to be 0.50 MAF on average in the absence of the
18 BDCP. By 2050, these mean shortages are projected to be 0.84 MAF. The BDCP would mitigate these
19 losses by lessening the frequency and magnitude of water supply shortages. With implementation,
20 mean shortages would drop to 0.37 MAF by 2025. By 2050, they would average 0.57 MAF.

21 As presently configured, the Delta's water export infrastructure is vulnerable to earthquake-induced
22 outages in which SWP and CVP deliveries would be drastically reduced, resulting in a potential
23 shortage to urban and agricultural consumers. Through the construction of the north Delta water
24 conveyance facility, the BDCP would reduce the vulnerability of the Delta's water export
25 infrastructure to seismic events. With a 9,000-cfs north Delta water conveyance facility, post-
26 earthquake water supplies could be maintained at a level of 3.8 MAF. Mean water supplies following
27 an earthquake without BDCP are estimated to be 1.0 MAF.⁶⁰

28 The water conveyance facilities and operating criteria implemented as part of the BDCP would
29 improve the quality of Delta exports to agricultural and municipal water users. With the BDCP,
30 49% of state and federal project supplies would originate at the north Delta facilities as opposed to
31 100% of supplies provided from the south Delta facilities without BDCP. As a result, project
32 deliveries would be less saline with BDCP than without BDCP.

33 The economic benefits to the state and federal water contractors paying for CM1 and other
34 conservation measures (see below for details) are \$18.0 billion (Brattle Group 2013). The present
35 value of the cost of BDCP (including construction, habitat restoration, and operations and
36 maintenance costs) that would be assigned to the contractors is \$13.5 billion.⁶¹ The BDCP would
37 thus result in a net economic benefit of \$4.5 billion compared to a scenario without BDCP. State and

⁵⁹ Other economic costs and benefits beyond those evaluated to date are being assessed by DWR and are expected to be released prior to completion of the BDCP.

⁶⁰ MWD Board Meeting (Information obtained through personal communication with Randall Neudeck).

⁶¹ Both the benefits and costs are incremental to the baseline scenario of no BDCP, and are discounted to year 2012 at a 3% real discount rate.

1 federal water contractors have not agreed on a specified allocation of costs for the BDCP. The exact
2 allocation of these costs between SWP and CVP contractors and within each group will be
3 determined near the time that permits are issued for the BDCP, and will take into account how BDCP
4 benefits are realized within the project, as well as existing SWP and CVP policies and procedures.

5 **8.3.5 State Funding Sources**

6 **8.3.5.1 New Water Bonds**

7 In 2009, the California State Legislature passed a comprehensive water package that included four
8 policy bills and a major water bond measure that is scheduled to be on the 2014 ballot. The measure
9 is known as the Safe, Clean, and Reliable Drinking Water Supply Act of 2014. Funds derived from the
10 issuance of such bonds would be used, in part, to satisfy the State's financial commitments to the
11 BDCP.

12 The bond was originally slated to be on the 2010 ballot (as Proposition 18), then on the 2012 ballot,
13 but was postponed until 2014 because of the State's unprecedented economic recession. The bond
14 would provide \$11.14 billion for water supply reliability, surface and groundwater storage, Delta
15 restoration, water recycling, water conservation, watershed restoration, groundwater protection
16 and cleanup, and drought relief (Table 8-46). The Legislature is presently considering amendments
17 to the bond act.

18 The BDCP is expected to secure a large portion of the funds allocated to Delta sustainability, as well
19 as smaller portions of funds allocated to conservation and watershed protection. The water bond
20 will support the public benefits of Plan implementation, particularly natural community restoration
21 and other stressors conservation measures. For the purposes of the funding program and assuming
22 the water bond passes, the BDCP is expected to receive the conservative estimate of funding in Table
23 8-46. Based on the lifespan of similar recent water bonds, the 2014 water bond is expected to
24 disburse most or all of its funds within 10 years. For the purposes of this funding analysis, all of the
25 funds relevant to the BDCP are assumed to be disbursed within a 10-year period.

1 **Table 8-46. Estimated Funding for 2014 Water Bond Relevant to the BDCP (based on 2010 allocations)**

Category Relevant to the BDCP (2010 Proposed Bond Section)	Total Funding Assumed (millions) ^a	Proportion Assumed for the BDCP ^b	Total Estimated for the BDCP (millions)
Delta Sustainability (79731)			
• Improvements in Delta cities and counties	\$750	13%	\$100
• Implement Bay Delta Conservation Plan	\$1,500	80%	\$1,200
<i>Subtotal: Delta Sustainability</i>			<i>\$1,300</i>
Conservation and Watershed Protection			
Ecosystem and watershed protection (79750)	\$1,785	6%	\$100
Coastal Conservancy (79750(a))	\$250	20%	\$50
Wildlife Conservation Board (79750(c))	\$215	14%	\$30
Farmland Conservancy and Watershed Coordinator grant programs (79750(j))	\$20	20%	\$4
Central Valley Project Improvement Act project that improves salmonid fish passage in Sacramento River (79760)	\$60	50%	\$30
<i>Subtotal: Conservation and Watershed Protection</i>			<i>\$214</i>
Total Funding Estimated for the BDCP			\$1,514
Notes:			
^a Based on allocations for 2010 bond; amounts in 2014 or in a future year may be different.			
^b Based on overlap of BDCP conservation measures with the purpose of the program and potential competitiveness of the BDCP with other projects in the geographic area of the program (some are local, others are statewide).			
Source: Meral pers. comm.; Senate Bill 2, 2009-10 7th Ex. Sess. (CA 2009).			

2

3 BDCP assumes passage of a second water bond to fully fund the state portion of the Plan. The total
4 BDCP funding assumed for the subsequent water bond is \$2.25 billion. The timing of any subsequent
5 bond is unknown but would likely occur by year 15 of the permit term, providing funding for
6 approximately 10 years after its passage.

7 **8.3.5.1.1 History of Water Bonds in California**

8 As shown in Table 8-47, 12 water bonds have been approved by California voters since 1960, a
9 frequency of one every 4 years, on average. Based on this history, subsequent water bonds that
10 would partially fund the BDCP are also likely to occur during the permit term.

1 **Table 8-47. Past General Obligation Water Bonds in California**

Water Bond	Year Passed	Amount at Time of Bond (in billions)	Present Value (discounted 2012 dollars in billions)	Voter Approval
The Safe, Clean, and Reliable Drinking Water Supply Act of 2010	(N/A) ^a	\$11.4	N/A	N/A
The Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 (Proposition 84)	2006	\$5.4	\$6.0	54%
Disaster Preparedness and Flood Prevention Bond Act (Proposition 1E)	2006	\$4.1	\$4.6	64%
Water Quality, Supply and Safe Drinking Water Projects Act (Proposition 50)	2002	\$3.4	\$4.3	55%
Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Bond Act (Proposition 13)	2000	\$2.0	\$2.6	65%
The Safe, Clean, Reliable Water Supply Act (Proposition 204)	1996	\$1.0	\$1.4	63%
California Safe Drinking Water Bond Law of 1988 (Proposition 81)	1988	\$0.075	\$1.130	72%
Water Conservation and Water Quality Bond Law of 1986 (Proposition 44)	1986	\$0.075	\$0.138	74%
California Safe Drinking Water Bond Law of 1986 (Proposition 55)	1986	\$0.1	\$0.183	79%
Clean Water Bond Law (Proposition 25)	1984	\$0.01	\$0.019	73%
California Safe Drinking Water Bond Law of 1984 (Proposition 28)	1984	\$0.075	\$0.145	74%
California Safe Drinking Water Bond Law of 1976 (Proposition 3)	1976	\$0.175	\$0.575	---
California Water Resources Development Bond Act (Proposition 1)	1960	\$1.75	\$10.8	---
Notes:				
^a Accepted by CA legislature but vote postponed until 2014.				

2

3 **8.3.5.2 Existing State Bonds and Other Programs**4 **8.3.5.2.1 Proposition 1E**

5 The Disaster Preparedness and Flood Protection Bond Act of 2006, commonly referred to as
6 Proposition 1E (codified at Public Resources Code [PRC] 5096.821, 5096.824, 5096.825, and
7 5096.827), authorized \$4.09 billion in general obligation bonds to rebuild and repair California's
8 most vulnerable flood control structures to protect homes and prevent loss of life from flood-related
9 disasters, including levee failures, flash floods, and mudslides, and to protect California's drinking
10 water supply system by rebuilding delta levees that are vulnerable to earthquakes and storms.

1 As of November 27, 2012, Proposition 1E had a remaining balance of approximately \$378.7 million
 2 (Tufts pers. comm.). The balance of remaining Proposition 1E funds and the purpose to which such
 3 funds may be applied is summarized in Table 8-48. All remaining funding from Proposition 1E is
 4 expected to be expended by the end of 2013 (Billington pers. comm.). Most (or all) funds from
 5 Proposition 1E are therefore expected to be spent prior to permit issuance. However, a portion of
 6 these funds (described below) are assumed to be spent on implementation actions that overlap with
 7 conservation measures as interim implementation actions that would occur prior to permit issuance
 8 and count toward BDCP requirements (Chapter 6, Section 6.2, *Interim Implementation Actions*).

9 Proposition 1E (PRC 5096.821) is a potential funding source for flood protection and habitat
 10 restoration in the Delta, and has already provided significant funding for these purposes. For
 11 example, Proposition 1E has authorized funding for the following actions.

- 12 ● The evaluation, repair, rehabilitation, reconstruction, or replacement of levees, weirs, bypasses,
 13 and facilities of the State Plan of Flood Control.⁶²
- 14 ● The improvement or addition of facilities to the State Plan of Flood Control to increase levels of
 15 flood prevention for urban areas, including all related costs for mitigation and infrastructure
 16 relocation.
- 17 ● The reduction of risk of levee failure in the Delta via funding for the Delta Levee Subventions
 18 and Special Projects programs.

19 A remaining balance of approximately \$59.2 million is available for these purposes. The
 20 conservation measures that may be eligible for these funds include *CM2 Yolo Bypass Fisheries*
 21 *Enhancement* and all natural community restoration measures (CM4, CM5, CM6, CM7, CM8, CM9,
 22 CM10, and CM12).

23 Proposition 1E (PRC 5096.824) is a potential funding source for payment for the state's share of the
 24 nonfederal costs, and related costs, of flood control and flood prevention projects authorized under
 25 any of the following legislation.

- 26 ● The State Water Resources Law of 1945 (Chapter 1 [commencing with Section 12570] and
 27 Chapter 2 [commencing with Section 12639] of Part 6 of Division 6 of the Water Code).
- 28 ● The Flood Control Law of 1946 (Chapter 3 [commencing with Section 12800] of Part 6 of
 29 Division 6 of the Water Code).
- 30 ● The California Watershed Protection and Flood Prevention Law (Chapter 4 [commencing with
 31 Section 12850] of Part 6 of Division 6 of the Water Code).

32 A remaining balance of approximately \$316 million is available for these purposes. Importantly,
 33 only projects that are not part of the State Plan of Flood Control are eligible for funding under this
 34 provision, which may limit its applicability to flood control projects in the Delta. The conservation
 35 measures that may be eligible for these grants include those that would provide flood protection

⁶² Collectively, the facilities, lands, programs, conditions, and mode of operations and maintenance for the state-federal flood protection system in the Central Valley are referred to as the State Plan of Flood Control. This plan is only a portion of the larger system that provides flood protection for the Central Valley. Private levees, locally operated drainage systems, and other facilities work in conjunction with plan facilities. An overview of the State Plan of Flood Control can be found at <http://www.water.ca.gov/cvfmp/docs/SPFCDescriptiveDocumentNov2010.pdf>.

benefits: *CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM6 Channel Margin Enhancement, and CM10 Nontidal Marsh Restoration.*

Proposition 1E (PRC 5096.825) also authorized funding for the protection, creation, and enhancement of flood protection corridors and bypasses through any of the following actions.

- Acquiring easements and other interests in real property to protect or enhance flood protection corridors and bypasses while preserving or enhancing the agricultural use of the real property.
- Constructing new levees necessary for the establishment of a flood protection corridor or bypass.
- Setting back existing flood control levees, and in conjunction with undertaking those setbacks, strengthening or modifying existing levees and weirs.
- Relocating or flood proofing structures necessary for the establishment of a flood protection corridor.
- Acquiring interests in or providing incentives for maintaining agricultural uses of, real property that is located in a floodplain that cannot reasonably be made safe from future flooding.
- Acquiring easements and other interests in real property to protect or enhance flood protection corridors while preserving or enhancing the wildlife value of the real property.
- Floodplain mapping and related activities.

A remaining balance of approximately \$3.5 million is available for these purposes. The conservation measures that may be eligible for these grants include *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Community Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM6 Channel Margin Enhancement, and CM10 Nontidal Marsh Restoration.*

Proposition 1E (PRC 5096.827) directed DWR to make funding available for a stormwater flood management grant program. Funding is no longer available under this portion of Proposition 1E. Table 8-48 summarizes the funding opportunities available under Proposition 1E.

Table 8-48. Proposition 1E Funding Opportunities

Prop. 1E Bond Program	Public Resources Code	Balance Remaining (in millions)	BDCP Expected Funding (in millions) ^a	Relevant BDCP Conservation Measures
State Plan of Flood Control	5096.821	\$59.2	\$5.9–\$14.8	CM2, CM4, CM5, CM6, CM7, CM8, CM9, CM10, and CM12
Flood control and flood prevention projects	5096.824	\$316	\$31.6–\$79	CM4, CM5, CM6, and CM10
Flood protection corridors and bypasses	5096.825	\$3.5	\$0.4–\$0.9	CM2, CM4, CM5, CM6, and CM10
Total		\$378.7	\$37.9–\$94.7	

Notes:
^a BDCP expected funding: low estimate = 10%; high estimate = 25%
 Source: Tufts pers. comm.

1 **8.3.5.2.2 Proposition 84**

2 The Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection
3 Bond Act of 2006, commonly known as Proposition 84, authorized \$5.388 billion in general
4 obligation bonds to fund safe drinking water, water quality and supply, flood control, waterway and
5 natural resource protection, water pollution and contamination control, state and local park
6 improvements, public access to natural resources, and water conservation efforts. Of the total
7 authorized by Proposition 84, \$800 million is committed to efforts that enhance Proposition 1E
8 flood control projects.

9 Proposition 84 (PRC 75026 *et seq.*) allocated \$1 billion for planning and implementing California's
10 Integrated Regional Water Management program. This program, which is administered by DWR,
11 provides comprehensive management of all aspects of water resources on a regional basis.
12 Proposition 84 allocated funds to 11 funding areas across the state's 10 hydrologic regions. The Plan
13 Area is located in three of these regions: Sacramento River, San Joaquin River, and San Francisco Bay
14 Area. A further \$100 million was set aside for interregional grants to address multiregional needs or
15 issues of statewide significance. Funds for the three hydrologic regions that include the Plan Area
16 and the interregional allocation could potentially support Delta water supply, water quality, flood
17 protection, and habitat restoration projects, provided such projects are incorporated into the
18 integrated regional water management plans for each region. The funding allocation and remaining
19 balance for each of the relevant regions is as follows.

- 20 ● San Francisco Bay Area: \$21 million remaining balance (as of January 2013)
- 21 ● Sacramento River: \$12 million remaining balance (as of January 2013)
- 22 ● San Joaquin River: \$10 million remaining balance (as of January 2013)

23 All remaining funding from Proposition 84 is expected to be awarded by 2015. The conservation
24 measures that would likely be eligible for these funds in one or more regions include *CM2 Yolo*
25 *Bypass Fisheries Enhancement*, *CM3 Natural Communities Protection and Restoration*, and all natural
26 community restoration and enhancement measures (CM4, CM5, CM6, CM7, CM8, CM9, CM10, and
27 CM12). Projects in and near the Delta and similar in purpose to conservation measures that have
28 been funded by Proposition 84 include the Lower Cosumnes River Floodplain Restoration Project,
29 Sears Point Wetland and Watershed Restoration, and East Contra Costa County Watershed
30 Protection and Restoration.

31 Proposition 84 (PRC 75029) allocated funding for grants to implement Delta water quality
32 improvement projects that protect drinking water supplies. DWR requires a cost share from local
33 agencies that receive grant funding. Projects are eligible if they meet any of the following criteria.

- 34 ● Projects that reduce or eliminate discharges of salt, dissolved organic carbon, pesticides,
35 pathogens and other pollutants to the San Joaquin River.
- 36 ● Projects that reduce or eliminate discharges of bromide, dissolved organic carbon, salt,
37 pesticides, and pathogens from discharges to the Sacramento River.
- 38 ● Projects at Franks Tract and other locations in the Delta that will reduce salinity or other
39 pollutants at agricultural and drinking water intakes.
- 40 ● Projects identified in the June 2005 *Delta Region Drinking Water Quality Management Plan*, with
41 a priority for design and construction of the relocation of drinking water intake facilities for in-
42 delta water users.

1 A remaining balance of approximately \$35 million is available for projects that reduce or eliminate
 2 discharges of salt, dissolved organic carbon, pesticides, pathogens and other pollutants to the San
 3 Joaquin River. Projects promoting *CM19 Urban Stormwater Treatment* may be eligible to receive
 4 grant funding under PRC 75029.

5 Proposition 84 (PRC 75041) allocated funding for planning and feasibility studies related to the
 6 existing and potential future needs of California's water supply, conveyance, and flood control
 7 systems. A remaining balance of approximately \$11 million is available for these purposes. The
 8 BDCP is unlikely to qualify for these funds, if any remain by the time of implementation because the
 9 BDCP would be well beyond the studies stage.

10 Proposition 84 (PRC 75050(c)) allocated funding for development, rehabilitation, acquisition, and
 11 restoration costs related to providing public access to recreation and fish and wildlife resources in
 12 connection with state water project obligations pursuant to Water Code Section 11912. A remaining
 13 balance of approximately \$52 million is available for these purposes. The BDCP may qualify for
 14 these funds for restoration projects that also introduce or expand public access to new areas of the
 15 Delta (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and
 16 *CM11 Natural Communities Enhancement and Management*).

17 Table 8-49 summarizes the funding opportunities available under Proposition 84.

18 **Table 8-49. Proposition 84 Funding Opportunities**

Proposition 84 Bond Program	Public Resources Code	Balance Remaining (in millions)
Integrated regional water management planning and implementation	75026	\$178 ^a
Delta water quality improvement projects	75029	\$35
Planning and feasibility studies	75041	\$11 ^b
Public access to recreation and fish and wildlife resources related to SWP	75050(c)	\$52
Total		\$265
BDCP expected funding (low estimate = 15%; high estimate = 30%)		\$40-80
Notes: ^a Funding for the three hydrologic regions that overlap with the Plan Area. ^b Funding source may not apply to conservation measures; not included in total. Source: Kenner pers. comm.		

19

20 **8.3.5.2.3 Proposition 50**

21 The Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 provided
 22 \$3.44 billion in bond funds for projects and grants to secure and safeguard the integrity of the state's
 23 water supply from catastrophic damage or failure; to provide a safe, clean, affordable, and sufficient
 24 water supply; to establish and facilitate integrated regional water management systems; to improve
 25 water quality, reduce pollution, protect and manage groundwater, and increase water use efficiency;
 26 to provide river parkways; to effectively use Colorado River water; to restore and protect coastal
 27 wetlands and watersheds; and to protect, restore, and conserve the habitat and water resources of
 28 the Bay-Delta region.

1 As of January 14, 2011, Proposition 50 had a remaining balance of approximately \$22 million, less
 2 than 1% of the \$3.44 billion authorization. While Proposition 50 has been a significant source of past
 3 funding for flood protection and habitat restoration in the Delta, less than 1% of authorized funding
 4 remains. All remaining funding from Proposition 50 is expected to be expended by 2013, before
 5 permits are issued. Although Proposition 50 is unlikely to be a source of funds for the BDCP, it is
 6 discussed here because it demonstrates California’s willingness to approve significant funding for
 7 water quality and habitat restoration projects in the Delta.

8 **8.3.5.2.4 Interagency Ecological Program (State Funding)**

9 The IEP brings state and federal natural resource and regulatory agencies together to coordinate
 10 monitoring and studies of ecological changes in the Delta. The IEP consists of ten member entities:
 11 three state agencies (DWR, CDFW, and the State Water Resources Control Board [State Water
 12 Board]); six federal agencies (USFWS, Reclamation, USGS, USACE, NMFS, and U.S. Environmental
 13 Protection Agency [EPA]), and one nongovernment organization (The San Francisco Estuary
 14 Institute). These ten program partners work together to develop a better understanding of the
 15 estuary’s ecology and the effects of the SWP and CVP operations on the physical, chemical, and
 16 biological conditions of the San Francisco Bay-Delta estuary. The IEP has been instrumental in
 17 coordinating Delta monitoring and research activities conducted by state and federal agencies and
 18 other science partners for 40 years. IEP monitoring activities are generally carried out in compliance
 19 with water right decisions and ESA permit and/or BiOp conditions. Most of the monitoring under
 20 the IEP focuses on open water areas and the major Delta waterways conveying water to the SWP
 21 and CVP facilities in the south Delta. The IEP produces publicly accessible data that include fish
 22 status trends, water quality, estuarine hydrodynamics, and foodweb monitoring.

23 In 2012, the IEP oversaw almost \$25 million for 129 separate special studies divided into six
 24 program areas, all of which are relevant to the BDCP monitoring and adaptive management program
 25 (Table 8-50). Funding for the IEP comes from nearly every state and federal agency involved in the
 26 program, including DWR, Reclamation, USFWS, NMFS, and USGS (Table 8-50); special studies
 27 funding represents only a fraction of the entire IEP budget. For the purposes of the cost estimate,
 28 25% of DWR funding for IEP and 10% of “Other” state funding for IEP is assumed to overlap with
 29 BDCP (\$1.7 million x 25% + \$6.8 million x 10% = \$1.1 million per year), which is an estimated \$55
 30 million over the permit term.

31 **Table 8-50. 2012 Funding for Interagency Ecological Special Studies Projects (millions \$),**
 32 **by Funding Source**

Program Area	DWR ^a	Reclamation	Other ^b	Total
Salmon migration	\$0.8	\$5.4	\$1.1	\$7.3
Resident and native fish	\$0.6	\$4.3	\$0.7	\$5.6
Ecological processes	\$0.3	\$3.5	\$4.2	\$8.0
Estuarine monitoring	–	\$0.4	\$0.3	\$0.7
Fish facilities	–	\$1.5	–	\$1.5
Contaminant effects	–	\$0.4	\$0.5	\$0.9
Total	\$1.7	\$15.2	\$6.8	\$24.0

Notes:
 a DWR funding for the IEP is provided by the state water contractors.
 b Includes funding from the State Water Resources Control Board, Delta Science Program, and CALFED Environmental Restoration Program.
 Source: Souza pers. comm.

1 **8.3.5.2.5 Delta Stewardship Council**

2 On Feb. 3, 2010, the Sacramento–San Joaquin Delta Reform Act of 2009 took effect, creating the new
3 Delta Stewardship Council as an independent state agency. Under the same legislation, the CALFED
4 Science Program became the Delta Science Program, reporting to the new Delta Stewardship
5 Council.

6 The mission of the Delta Stewardship Council is to achieve the state’s goals of providing a more
7 reliable water supply for California and protecting, restoring, and enhancing the Sacramento–San
8 Joaquin Delta ecosystem. The mission will be carried out through funding research, synthesizing and
9 communicating scientific information to policymakers and decision makers, promoting independent
10 scientific peer review, and coordinating with Delta agencies to promote science-based adaptive
11 management. Any public agency or nonprofit organization capable of entering into a grant
12 agreement with the state or federal government may apply (Water Code 85280 (b) (4)). This
13 includes, but is not limited to local agencies, private nonprofit organizations, tribes, universities,
14 state agencies, and federal agencies.

15 Under the Delta Stewardship Council, the Delta Science Program has funded more than 40 research
16 grants totaling more than \$25 million. Proposals must address at least one of the priority topic
17 needs, and those that address more than one topic and study question are encouraged. Because the
18 Delta Science Program has limited funds, proposals that demonstrate use of other funding sources
19 (e.g., matching funds, cost sharing, in-kind services.) to leverage science program funds were
20 preferred compared to those without matching funds.

21 Table 8-51 shows the amounts and funding details for solicitations from 2004 to 2010 (solicitations
22 do not occur in every year). Over the past 7 years, the Delta Science Program (and its predecessor,
23 the CALFED Science Program) has provided approximately \$25 million for research and peer review
24 services to the Delta. Because of the strong overlap between the mission of the Delta Science
25 Program and the goals of the BDCP and the expected overlap in research priorities of the two
26 organizations, it is assumed that 50% of the funds available to the program (an average of \$1.8
27 million annually) would directly support as the BDCP adaptive management and monitoring
28 program.

1 **Table 8-51. Delta Science Program Historical Funding Opportunities**

Year	Total Amount	Funding Source	Potential Funding per Grant/Duration	Priority Topics
2004	\$10 million	Prop 204 Prop 13 Prop 50	<ul style="list-style-type: none"> No limits, most between \$150,000–\$1.5 million Up to 3 years 	<ul style="list-style-type: none"> Water operations and biological resources Ecological processes and their relationship to water management and key species Performance assessment to improve tools and evaluate implications of future changes
2006	\$6 million	Prop 50	<ul style="list-style-type: none"> \$1 million minimum Up to 3 years 	<ul style="list-style-type: none"> Environmental water Aquatic invasive (exotic) species Trends and patterns of populations and system response to a changing environment Habitat availability and response to change
2007	\$2 million	NA	<ul style="list-style-type: none"> \$300,000 maximum Up to 2 years 	<ul style="list-style-type: none"> Proposals selected for funding in 2004 or 2006 were eligible to receive supplemental funding
2010	\$7 million	Prop 84	<ul style="list-style-type: none"> No limits, most between \$150,000–\$1.5 million Up to 3 years 	<ul style="list-style-type: none"> Native fish biology and ecology Food webs of key delta species and their relationship to water quality and other drivers Coupled hydrologic and ecosystem models Water and ecosystem management decision support system development

2

3 **8.3.5.2.6 Fish Agreements (DBEEP, FRPA)**4 **1986 Delta Fish Agreement**

5 The 1986 Agreement between DWR and CDFW to Offset Direct Losses in Relation to the Harvey O.
6 Banks Delta Pumping Plant, more commonly referred to as the Delta Fish Agreement, provides
7 funding for offsetting adverse fishery impacts caused by the diversion of water at the Harvey O.
8 Banks Delta Pumping Plant. Direct losses of Chinook salmon, steelhead, and striped bass are offset
9 or mitigated through the funding and implementation of fish mitigation projects. DWR and CDFW
10 coordinate with the Fish Advisory Committee to implement the agreement and projects funded
11 under the agreement. The Fish Advisory Committee is made up of representatives of the state water
12 contractors, sport and commercial fishing groups, and environmental groups. In the past, the
13 program has implemented a variety of projects in the Sacramento and San Joaquin river basins and
14 in the Bay-Delta area.

15 One program implemented under the Delta Fish Agreement that is particularly relevant to the BDCP
16 is DBEEP. Since 1986, this project has been annually funded by DWR through contracts with CDFW
17 that are continually renewed every 3 years. Most recently, in July 2011, DWR entered into a contract
18 with CDFW to continue for an additional 3 years the implementation of DBEEP for increased fishery
19 protection enforcement efforts to reduce illegal take of striped bass, salmon, steelhead, and
20 sturgeon. The agreement will support ten existing warden positions in the San Francisco Bay/Delta,
21 northern Sacramento Valley, and southern San Joaquin Valley. Under this contract, DBEEP funding
22 for the next 3 years is projected to be \$1.9 to \$2.1 million annually.

23 Although DBEEP funding must be renewed every 3 years, DWR is assumed to fund the current
24 DBEEP program (accounting for inflation) throughout the permit term. Additionally, the

1 implementation of *CM17 Illegal Harvest Reduction* will hire and equip 17 additional game wardens
2 and five supervisory and administrative staff in support of DBEEP (i.e., 27 game wardens would be
3 employed by DBEEP through DWR and the BDCP).

4 **2010 Fish Restoration Program Agreement**

5 In October 2010, DWR and CDFW signed the Fish Restoration Program Agreement that establishes
6 the framework for selecting, funding, and implementing specific restoration projects, and for
7 management and funding plans to create or restore fish habitat or other activities. The
8 implementation of the fish restoration program will satisfy requirements in the 2008 USFWS BiOp
9 for delta smelt, the 2009 National Marine Fisheries Service (NMFS) BiOp for salmonids and green
10 sturgeon, and the longfin smelt incidental take permit from CDFW for SWP operations. The
11 commitment of specific funding for and implementation of the restoration actions or other activities
12 will be made by DWR through execution of subsequent agreements with other entities, such as, if
13 appropriate, CDFW, USFWS, and NMFS. Plans for individual restoration projects must include DWR
14 funding sufficient to accomplish full implementation of the action. Full implementation may include,
15 but is not limited to, restoration planning, environmental review and documentation, permitting,
16 interim management prior to restoration, restoration implementation, operation and maintenance
17 activities, and monitoring to evaluate project success in meeting the planned restoration objectives.

18 **8.3.5.3 Existing State Grants**

19 **8.3.5.3.1 Wildlife Conservation Board**

20 The Wildlife Conservation Board was created by legislation in 1947 to administer a capital outlay
21 program for wildlife conservation and related public recreation. The primary responsibilities of the
22 board are to select, authorize, and allocate funds for the purchase of land and waters suitable for
23 recreation purposes and the preservation, protection and restoration of wildlife habitat. Originally
24 created within the California Department of Natural Resources, and later placed with CDFW, the
25 Wildlife Conservation Board is a separate and independent board with authority and funding to
26 carry out an acquisition and development program for wildlife conservation. The board consists of
27 the president of the Fish and Game Commission, the director of CDFW and the director of the
28 Department of Finance (Wildlife Conservation Board 2012).

29 The Wildlife Conservation Board has received funding from the following sources.

- 30 ● Proposition 40—California Clean Water, Clean Air, Safe Neighborhoods Parks and Coastal
31 Protection Act of 2002.
- 32 ● Proposition 50—Water Security, Clean Drinking Water and Coastal Protection Act of 2002.
- 33 ● Proposition 84—The Safe Drinking Water, Water Quality and Supply, Flood Control, River and
34 Coastal Protection Bond Act of 2006.
- 35 ● Proposition 1E—Disaster Preparedness and Flood Prevention Bond Act of 2006.

36 The Wildlife Conservation Board approves and funds projects that set aside lands in the state for
37 conservation purposes, through acquisition or other means. The board can also authorize the
38 construction of facilities for recreational purposes on property in which it has a proprietary interest.
39 The board's three main functions are land acquisition, habitat restoration, and development of
40 wildlife-oriented public access facilities, and are carried out through its various programs. The
41 Wildlife Conservation Board manages 10 programs that provide funding opportunities for different

1 types of habitat conservation projects (Wildlife Conservation Board 2012). Of these, seven programs
2 are relevant to the BDCP.

- 3 ● **Riparian.** Coordinates conservation efforts aimed at protecting and restoring the state's
4 riparian ecosystems.
- 5 ● **Forest.** Promotes the ecological integrity and economic stability of California's diverse native
6 forests.
- 7 ● **Inland wetlands.** Protects, restores, and enhances wetlands and associated habitats.
- 8 ● **Cultivated lands.** Assists farmers in integrating agricultural activities with wildlife habitat
9 restoration.
- 10 ● **Rangeland.** Protects California's rangeland, grazing land and grassland through the use of
11 conservation easements.
- 12 ● **Habitat enhancement restoration.** Includes all restoration projects that fall outside the
13 Wildlife Conservation Board's other mandated programs.
- 14 ● **Acquisition.** Acquires real property or rights in real property on behalf of CDFW and through
15 grants. The majority of the acquisition projects fall under two main categories, acquisition of fee
16 title or acquisition through conservation easements. In some cases, other property rights, such
17 as water, can be separated out and acquired.

18 The Wildlife Conservation Board relies on the biological expertise of CDFW to recommend and
19 prioritize projects. For the most part, the board only funds capital outlay costs. The board does not
20 fund non-project-specific planning, research, and studies. When evaluating projects the board
21 prefers projects that are ready for implementation, with all or most of the planning, design,
22 permitting or other preimplementation costs completed. Although the board does not fund
23 mitigation projects, it is able to collaborate on projects that include a mitigation component, so long
24 as the mitigation component can be clearly delineated and separated from other board funding
25 (Wildlife Conservation Board 2012). All projects are evaluated in terms of their relative cost to
26 habitat value.

27 In 2011, the Wildlife Conservation Board earmarked \$22.3 million to help restore and protect fish
28 and wildlife habitat throughout California through 19 funded projects. A sample of funded projects
29 relevant to the BDCP is provided below (California Department of Fish and Game 2011c).

- 30 ● A \$304,000 grant to Ducks Unlimited, Inc. for a cooperative project with CDFW to complete final
31 design plans for a tidal wetland restoration project on Ponds E12 and E13, located on the Eden
32 Landing Ecological Reserve in Alameda County.
- 33 ● A \$415,000 grant to Save The Bay for a cooperative project with CDFW, USFWS, and NMFS to
34 restore approximately 251 acres of transitional zone habitat adjacent to former salt ponds on
35 the Eden Landing Ecological Reserve and the Don Edwards San Francisco Bay National Wildlife
36 Refuge in Alameda and San Mateo Counties.
- 37 ● A \$7.8 million grant to the Pacific Forest Trust for a conservation easement over 8,230 acres in
38 Shasta and Siskiyou Counties.
- 39 ● A \$1.1 million grant to the Northern California Regional Land Trust for a cooperative project
40 with Western Rivers Conservancy and CDFW to acquire fee title to approximately 599 acres of
41 land for the expansion of the Lassen Foothills Conservation Area in Tehama County.

- 1 • A \$5 million grant to the Truckee Donner Land Trust to acquire approximately 2,995 acres of
2 land for the protection of the upper watershed and source of the Little Truckee River in Nevada
3 and Sierra Counties.

4 Funding from the Wildlife Conservation Board is likely to be most relevant to *CM3 Natural*
5 *Communities Protection and Restoration* to support acquisition of land for the reserve system. For
6 example, the board has helped fund land acquisition in Contra Costa County for the East Contra
7 Costa County HCP/NCCP.⁶³ However, other conservation measures may also benefit from funding,
8 including CM4, CM5, CM6, and CM7.

9 As described above, the Wildlife Conservation Board receives funds from a variety of sources, some
10 of which are already accounted for in other sections of the funding analysis (e.g., state propositions).
11 However, the board is likely to have some funding available for the BDCP independent of these other
12 sources, or from new sources. Therefore, it is assumed that the board could provide an average of
13 \$1 million annually for conservation measures over the permit term (\$50 million total).

14 **8.3.5.3.2 Ecosystem Restoration Program**

15 The Ecosystem Restoration Program (ERP) is a multiagency effort aimed at improving and
16 increasing aquatic and terrestrial natural communities and ecological function in the Delta and its
17 tributaries.⁶⁴ The CDFW water branch coordinates with USFWS and NMFS to implement the
18 program.

19 The water branch executes restoration actions through projects administered by the ERP's grants
20 program. The majority of these projects focus on fish passage issues, species assessment,
21 sedimentation, or natural community restoration. Branch staff provides grant management for
22 ongoing ERP projects; the water branch also works with CDFW regional staff and prospective grant
23 recipients to award and execute new projects.

24 The 2010 solicitation was for ecosystem restoration projects primarily in the Delta and Suisun
25 Marsh and required that projects be consistent with the following plans and programs (California
26 Department of Fish and Game 2010).

- 27 • CALFED Record of Decision
- 28 • ERP Stage 2 Conservation Strategy
- 29 • Delta Stewardship Council Interim Plan
- 30 • The BDCP

31 Specifically, the ERP solicited for proposals focused on the following priorities (California
32 Department of Fish and Game 2010).

- 33 • Restoration projects that restore or enhance aquatic natural communities in the Sacramento-
34 San Joaquin Delta and Suisun Marsh and Bay.

⁶³ Often the Wildlife Conservation Board is the state entity that provides funds to local HCPs and NCCPs secured by the state through the ESA Section 6 federal grant program, administered by USFWS. See the USFWS funding section for details.

⁶⁴ Funding may be provided from this source but it is not assumed because of the uncertainty in funding to support the BDCP.

- 1 • Research that tests hypotheses identified in the Delta Regional Ecosystem Restoration
2 Implementation Plan (DRERIP) evaluation of the conservation measures and National Research
3 Council OCAP BiOp review and that addresses uncertainties.
- 4 • Projects that construct facilities to control waste discharges that contribute to low dissolved
5 oxygen and other water quality problems in the lower San Joaquin River and south Delta, or
6 that construct facilities to control drainage from abandoned mines that adversely affect water
7 quality in the Bay Delta.

8 The grants are awarded for up to 3 years. The number of awards and total funding depends on
9 legislative appropriation. Funding was provided through Proposition 84, Proposition 13, and other
10 state sources. To be funded by Proposition 13, a project must be an “eligible project” that
11 “constructs facilities” to address specific water quality problems, defined in of the California Water
12 Code (Section 79190). Historically, Proposition 13 funds have been managed by ERP to support
13 projects that address low dissolved oxygen conditions in the Stockton Deep Water Ship Channel and
14 mercury issues, both of which affect water quality in the Delta. Table 8-52 summarizes the projects
15 that received funding in the 2010–2011 solicitation (California Department of Fish and Game 2010).

16 **Table 8-52. Ecosystem Restoration Program 2010–2011 Funding**

Project Name	Amount
Management Tools for Landscape-Scale Restoration of Ecological Functions in the Delta	\$875,000
Salinity Effects on Native and Introduced SAV of Suisun Bay and the Delta	\$412,410
Wetland and Rice Management to Limit Methylmercury Production and Export	\$197,416
Development of a Spatially Explicit Ecosystem Model to Explore Physicochemical Drivers of Step Changes in POD Species And Distribution in the Sacramento–San Joaquin Delta and Suisun Bay	\$356,483
Evaluation of Floodplain Rearing and Migration in the Yolo Bypass	\$878,020
Linking Habitat and Spatial Variability to Native Fish Predation	\$730,307
A Systems Biology Assessment of EDCs in the Delta	\$486,411
McCormack-Williamson Tract Flood Control and Ecosystem Restoration Project	\$3,314,300
Survival and Migratory Patterns of Juvenile Spring and Fall Run Chinook Salmon in Sacramento River & Delta	\$1,746,955
If we build it, will they come?: Identifying habitat characteristics that support native fish in the Delta & Suisun Marsh	\$1,152,195
Managing Natural Resources for Adaptive Capacity: the Central Valley Chinook Salmon Portfolio	\$489,343
Corona and Twin Peaks Mine Drainage Treatment Project	\$1,422,469

17

18 This funding source is directly applicable to the BDCP because one of the goals of the program is to
19 support the conservation strategy. This funding source would be applicable to nearly all
20 conservation measures. While this fund has the potential to fund conservation measures, no funding
21 is assumed at this time because of its uncertainty. Future funding from ERP is contingent on
22 available state funds and legislative action to allocate these funds to CDFW.

8.3.5.3.3 Environmental Enhancement Fund

The Environmental Enhancement Fund grant program is administered by the CDFW's Office of Spill Prevention and Response for environmental enhancement projects located within or adjacent to the marine waters of the state. An enhancement project is a project that acquires habitat for preservation, or improves habitat value and ecosystem function above baseline conditions, and that meets all of the following requirements (California Department of Fish and Game 2011a).

- It is located within or immediately adjacent to California marine waters,⁶⁵ as defined in California Government Code (subdivision (i) of Section 8670.3).
- It has measurable outcomes within a predetermined timeframe.
- It is designed to acquire, restore, or improve habitat or restore ecosystem function, or both, to benefit fish and wildlife.

Currently, the Office of Spill Prevention and Response is authorized to spend up to \$300,000 per year from the Environmental Enhancement Fund; however, after all mandatory deductions including overhead are accounted for, that amount is approximately \$250,000. Multiyear projects are acceptable as long as there is no more than the annual spending authority requested per year (\$250,000) (California Department of Fish and Game 2011b). The grant can be awarded to nonprofit organizations, cities, counties, districts, state agencies, and departments; and, to the extent permitted by federal law, to federal agencies.

Availability of funding is intermittent and dependent on violation fees. Available funds are a potential source of funding for the BDCP, but are not guaranteed. The conservation measures most relevant to this grant program are restoration measures for tidally influenced natural communities (CM2, CM4, CM5). Because funding under this program is uncertain, no funding is assumed for the BDCP in this analysis.

8.3.5.3.4 Fisheries Restoration Grant Program

The CDFW Fisheries Restoration Grant Program was established in 1981 and supports projects restoring anadromous salmon and steelhead habitats. Contributing partners include CDFW, federal and local governments, tribes, water districts, fisheries organizations, watershed restoration groups, the California Conservation Corps, AmeriCorps, and private landowners. Since 1981, over 600 stakeholders have participated in 3,000 projects totaling \$200 million in funding. Past projects have restored the following features (California Department of Fish and Game 2012a):

- 895 miles of stream treated
- 53 miles of stream bank stabilized
- 122 miles of instream habitat restored
- 661 miles of stream opened to fish passage by removing 440 barriers
- 5,467 acres of riparian habitat restored

⁶⁵ The section referenced as defining marine waters in the California Governmental Code is incorrectly cited. Section 8670.3(l) provides the definition for *marine waters* as those waters subject to tidal influence, and includes the waterways used for waterborne commercial vessel traffic to the Port of Sacramento and the Port of Stockton.

- 1 • 1,283 miles of road treated to reduce sediment in salmonid streams

2 Applicants apply through an annual open, competitive selection process. Acceptable proposals are
3 consistent with the CDFW *California Salmonid Stream Habitat Restoration Manual* and the CDFW
4 *Steelhead Restoration & Management Plan* for California (other criteria are not relevant to the BDCP)
5 (California Department of Fish and Game 2012b).

6 Funding sources include the Pacific Coastal Salmon Recovery Fund, Proposition 84, and the
7 Steelhead Fishing Report and Restoration Card. In 2011, CDFW anticipated that \$15 million in
8 federal funds and \$10 million in Proposition 84 bond funds were available to be distributed by
9 geographic area. In 2011 and 2012, 55 programs received a total of \$13.5 million in funding. To date,
10 no grants have been awarded in the Central Valley, including the Delta. However, with the
11 conservation activity generated by the BDCP, the conservation measures that may qualify for this
12 grant program include those that directly benefit salmonid covered fish such as *CM2 Yolo Bypass*
13 *Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*. Despite the applicability of
14 this fund to the conservation measures, no funding is assumed from this program due to a lack of
15 history of funding projects in the Central Valley and associated funding uncertainties.

16 **8.3.6 Federal Funding Sources**

17 Potential federal funding sources are divided into four categories. First, existing federal
18 appropriations relevant to BDCP are expected to continue in amounts and for durations described
19 below. Second, new federal appropriations would be needed to support BDCP. Third, several federal
20 grant programs are expected to provide funding to support BDCP actions. Finally, other federal
21 funding sources are described.

22 **8.3.6.1 Existing Federal Authorizations**

23 There are two existing federal authorizations that could be used to fund BDCP, the Central Valley
24 Project Improvement Act Restoration Fund and the CALFED Bay-Delta Authorization Act, which
25 provides the authority for California Bay-Delta Restoration appropriations. Each of these authorities
26 and their expected federal appropriations are discussed below.

27 **8.3.6.1.1 Central Valley Project Improvement Act Restoration Fund**

28 The Central Valley Project Improvement Act (CVPIA) Restoration Fund was authorized in the
29 Reclamation Projects Authorization and Adjustments Act of 1992 (Title XXXIV of Public Law 102-
30 575; October 30, 1992). The fund was established to contribute to the implementation of the CVPIA,
31 which directs the following purposes.

- 32 • Protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and
33 Trinity River Basins.
- 34 • Address impacts of the CVP on fish, wildlife, and associated habitats.
- 35 • Increase the water-related benefits provided by the CVP to the state of California through
36 expanded use of voluntary water transfers and improved water conservation.
- 37 • Contribute to the state's efforts to protect the San Francisco Bay and Sacramento-San Joaquin
38 Delta estuary.
- 39 • Achieve a reasonable balance among competing demands for use of CVP water.

- 1 • Improve the operational flexibility of the CVP.

2 The CVPIA Restoration Fund’s primary source of revenue is from annual mitigation and restoration
3 payments made by CVP water service and power contractors. In addition to these payments, the
4 CVPIA also establishes specific nondiscretionary charges such as the Friant Division surcharge,
5 charges on water transfers to non-CVP municipal and industrial users, and incremental revenue
6 from tiered water rates. Rates and charges are established with the goal of collecting an aggregate
7 \$50 million per year at 1992 price levels into the restoration fund, based on a 3-year rolling average.
8 Of this amount, up to \$30 million per year (at 1992 price levels) is collected from mitigation and
9 restoration payments made by CVP water service and power contractors. Through federal fiscal year
10 2010, CVP water and power users have contributed more than \$600 million in mitigation and
11 restoration payments to the restoration fund. CVPIA provides that the amount paid to the
12 restoration fund by water and power contractors will, “to the greatest degree practicable,” be
13 assessed on a 10-year average basis in proportion to the project repayment obligations allocated to
14 water and power purposes.

15 The CVPIA establishes limitations on the amount of federal funds that may be spent on specific
16 activities. For activities that support the development and implementation of programs to mitigate
17 fishery impacts associated with operations of Jones Pumping Plant, costs are reimbursed according
18 to the following statutory formula.

- 19 • 37.5% reimbursed as main project (CVP) feature
20 • 37.5% considered a nonreimbursable federal expenditure
21 • 25% paid by the State of California

22 The reimbursable share of funding is allocated among CVP project water and power users according
23 to existing procedures. For activities that support the development and implementation of measures
24 to avoid losses of juvenile anadromous fish resulting from unscreened or inadequately screened
25 diversions on the Sacramento and San Joaquin Rivers, their tributaries, the Sacramento–San Joaquin
26 Delta, and Suisun Marsh, costs allocated to Reclamation cannot exceed 50% of the total cost of any
27 such activity. Examples of such projects include construction of screens on unscreened diversions,
28 rehabilitation of existing screens, replacement of existing nonfunctioning screens, and relocation of
29 diversions to less fishery-sensitive areas. For federal fiscal year 2012, the Consolidated
30 Appropriations Act of 2012 (Public Law 112-74) provided an appropriation of \$53.0 million for the
31 CVPIA Restoration Fund (U.S. Senate Report 112-075, 2011). For 2013, the President’s budget seeks
32 \$39.9 million for the CVPIA Restoration Fund. Table 8-53 shows the appropriation history of the
33 fund from the annual Energy and Water Appropriations Bill. This funding history demonstrates a
34 consistent record of accomplishment of annual appropriations, and a general trend of steady
35 funding since 1996, including increases to account for inflation.

36 CVPIA Restoration Funds are for mitigation and restoration of the Central Valley Project. If at some
37 time in the future Interior determines that mitigation and restoration actions under CVPIA Section
38 3406 are complete, then the CVPIA Restoration Fund will be reduced under the provisions of CVPIA.
39 At that time, the reduced Restoration Fund will be primarily used to maintain existing mitigation
40 and restoration programs and activities. The CVPIA Restoration Fund collections from water and
41 power contractors are reduced by 50% (\$15 million in 1992 dollars) when the CVPIA mitigation and
42 restoration actions are determined to be complete.

1 **Table 8-53. Appropriation History of the CVPIA Restoration Fund from the Annual Energy and**
 2 **Water Appropriations Bill**

Appropriation	Amount	Appropriation	Amount
1994	\$45,000,000	2003	\$48,904,000
1995	\$45,385,000	2004	\$39,600,000
1996	\$43,579,000	2005	\$54,695,000
1997	\$38,096,000	2006	\$52,219,000
1998	\$25,130,000	2007	\$52,149,990
1999	\$33,130,000	2008	\$59,122,000
2000	\$42,000,000	2009	\$56,079,000
2001	\$38,359,666	2010	\$35,358,000
2002	\$55,039,000	2011	\$49,915,000
		2012	\$53,068,000
Total			\$866,829,000
Notes: CVPIA = Central Valley Project Improvement Act			

3
 4 Restoration funding is provided for activities that protect, restore, and manage aquatic and riparian
 5 natural communities, for provision of water supplies to wildlife refuges, and for water acquisition
 6 and other activities that benefit anadromous fish. These activities are consistent with the
 7 performance goals, criteria, and recommendations from the 2009 *CVPIA Program Activity Review*
 8 *Report* (Bureau of Reclamation 2011b). Table 8-54 provides a summary of CVPIA program funding
 9 obligations from fiscal years 2001 to 2011 for programs that may potentially relate to the
 10 conservation measures.

11 While the BDCP is not a CVPIA project-specific action and therefore is not authorized for broad
 12 implementation, there will be elements of the BDCP that may be implemented as CVPIA projects
 13 provided they are consistent with the authorized purposes of the CVPIA, including various CVP
 14 implementing documents.

15 Certain CVPIA programs provide for grants and cooperative agreements for mitigation actions that
 16 meet the needs and goals of CVPIA. In 2012, a total of \$3 million will be awarded to 15 projects with
 17 a ceiling of \$1 million and a floor of \$25,000 per grant.

18 Based on common ecological goals of CVPIA and the BDCP conservation measures, it is anticipated
 19 that various CVPIA authorities and funds will be used to support the implementation of certain
 20 BDCP conservation measures. For the purposes of this analysis, it is assumed that the BDCP has the
 21 potential to secure, on average, \$2 million annually in grants throughout the permit term (\$100
 22 million total). However, most of this amount is expected during the earlier part of the permit term.

1 **Table 8-54. Summary of CVPIA Restoration Funding Potentially Relevant to Conservation Measures**

Description	Similar to Conservation Measure or Component	Federal Fiscal Year Appropriations (in millions \$)											Total FY01–11
		FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	
Anadromous Fish Restoration Program (3405(a))	Many	5.3	5.0	5.0	3.1	4.1	3.3	5.5	3.5	6.6	4.1	6.2	51.7
Anadromous Fish Screen Program (3406(b)(21))	CM1 (fish screens), CM21	1.9	7.9	3.6	4.7	8.2	10.0	7.5	(1.3)	3.9	7.7	3.9	58.0
Habitat Restoration Program Other CVP Impacts (3406(b)(1)(other))	Many	1.4	1.5	1.5	1.4	1.5	1.5	1.5	1.4	1.4	1.2	1.7	16.0
Water Acquisition-Instream Flow (3406(b)(3))	CM1 (water acquisition)	1.1	3.3	3.2	(0.6)	3.6	2.0	6.5	3.8	6.0	6.6	6.8	42.3
Comprehensive Assessment and Monitoring Program(3406 (b)(16))	Monitoring		0.3	0.5	0.2	0.2	0.5	0.4	0.3	1.2	2.2	1.7	7.5
Ecol\Wtr System Ops Model (3406(g)(4))	Directed Research			0.8		0.5	0.1	0.4	0.4	7.0	0.6	0.6	10.4
Notes: CVPIA = Central Valley Project Improvement Act; FY = fiscal year Source: Bureau of Reclamation 2011b													

2

8.3.6.1.2 California Bay-Delta Appropriations

Established in 1995, the CALFED Bay-Delta Restoration Program was a collaborative effort involving 25 state and federal agencies and representatives of California's urban, agricultural, and environmental communities (Senate Report 112-075, 2011). The mission of the CALFED program was focused on conserving and restoring the health of the ecosystem and improving water management through improvements to fish and wildlife habitat, water supply reliability, and water quality in the Bay-Delta (Bureau of Reclamation 2011c). Oversight and implementation of the program was initially the responsibility of the California Bay-Delta Authority established by the California Bay-Delta Act of 2003. In 2009, the State Legislature designated the Delta Stewardship Council as successor to the California Bay-Delta Authority's administrative rights, obligations, and duties (see Section 8.3.5.2.5, *Delta Stewardship Council*, for a discussion of the Delta Stewardship Council and its funding).

Federal participation in CALFED was initially authorized in the California Bay-Delta Environmental and Water Security Act enacted in 1996. Since CALFED was established in 1995, more than \$1.4 billion of state and federal funds have been spent for restoration activities (Senate Report 112-075 2011). CALFED funding since 1995 provides an example of a substantial commitment of funding from the federal government to support ecosystem and species restoration in the Delta of the scale necessary to support the BDCP.

The CALFED Bay-Delta Authorization Act (Title I of Public Law 108-361) was enacted in 2004. This act authorized \$389 million in federal appropriations for federal fiscal years 2005 through 2010. Authorizations in the act were extended through September 30, 2014, by the Energy and Water Development and Related Agencies Appropriations Act of 2009. It is anticipated that the CALFED Bay-Delta Authorization Act will be further extended beyond September 30, 2014. Funding continues implementation of priority activities included in the CALFED Bay-Delta Authorization Act that will work toward resolving water resource conflicts in the Bay-Delta. Funds are used for renewed federal state partnership, smarter water supply and use (including water conservation and storage projects), and the habitat restoration program.

Various activities previously funded under the California Bay-Delta Restoration Program align with numerous BDCP conservation measures. Numerous federal agencies, including Reclamation, have received funding through the California Bay-Delta Restoration appropriations.

Specifically, seven federal agencies have the authority to receive continuing California Bay-Delta Restoration appropriations (Reclamation, USACE, Natural Resources Conservation Service [NRCS], NMFS, USGS, USFWS, and EPA) to implement various programs within each agency. The Bay-Delta Restoration appropriations for each of these agencies is discussed in the sections below. All Bay-Delta Restoration appropriations sources and assumptions for potential BDCP funding are listed in Table 8-55. All Bay-Delta Restoration appropriations-related funding (for all federal agencies) is assumed to continue at the same level as fiscal year 2011 appropriations through year 40 of the permit term. For actions related to monitoring, research, and program administration, the same funding level is assumed to continue until year 50. For actions related to restoration, funding is assumed to be 25% of the 2011 appropriations amount from year 41 through year 50 of the permit term (Table 8-55).

1 **Table 8-55. Potential Funding from California Bay-Delta Restoration Appropriations, by Federal**
 2 **Agency and Associated Plan Component**

California Bay-Delta Restoration Appropriations, by Agency (listed in order of potential funding level)	FY2011 Cross-Cut Appropriation (BDP-Related)	Potential Funding over 50-year Permit Term ^b	Allocation by Plan Component for 50-Year Permit Term ^a					
			Program Administration	Monitoring, Research, Adaptive Management, and Remedial Measures	Water Facilities and Operation (CM1, CM22)	Natural Community Protection and Management (CM3, CM11)	Natural Community Restoration (CM2, CM4–CM13)	Other Stressors Conservation (CM13–CM21)
Bureau of Reclamation								
Suisun Marsh Protection Program (W&RR)	\$ 1.5	\$63.8	-	-	-	-	\$64	-
Anadromous Fish Screen Program (PL108-361)	\$2.0	\$85.0	-	-	-	-	\$85	-
Anadromous Fish Screen Program (3406(b)(21))	\$4.0	\$170.0	-	-	-	-	\$68	\$102
BDP Support (PL108-361)	\$6.5	\$975.0	-	-	-	-	\$300	\$675
Assessment and Monitoring Program (3406(b)(16))	\$1.3	\$65.0	-	\$65	-	-	-	-
San Joaquin River salinity management (PL108-361)	\$4.2	\$178.5	-	-	-	-	-	\$179
Delta water quality standards (PL108-361)	\$0.8	\$31.9	-	-	-	-	-	\$32
Tracy Pumping Plant mitigation (W&RR)	\$2.0	\$85.0	-	-	-	-	\$85	-
Interagency Ecological Program (W&RR)	\$6.0	\$300.0	-	\$300	-	-	-	-
Pelagic organism decline (W&RR)	\$1.8	\$90.0	-	\$90	-	-	-	-
CALFED Science Program (PL108-361)	\$4.5	\$225.0	-	\$185	-	-	-	\$40
CALFED Program Management (PL108-361)	\$2.0	\$100.0	\$100	-	-	-	-	-
Total Bureau of Reclamation	\$36.6	\$2,369.1	\$100	\$640	-	-	\$602	\$1,027
U.S. Fish and Wildlife Service								
Land acquisition	\$4.5	\$191.3	-	-	-	\$96	\$96	-

California Bay-Delta Restoration Appropriations, by Agency (listed in order of potential funding level)	FY2011 Cross-Cut Appropriation (BDCP-Related)	Potential Funding over 50-year Permit Term ^b	Allocation by Plan Component for 50-Year Permit Term ^a					
			Program Administration	Monitoring, Research, Adaptive Management, and Remedial Measures	Water Facilities and Operation (CM1, CM22)	Natural Community Protection and Management (CM3, CM11)	Natural Community Restoration (CM2, CM4–CM13)	Other Stressors Conservation (CM13–CM21)
Environmental Restoration Program administration	\$1.2	\$60.0	\$60	-	-	-	-	-
Interagency Ecological Program	\$0.2	\$10.0	-	\$10	-	-	-	-
Total U.S. Fish and Wildlife Service	\$5.9	\$261.3	\$60	\$10	-	\$96	\$96	-
U.S. Environmental Protection Agency	\$5.6	\$238.0	-	-	-	-	\$238	-
U.S. Geological Survey, Interagency Ecological Program	\$3.5	\$175.0	-	\$175	-	-	-	-
Natural Resource Conservation Service	\$2.4	\$102.0	-	-	-	-	\$102	-
National Marine Fisheries Service, Biological Opinion implementation	\$0.3	\$15.0	-	\$15	-	-	-	-
U.S. Army Corps of Engineers								
Delta islands and levees	\$0.5	-	-	-	-	-	-	-
CALFED coordination	\$0.1	-	-	-	-	-	-	-
Notes:								
^a Totals may not add due to rounding error.								
^b For all restoration and other stressors sources, assumes full funding at FY2011 levels for the first 40 years of the permit term, which corresponds to the timeline for all natural community restoration. The final 10 years is assumed to have funding at 25% of this level. BDCP Support (PL108-361) is expected to increase to \$19.5 million annually for the entire permit term (three times current levels). Other sources related to ongoing monitoring and research, program administration, or mitigation for on-going operations are assumed to continue at current levels.								
W&RR = water and related resources; PL = Public Law; FR = <i>Federal Register</i>								

1 This assumption is timed to coincide with the construction period for all natural community
2 restoration (years 1 through 40). Assumptions regarding California Bay-Delta Restoration
3 appropriations for each relevant federal agency are described below.

4 **US Bureau of Reclamation**

5 Of all of the federal agencies, Reclamation receives the majority of the California Bay-Delta
6 Restoration appropriations. At least thirteen authorities for those appropriations overlap with and
7 are expected to support BDCP program administration, monitoring and research, natural
8 community protection, natural community restoration, and other stressors conservation measures
9 (Table 8-55). Appropriations in FY2011 for Reclamation relevant to program administration or
10 monitoring and research are assumed to continue for 50 years at the same level. Appropriations in
11 FY2011 relevant to natural community protection, restoration, or other stressors are assumed to
12 continue at the same level for 40 years, then 25% of current levels for 10 years. The one exception is
13 “BDCP Support” (PL108-361), which is assumed to triple from \$6.5 million annually in FY2011 to
14 \$19.5 million annually throughout the permit term.

15 Included in Table 8-55 are Reclamation’s Water and Related Resources (W&RR) appropriations. In
16 the past, water and related resources funding has been used to support Reclamation programs
17 similar to the conservation measures although mostly not in the Plan Area to date (Bureau of
18 Reclamation 2010a). Water and related resources funding has been consistently used to support
19 Reclamation’s efforts to increase the reliability and efficiency of water delivery systems, protect and
20 restore ecosystems, and address ESA compliance. Because of the overlap in goals, the BDCP is likely
21 to be eligible for substantial funding under this program.

22 **US Fish and Wildlife Service**

23 The California Bay-Delta Restoration appropriations supports three activities relevant to the BDCP:
24 land acquisition to facilitate habitat restoration, administration of the ERP, and support for the IEP
25 for oversight of monitoring and research. Land acquisition funding is assumed to support
26 restoration conservation measures and ERP funding is assumed to support BDCP program
27 administration. Funding for the IEP is assumed to support BDCP monitoring (see Section 8.3.5.2.4,
28 *Interagency Ecological Program (State Funding)* for details).

29 **Environmental Protection Agency**

30 EPA received \$5.6 million in funding in fiscal year 2011 through the California Bay-Delta Restoration
31 appropriations that are relevant to BDCP covered activities for ecosystem restoration (Table 8-55).
32 Funding for this program is assumed to continue and to support natural community restoration
33 under BDCP.

34 **US Geological Survey**

35 USGS plays an important role in how agencies manage the water systems in the Delta. The USGS
36 California Water Science Center based at California State University, Sacramento, collects, analyzes,
37 and disseminates hydrologic data from monitoring stations throughout the Delta and the Central
38 Valley. The following Water Science Center tasks provide examples of the overlap with the
39 monitoring needs of the BDCP (Nickles and Taylor 2010).

- 1 • Maintain a network of real-time flow monitoring stations to help determine the relationships
2 between covered species and water flows. The stations have recently been augmented to
3 measure turbidity, an important physical variable for many covered fish species.
- 4 • Determine the causes and rates of decreased sediment supply and turbidity in the Delta, which
5 may have implications for Delta smelt survival.
- 6 • Tag and track juvenile salmon as they move into Delta channels to better understand how flow
7 conditions, channel geometry, and fish behavior affect salmon survival.
- 8 • Study the Delta's complex water-quality issues, including mercury, pesticides and dissolved
9 organic carbon.

10 USGS received \$3.5 million in funding in fiscal year 2011 through the California Bay-Delta
11 Restoration appropriations relevant to the BDCP (Table 8-55) to support monitoring and targeted
12 research. Funding for this program is assumed to continue and to support BDCP-related monitoring
13 and research needs.

14 **National Resources Conservation Service**

15 NRCS received \$2.4 million in funding in fiscal year 2011 through the California Bay-Delta
16 Restoration appropriations to supplement the Wetlands Reserve Program, which is funded
17 primarily through the Farm Bill. This program supports the acquisition of conservation easements
18 to protect wetlands and related agricultural land, and to restore wetlands in agricultural landscapes.
19 As described in more detail in Section 8.3.6.3.1, *Wetlands Reserve Program (NRCS)*, this program is
20 highly relevant to the goals of BDCP. The funding level in FY2011 is assumed to continue and to
21 support BDCP natural community restoration (Table 8-55).

22 **National Marine Fisheries Service**

23 NMFS received \$1.6 million in funding in fiscal year 2011 through the California Bay-Delta
24 Restoration appropriations. Most of this funding supported oversight and implementation of the
25 requirements of the 2009 NMSF BiOp. Because of the overlap with some BiOp actions and BDCP, an
26 estimated \$0.3 million per year of this funding is assumed relevant to BDCP covered activities (Table
27 8-55). This funding level is assumed to continue and to support BDCP monitoring.

28 **US Army Corps of Engineers**

29 USACE received \$600,000 in funding in fiscal year 2011 through the California Bay-Delta
30 Restoration appropriations relevant to BDCP covered activities (Table 8-55) in two program areas:
31 Delta islands and levees, and CALFED coordination. The goal of the Delta Islands and Levees
32 Program is to restore sustainable ecosystem functions in the Bay-Delta, improve flood risk
33 management, and incorporate recommendations from other Delta planning efforts. The funding was
34 authorized under House Resolution 01 June 1948; House Resolution 08 May 1964; Conference
35 Report 108-357, accompanying the Energy and Water Development Appropriations Act of 2004
36 (Public Law 108-357). This authority and the USACE planning process allows for studying
37 ecosystem restoration needs, flood risk management problems, and related water resources in the
38 Delta, and funding projects to implement recommendations.

39 Federal agencies submit study and construction proposals through the federal budget process. This
40 is a 20-month development and defense cycle, with funding provided by Congress in annual
41 appropriations. Investigations funding is available for feasibility studies (based on annual federal

1 appropriations) and is cost-shared at 50% federal and 50% nonfederal. Construction funding is
 2 available for implementation projects (based on annual federal appropriations) and would likely be
 3 cost-shared at 65% federal and 35% nonfederal. Table 8-56 shows the annual appropriations to this
 4 program.

5 **Table 8-56. Sacramento–San Joaquin Delta Islands and Levees Program Appropriations**

Appropriations	Amount
Fiscal year 2008	\$859,000
Fiscal year 2009	\$478,000
	\$150,000 (Reprogrammed additional)
Fiscal year 2010	\$394,000
Fiscal year 2011	\$239,000

6
 7 To date, the funding source has not funded projects similar to the BDCP. Funding could be provided
 8 by USACE for the repair and relocation of levees associated with BDCP floodplain restoration (e.g.,
 9 *CM5 Seasonally Inundated Floodplain Restoration*). Congressional authorization is required for any
 10 construction projects recommended for USACE implementation. Congress would also need to
 11 appropriate funds to enable project design and construction to proceed. Because of the uncertainty
 12 of this funding source, no funding is assumed for the BDCP from this source at this time.

13 **8.3.6.1.3 Regional Ecosystem Conservation (NMFS)**

14 NMFS is responsible for the stewardship of the nation’s living marine resource and their habitat. In
 15 support of its mission, NMFS focuses on regional ecosystem conservation. The role of NMFS in
 16 President Obama’s interagency ocean policy task force is to help “establish and implement an
 17 integrated ecosystem protection and restoration strategy that is science-based and aligns
 18 conservation and restoration goals at the federal, state, tribal, local, and regional levels.” NMFS
 19 recently identified the San Francisco Bay Delta region as an area within which “there is potential for
 20 [NMFS as a division of the National Oceanic and Atmospheric Administration] to play a significant
 21 role in the bay-delta restoration efforts” (National Marine Fisheries Service 2011a).

22 NMFS provided funding for a variety of local projects through its Office of Habitat Conservation.
 23 Table 8-57 shows NMFS allocation of funds since 2009 and the proposed allocation for 2012.

24 **Table 8-57. NMFS Office of Habitat Conservation Funding Allocations (millions \$)**

	2009 Fiscal Year (Enacted)	2010 Fiscal Year (Enacted)	2011 Fiscal Year (Enacted)	2012 Fiscal Year (Proposed)
Sustainable habitat management	\$21.0	\$22.4	\$20.9	\$22.8
Habitat conservation	\$18.4	\$18.8	\$17.3	\$19.1
Fisheries habitat restoration	\$23.0	\$28.0	\$20.8	\$30.8
Community-based restoration	\$13.1	\$18.6	\$19.0	\$23.9
Source: National Marine Fisheries Service 2011b				

1 There are no current estimates for the funding that NMFS may allocate to the San Francisco Bay
2 Area; however, other targeted regions (e.g., Chesapeake Bay, Great Lakes) have received \$1 to \$1.5
3 million per region, annually, between 2009 and 2011 (National Marine Fisheries Service 2011a).
4 The BDCP is expected to receive a similar level of funding, so it is assumed that an average of \$1
5 million per year would be available from this source for the next 10 years (\$10 million total) to help
6 fund a variety of restoration and other stressor conservation measures.

7 **8.3.6.2 New Federal Authorizations**

8 As described earlier, the Delta is an ecosystem of national significance. The Delta is also the critical
9 conveyance hub for the coordinated operation of the SWP and CVP that facilitates movement of
10 water supplies to more than 25 million people in northern California, the San Francisco Bay Area,
11 the San Joaquin Valley, the central coast, and southern California, and irrigation for over 3.3 million
12 acres of farmland. Implementation of the BDCP will address several issues of national importance
13 including large-scale ecosystem restoration, climate change adaptation, and water supply reliability
14 for the 12th largest economy in the world. An economic impact analysis of the BDCP concludes that
15 the Plan would increase California business output by over \$83.5 billion and create or preserve up
16 to 1.1 million jobs (The Brattle Group 2013). These substantial national public benefits may warrant
17 additional federal authorizations that would provide funding beyond the existing federal
18 authorizations and grant programs listed in this chapter. New federal authorizations would enable
19 federal agencies to request and receive additional appropriations to assist the State of California in
20 implementing the BDCP.

21 The BDCP Permittees intend to collaborate and seek additional federal authorizations through
22 Congress consistent with the public benefits and funding needs of the Plan. This approach is
23 consistent with other large-scale restoration programs that provide substantial public benefits
24 (Table 8-58). For example, local and state permittees for the Lower Colorado River Multi-Species
25 Conservation Plan (also an HCP) sought and obtained new federal authorizations for appropriations.
26 In 2009, Congress authorized a 50% federal cost share for the plan (Public Law 111-11, Title IX,
27 Subtitle E, Section 9401 *et seq.*) subject to future appropriations. In another example, in 2008, the
28 proponents of the three-state Platte River Restoration Program sought and received Congressional
29 authorization for appropriations for up to 50% of that large-scale restoration program (Public Law
30 110-229, Title V, Section 515 *et seq.*).

1 **Table 8-58. Federal Funding Share for Large-Scale Habitat Restoration Programs**

Restoration Program ^a	Federal Funding Share	Nonfederal Funding Share ^b	Notes
Bay Delta Conservation Plan	14%	86%	See Table 8-37 for a funding summary
Chesapeake Bay Restoration Program	27%	72% states; 1% NGOs	Cost share not prescribed. Allocation based on 2007–2011 spending.
Comprehensive Everglades Restoration Plan	50%	50%	
Puget Sound Partnership	33%	67% (state)	Rough estimate based on 2010–2012 spending
Upper Mississippi River Navigation and Ecosystem Sustainability Program	65%	35%	Allocation for ecosystem restoration; for certain projects, federal share is 100%
Missouri River Recovery Program and Missouri River Ecosystem Restoration Plan	Approx. 100%	See note	Primarily federally funded, with non-federal cost-share up to 100% depending on project location and purpose.
Great Lakes Restoration Initiative	Approx. 100%	See note	Mostly federally funded, but cost-share varies by project type.
Lower Colorado River Multi-Species Conservation Program	50%	50%	Federal agencies are responsible for all costs over \$626 million.
Upper Mississippi River Restoration - Environmental Management Program	25% or 100% (see note)	See note	Federal share 100% for fish and wildlife enhancement ^c otherwise 75% nonfederal cost share.
Upper Colorado River Endangered Fish Program	41%	59%	Based on actual contributions FY 1989-2013.
Platte River Recovery Implementation Program	50%	50%	
<p>^a The purposes of these restoration programs varies. Of these, only the Lower Colorado River Multi-Species Conservation Program is an HCP like the BDCP. Like BDCP, these programs share a common goal of large-scale restoration for the benefit of ecosystems, listed species, and ecosystem functions of national importance.</p> <p>^b Includes funding from tribes, states, local agencies, non-governmental organizations (NGOs), and private entities.</p> <p>^c 100% federal cost share where there is a national benefit, benefit to a listed species, or project on a National Wildlife Refuge.</p> <p>NGO = nongovernment organization</p>			

2

3 **8.3.6.3 Existing Federal Grants**4 **8.3.6.3.1 Wetlands Reserve Program (NRCS)**

5 The Natural Resources Conservation Service (NRCS), an agency of the U.S. Department of
6 Agriculture, administers several funding programs that are relevant to BDCP implementation. The
7 most relevant programs are the Wetlands Reserve Program and the Environmental Quality

1 Incentives Program, both of which are provided under the Farm Bill⁶⁶. Under the current Farm Bill
 2 (2008), the Bay-Delta region has received considerable funding. There is no guarantee, however,
 3 that the current level of funding will continue. The Farm Bill is on a 5-year cycle and available
 4 funding from these NRCS programs is dependent on continued Congressional appropriations.

5 The Wetlands Reserve Program provides financial and technical assistance to help landowners
 6 protect, restore, and enhance wetlands on their property. The goal of the program is to “achieve the
 7 greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled
 8 in the program.” Over 2.3 million acres are currently enrolled in the program; however, legislation in
 9 2008 increased the number of acres that can be enrolled to over 3 million.

10 The Wetlands Reserve Program offers five enrollment options: permanent easement, in which NRCS
 11 pays 100% of the easement value and up to 100% of the restoration costs; 30-year easement, in
 12 which NRCS pays up to 75% of the easement value and up to 75% of restoration costs; and
 13 restoration cost-share agreements. In addition, under the provisions of the 2008 Farm Bill, there is a
 14 reserved rights pilot option under which a landowner can reserve grazing rights to the property in
 15 approved counties as long as grazing is compatible with the wildlife habitat goals identified in the
 16 restoration plan. The grazing option has been used on vernal pool landscapes, and in intermountain
 17 wet meadows to manage for greater sandhill cranes. The restoration cost-share agreement does not
 18 require an easement, but involves an agreement for restoration or enhancement of the wetland
 19 functions and values. Under this option, NRCS pays up to 75% of restoration costs. Also, because the
 20 reserved rights pilot option allows the landowner to keep grazing rights to the property, they are
 21 paid 75% of the established per acre value for the easement.

22 Competition for funds under the Wetlands Reserve Program is through individual state funding
 23 allocations and partnership funding contributions are given additional points in the environmental
 24 ranking score. Traditional partners for applicants in the Bay-Delta region are the California Wildlife
 25 Conservation Board and USFWS. In 2011, projects in the Bay-Delta region received \$25 million
 26 through the Wetlands Reserve Program. All of the wetland restoration conservation measures are
 27 closely aligned with the Wetlands Reserve Program. In addition, *CM3 Natural Communities*
 28 *Protection and Restoration* calls for extensive acquisition of conservation easements on a variety of
 29 natural communities that support or could support wetlands and therefore could be eligible for
 30 funding under the Wetlands Reserve Program. To be eligible for Wetlands Reserve Program funds,
 31 lands would need to remain in private ownership. For the purposes of this funding analysis, it is
 32 assumed that private landowners who collaborate with the BDCP could potentially receive an
 33 average of \$2.5 million annually to support BDCP conservation easements (\$125 million total).

34 **8.3.6.3.2 Cooperative Endangered Species Conservation Fund (USFWS)**

35 The USFWS Cooperative Endangered Species Conservation Fund authorized under Section 6 of the
 36 ESA is likely to provide a source of grant funding for land acquisition under the BDCP to support the
 37 contribution to recovery for the terrestrial covered species. Section 6 grants cannot be used for
 38 mitigation. USFWS annually provides significant funds to local agencies implementing regional
 39 HCPs. The Section 6 grant program is divided into three funding categories: HCP Assistance (for

⁶⁶ The Farm and Ranch Lands Protection Program and the Grassland Reserve Program, both also part of the Farm Bill, also overlap with the goals of the BDCP. Although both of these programs are potential sources of funding for the BDCP, neither is discussed because of the limited amount of available funds. If these programs receive more funding from Congress in the future, they could provide additional funds for the BDCP from NRCS.

1 planning), HCP Land Acquisition, and Recovery Land Acquisition grants. Grants are applied for and
 2 administered by CDFW, as summarized in Table 8-59. Implementation is expected to be supported
 3 by the HCP Land Acquisition fund. Once approved, the Plan would no longer qualify for HCP
 4 planning assistance grants.⁶⁷ Recovery land acquisition grants are not associated with approved
 5 HCPs.

6 **Table 8-59. USFWS Cooperative Endangered Species Conservation Grant Programs**

Grant Program	Purpose	Species Benefiting	Applicants	Competition	Financial Match Requirement ^a
HCP Planning Assistance	To support development of HCPs	Federally listed threatened or endangered species, proposed and candidate species, and unlisted species proposed to be covered by the HCP ^b	States or territories that have entered into cooperative agreements with USFWS for endangered and threatened species conservation	National competition	25% of estimated project cost or 10% when two or more states or territories implement a joint project
HCP Land Acquisition	To acquire land associated with conservation under approved HCPs (not mitigation)	Federally listed threatened or endangered species, unlisted (including state-listed species), proposed and candidate species covered by the HCP ^b	States or territories that have entered into cooperative agreements with USFWS for endangered and threatened species conservation	National competition	25% of estimated project cost or 10% when two or more states or territories implement a joint project
Recovery Land Acquisition	To acquire habitat in support of approved recovery goals or objectives	Federally listed threatened or endangered species	States or territories that have entered into cooperative agreements with USFWS for endangered and threatened species conservation	Regional competition	25% of estimated project cost or 10% when two or more states or territories implement a joint project

Notes:

^a As required under Section 6 of the Endangered Species Act, grants to states and territories must include a minimum contribution by the project’s nonfederal partners. These contributions can be in-kind, through staff time or use of nonfederal equipment, or financial assistance.

^b A species covered by the HCP is any species (listed or unlisted) that is included in the Section 10(a)(1)(B) permit, thus receiving incidental take authorization.

HCP = habitat conservation plan; USFWS = U.S. Fish and Wildlife Service

Source: Rinek pers. comm.

7
 8 The HCP Land Acquisition grant provides funding to state and territories to acquire land associated
 9 with approved HCPs. The HCP Land Acquisition and HCP Land Recovery grants cannot be used to
 10 fund the mitigation required of an HCP permittee; instead, they support the land acquisitions by the
 11 state or local governments that complement mitigation.

⁶⁷ The BDCP relied on HCP planning assistance grants in 2008, 2010, 2011, 2012, and 2013.

1 From fiscal year 2002 through 2012, USFWS has made available over \$452 million in land
2 acquisition funds nationally, or an average of \$41.1 million annually. Since 2002, California has
3 received over \$200 million in land acquisition funding for approved HCPs and NCCPs, by far the
4 largest share of any state (45% of the total, or an average of \$18.3 million annually). This is due to
5 the state having the largest number of large-scale approved HCPs and little competition from other
6 states. Grant awards to individual plans in California have ranged from just under \$1 million to over
7 \$23 million; recent awards have been approximately \$6 million per plan per year. This trend is
8 expected to continue but California's share of the funds is likely to decline as more large-scale HCPs
9 are approved in other states.

10 In fiscal year 2011, HCP Land Acquisition grants awarded totaled \$28.6 million nationally. In fiscal
11 year 2012, funding for the HCP Land Acquisition grants was cut by 48%, to \$15 million. The status of
12 this fund in the future is uncertain.

13 Section 6 funding would be applicable primarily to *CM3 Natural Communities Protection and*
14 *Restoration*. Section 6 funding may also apply to the land acquisition portion of restoration
15 conservation measures (i.e., if land acquisition is needed to facilitate restoration). The BDCP is
16 expected to be highly competitive for these grants because of the large number of federally listed
17 species in the Plan Area and its comprehensive ecosystem approach. Based on this, the past
18 performance of California plans, and the assumption that the fund will grow in the future to its
19 historical funding amounts, the BDCP has the potential to receive an estimated \$50 million from
20 Section 6 funds for CM3 over the permit term. This conservative assumption is consistent with the
21 performance of California NCCPs of comparable size and complexity that have secured the largest
22 amounts of Section 6 funding since 2002.⁶⁸

23 With respect to the Section 6 Land Acquisition grants, the BDCP will likely be competing with other
24 regional HCPs in California, including those that overlap with the Plan Area (Chapter 1, Section 1.5,
25 *Relationship to Other Plans in the Delta*). The Implementation Office will work with the sponsors of
26 these regional conservation plans to encourage an increase in federal appropriations to support this
27 program to ensure that sufficient funds are available to all eligible plans in California. The
28 Authorized Entities will not seek Section 6 land acquisition grants unless available funding under
29 the program exceeds the level set for fiscal year 2010 (\$40.9 million), after any successful grants
30 received by the BDCP are deducted and after any corrections for inflation.

31 **8.3.6.3.3 Environmental Quality Incentives Program (NRCS)**

32 The NRCS Environmental Quality Incentives Program is designed to provide financial and technical
33 assistance to farmers and ranchers for addressing natural resources concerns. Under this program,
34 NRCS awards cost-share assistance to projects that provide significant environmental benefits.
35 NRCS provides conservation practice payments to landowners under program contracts of up to 10
36 years. To determine which projects are allocated funds, priority natural resource concerns are
37 identified within each state. Water quality and water quantity projects, like the BDCP, are given very
38 high priority in California. In 2011, projects in the Bay-Delta region received \$70 million through the
39 program.

⁶⁸ *San Diego County Multi-Species HCP/NCCP* (\$56 million in 11 years); *Western Riverside County HCP/NCCP* (\$46 million in 11 years); *East Contra Costa County HCP/NCCP* (\$33 million in 7 years).

1 Traditionally, under the Environmental Quality Incentives Program, individuals are limited to
2 \$300,000 for all contracts entered into in a 6-year period and participants whose projects have been
3 determined by NRCS to have “special environmental significance” may petition for the payment
4 limitation to be increased to \$450,000. Despite these funding limitations, the size of the applicant
5 project does not affect the applicability of the potential funding mechanism. Therefore, NRCS can
6 provide funds for larger-scale projects that provide on-farm benefits.

7 Although NRCS does not directly fund the public and private entities who will be implementing the
8 BDCP, NRCS may work with an agency that can provide direct funding to these entities. For example,
9 NRCS is currently working with Reclamation on the WaterSMART program. This program provides
10 water districts, among others, with the opportunity to leverage their money and resources by cost
11 sharing with Reclamation on projects that save water, improve water management, create new
12 supplies for agricultural irrigation, improve energy efficiency, benefit endangered species, and
13 increase the capability or success rate of on-farm water conservation or water use efficiency
14 projects. Under this program, water districts describe how the improvements will benefit end users
15 and NRCS makes available on-farm funding. Through this joint venture, NRCS and Reclamation put
16 forward \$5 million and NRCS gave an additional \$2 million. All funds under this program were
17 received by entities in the Bay-Delta area. NRCS and Reclamation are planning to continue this
18 program again in the next fiscal year. Cultivated lands acquired through conservation easements or
19 fee-title as part of *CM3 Natural Communities Protection and Restoration* could be eligible for grant
20 funding under this program.

21 NRCS could create a new partnership with other agencies that can provide money to water districts
22 or other BDCP entities (e.g., DWR) as long as the two entities collaborate to set up a program that
23 addresses water quality and water quantity issues and which benefits farmers directly. For the
24 funding analysis, the BDCP is assumed to have the potential to receive an average of \$1 million
25 annually from this program to support BDCP conservation easements (\$50 million total).

26 **8.3.6.3.4 Land and Water Conservation Fund**

27 The Land and Water Conservation Fund was established by Congress in 1965 to receive a portion of
28 receipts from offshore oil and gas leases be placed into a fund annually for state and local
29 conservation, as well as for the protection of national treasures (parks, forest, and wildlife areas).
30 The fund has been the principal funding source for federal land acquisitions for conservation and
31 recreation purposes since 1965. The Bureau of Land Management, USFWS, the National Park
32 Service, and the U.S. Forest Service all receive funds from the Land and Water Conservation Fund.
33 The fund also serves as a major source of state and local funding for land acquisition and
34 development of public outdoor recreation resources through a state matching grant program.
35 Funding for the program has remained flat since at least 2002. In fiscal year 2011, the fund was
36 allocated \$301 million for land acquisition nationwide. Allocations nationwide in past years have
37 been as low as \$138 million (fiscal year 2007) and as high as \$536 million (fiscal year 2001).

38 The State Wildlife Grant Program is funded annually with an appropriation from Congress through
39 the Land and Water Conservation Fund. The goal of the grant program is to conserve wildlife and
40 their habitats. Grants are available to states and territories and are intended for developing and
41 implementing programs that benefit fish and wildlife species at risk and their habitats. The grant
42 program provides states with funds to address the conservation needs of nongame species,
43 including reptiles, amphibians, and invertebrates. Priority is placed on projects that benefit species
44 of greatest conservation concern. Grant funds must be used to address conservation needs, such as

1 research, surveys, species and habitat management, and monitoring, identified within a state's
2 comprehensive wildlife conservation plan or strategy.

3 The State Wildlife Grant Program of the Land and Water Conservation Fund may fund land
4 acquisition with *CM3 Natural Communities Protection and Restoration*. Over the history of the fund,
5 western states have received the majority of the funding because federal land is much more
6 common in the west. California has received an average of approximately \$50 million annually over
7 the 45-year life of the fund, although less in recent years due to declining funding allocations. The
8 BDCP is expected to be competitive for this funding. The funding plan assumes that the BDCP has the
9 potential to receive \$25 million over the permit term for CM3.

10 **8.3.6.3.5 National Coastal Wetlands Conservation Grant Program (USFWS)**

11 The National Coastal Wetlands Conservation Grant Program was established by Title III of Public
12 Law 101-646, Coastal Wetlands Planning, Protection and Restoration Act of 1990. Under this
13 program, USFWS provides matching grants to states for acquisition, restoration, management, or
14 enhancement of coastal wetlands.

15 Eligible applicants are any state agency or entity designated as eligible by the governor of a coastal
16 state. The following California agencies have been designated as eligible to apply for program
17 grants: State Coastal Conservancy, Wildlife Conservation Board, Rivers and Mountains Conservancy,
18 California Conservation Corps, California Natural Resources Agency, Department of Fish and Game,
19 Santa Monica Mountains Conservancy, San Diego River Conservancy, and the California Coastal
20 Commission.

21 The following activities are eligible for grants.

- 22 ● Acquisition of a real property interest in coastal lands or waters from willing sellers or partners
23 (coastal wetlands ecosystems), providing that the terms and conditions will ensure the real
24 property will be administered for long-term conservation.
- 25 ● The restoration, enhancement, or management of coastal wetlands ecosystems, providing
26 restoration, enhancement, or management will be administered for long-term conservation.

27 Typically, between \$13 million and \$17 million in grants are awarded annually through a
28 nationwide competitive process. In the last four fiscal years (fiscal years 2008 through 2011),
29 California received an average of \$3.7 million annually. In fiscal year 2012, the grant program will
30 fund 24 individual projects in 13 states encompassing nearly 13,950 acres of coastal habitat. USFWS
31 expects that approximately \$17.5 million will be available for grants in fiscal year 2013.

32 The Coastal Wetlands Planning, Protection and Restoration Act of 1990 provides that projects
33 meeting certain criteria will be given priority. The following criteria are consistent with the BDCP.

- 34 ● Consistent with the National Wetlands Priority Conservation Plan.
- 35 ● Located in states with dedicated land acquisition programs.
- 36 ● Benefitting threatened and endangered species, promoting partnerships, and supporting
37 conservation and recovery programs.

38 The program will not provide grants to support planning, research, monitoring activities, or
39 construction or repair of structures for recreational purposes. Awards typically range from
40 \$200,000 to a maximum of \$1 million. The BDCP is expected to be competitive for grants through

1 this program for a variety of conservation measures, but funding levels will likely be modest due to
2 limited annual funding amounts. Based on the trends in funding nationally and in California, the
3 BDCP assumes receipt of up to \$5 million over the permit term, or five awards of the maximum \$1
4 million amount.

5 **8.3.6.3.6 Restoration Partnership Grants (NMFS)**

6 NOAA's Restoration Center national and regional partnership grants provide funding for multiyear
7 national and regional habitat restoration partnerships that will result in the implementation of
8 habitat restoration projects, including watershed-scale projects that yield significant ecological and
9 socioeconomic benefits. Through these partnerships, the NOAA Restoration Center is able to
10 leverage funds and effort for restoration through match and in-kind contributions. The NOAA
11 Restoration Center has successfully funded this program for over 20 years (National Marine
12 Fisheries Service 2011e).

13 Partnerships are granted in 3-year cycles with typical partnership awards ranging from \$500,000 to
14 \$1 million. Approximately \$10 million is available through this program annually (National Marine
15 Fisheries Service 2011e). The program is currently funding 18 national and regional partnerships in
16 the current 3-year funding cycle. Organizations funded through this program that could support
17 BDCP conservation measures that contribute to species recovery (i.e., not mitigation) include
18 American Rivers, The California State Coastal Conservancy, Ducks Unlimited, The Nature
19 Conservancy, Restore America's Estuaries, and Trout Unlimited (National Marine Fisheries Service
20 2011f).

21 NMFS priority partnership selection criteria that will likely be met by the BDCP are listed below
22 (National Marine Fisheries Service Funding Announcement 2009).

- 23 ● Significant ecological and societal benefits (e.g., job creation).
- 24 ● Demonstration of sound science support for restoration.
- 25 ● Accountability through specific goals and outcomes.
- 26 ● Cost-effective use of funds and matching.

27 The conservation measures that would likely be most applicable to the partnership grants include
28 *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and other
29 conservation measures that directly benefit covered fish such as *CM15 Localized Reduction of*
30 *Predatory Fishes*. The BDCP has the potential to secure NMFS partnership grants at an estimated
31 average of \$500,000 annually for 20 years (\$10 million total).

32 **8.3.6.3.7 Estuary Habitat Restoration Projects (NMFS)**

33 The Estuary Restoration Act of 2000 makes restoring estuaries a national priority. Although USACE
34 was originally the only member agency authorized to receive funding for project implementation
35 under the act, amendments in 2007 authorized NOAA to receive appropriations of \$2.5 million per
36 year to carry out restoration projects. The amendments also authorized monitoring costs associated
37 with a funded project to be included in the total cost of the project (National Marine Fisheries
38 Service 2011c).

39 NMFS solicits proposals for estuary habitat restoration projects that "achieve cost-effective
40 restoration while prompting partnerships among agencies and between public and private sectors."

1 Eligible applicants include, among others, state and local governments, and nonprofit organizations.
 2 Funding awards range from \$100,000 to \$1 million (National Marine Fisheries Service 2011c).

3 NMFS first considers projects that meet the following criteria.

- 4 ● Are designed to address projected climate change impacts.
- 5 ● Occur in a watershed where there is a program being implemented that addresses sources of
 6 pollution and other activities that otherwise would adversely affect the restored habitat.
- 7 ● Include pilot testing or demonstration of an innovative technology or approach having the
 8 potential to achieve better restoration results than conventional technologies, or comparable
 9 results at lower cost in terms of energy, economics, or environmental impacts (National Marine
 10 Fisheries Service 2011d).

11 NMFS can allocate funds in excess of its appropriated funding amount of \$2.5 million through cost-
 12 share agreements with USACE or a cooperative agreement with USACE or NOAA, subject to
 13 availability of funds. In 2011, NMFS allocated \$7 million among estuary restoration projects
 14 (National Marine Fisheries Service 2011d). To date, no projects have been funded in California.

15 Based on the goals of the Estuary Restoration Act and the projects in other states funded to date, the
 16 conservation measures that would likely be most applicable to this program include *CM2 Yolo*
 17 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
 18 *Inundated Floodplain Restoration*. Other restoration conservation measures may also qualify.
 19 Because the goals of the BDCP align well with the goals of the Estuary Restoration Act and this
 20 funding program, the BDCP is expected to be highly competitive for these grants. Assuming this
 21 program is funded for another 10 years, the BDCP has the potential to secure an average of
 22 \$500,000 annually (\$5 million total).

23 **8.3.6.3.8 San Francisco Bay Area Water Quality Improvement Fund (EPA)**

24 EPA administers or has administered several grant programs that overlap in purpose with BDCP
 25 implementation. The only currently active grant program that is relevant to the BDCP is the San
 26 Francisco Bay Area Water Quality Improvement Fund⁶⁹.

27 The San Francisco Bay Area Water Quality Improvement Fund is a competitive grant program with
 28 the goal of protecting and restoring the San Francisco Bay and its watershed. Congress has been
 29 funding the program, which is administered by EPA, since 2008. Since the inception of the fund, EPA
 30 has awarded over \$20 million through 10 grants to 38 projects. In the future, awards will range in
 31 amount from \$500,000 to \$2 million over a 4-year period. Successful applications must demonstrate
 32 results concerning one or more of the following San Francisco Bay water quality priorities.

- 33 ● Protecting and restoring habitat, including riparian corridors, floodplains, wetlands, and the
 34 Bay.
- 35 ● Reducing polluted run-off from urban development and agriculture.

⁶⁹ In 2008, EPA administered the West Coast Estuaries Initiative for the California coast, which provided \$5 million to conserve, restore, and protect the water quality, habitat, and environment of California coastal waters, estuaries, bays and near shore waters through comprehensive approaches to water quality management. Although funding for this program was not renewed, it demonstrates that EPA may periodically provide funding for implementation beyond the sources described.

- 1 • Implementing TMDL standards and watershed plans to restore impaired water bodies.

2 An example of a funded project similar to the BDCP is the Dutch Slough Restoration Project in Contra
3 Costa County. This project is in the Plan Area and in the West Delta ROA. In 2011, EPA provided
4 \$1.4 million to help fund this tidal marsh restoration project. Although the San Francisco Bay Area
5 Water Quality Improvement Fund is limited in use to nine counties in the Bay Area, BDCP
6 restoration projects in Solano County (Suisun Marsh) and Contra Costa County (Dutch Slough) will
7 qualify because they occur in one of the Bay Area counties authorized for funding.

8 At a minimum, the following conservation measures are aligned with the focus of this fund and
9 would likely be eligible for funding: *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*
10 *Inundated Floodplain Restoration*, *CM6 Channel Margin Enhancement*, *CM7 Riparian Natural*
11 *Community Restoration*, and *CM10 Nontidal Marsh Restoration*.

12 The lifespan of this fund is unknown. For the purposes of the funding analysis, the BDCP has the
13 potential to receive at least \$5 million from this fund.

14 **8.3.6.4 Other Federal Funding Sources**

15 **8.3.6.4.1 Federal Loan Guarantees for Multiple Species Habitat** 16 **Conservation Plans**

17 A bill was introduced in Congress in June 2013 by Senator Dianne Feinstein that would provide
18 federal loans or create federal loan guarantees for public agencies that buy land for habitat
19 conservation as long as the plans support transportation and infrastructure efforts. This proposed
20 program, called the Infrastructure Facilitation and Habitat Conservation Act of 2013, would operate
21 in the U.S. Treasury, with input from the U.S. Departments of Interior and Commerce. If signed into
22 law, the Secretary of the Treasury would be tasked with soliciting loan applications for HCPs once
23 every calendar year. The Secretary of the Interior would evaluate the loan applications based on the
24 following criteria.

- 25 • The HCP eligibility status under Section 10 of the ESA.
26 • The likelihood that the HCP habitat acquisition program will be completed.
27 • Whether the HCP contemplates the mitigation of infrastructure projects.

28 The Secretary of the Treasury would evaluate the following elements.

- 29 • Financial soundness and sustainability of the HCP.
30 • Ability to be repaid by the public entity requesting the loan.
31 • Any other factor deemed appropriate.
32 • Recommendations from the Secretary of the Interior.

33 The bill does not specify a dollar amount to be appropriated for this loan program, which has a
34 10-year sunset clause. If signed into law, this loan and loan guarantee program could provide the
35 BDCP with loans early in the permit term that would facilitate land acquisition from willing sellers
36 for the reserve system (*CM3 Natural Communities Protection and Restoration*) and when necessary
37 to enable natural community restoration until funding sources were available later in the permit
38 term. This program would not provide new funding, so this funding plan does not assume this is a
39 potential funding source.

1 **8.3.7 Other Funding Sources**

2 **8.3.7.1 Interest Income**

3 The BDCP is expected to gain limited income from interest on revenue not yet spent. The interest
4 estimate assumes that the fund balances will earn an average interest rate of 2.2%. Future interest
5 rates are uncertain; however, this may be a somewhat conservative assumption. The average
6 apportionment yield rates earned on the State of California Investment Pooled Money Investment
7 Account-Surplus Investment Fund balances averaged 2.2% over the 10-year period of 2002 through
8 2011. During this 10-year period, the highest quarterly rate was 5.2% in 2007 and the lowest was
9 0.38% in 2011 (California State Controller's Office 2012).

10 The monetary income from water contractor debt service is estimated to be on average
11 approximately \$1.1 billion annually from 2021 through 2055. Agencies often hold operating reserve
12 balances equal to approximately 20% of their annual revenue. Thus, it is estimated that the
13 Implementation Office or its designee would hold 20% of the annual revenue from water contractor
14 debt service in an operating reserve, on average approximately \$220 million per year. (The BDCP
15 assumes no interest generated from grant funds due to the typical requirement to spend grants
16 immediately.) Using this assumption, interest income from nongrant revenue is estimated to be \$4.8
17 million per year, and approximately \$164.6 million over the 34-year period of applicable debt
18 service.

19 **8.3.7.2 Endowment**

20 An endowment is a method used to generate annual management funding over long time horizons.
21 The endowment is an interest-bearing account in an amount sufficient to generate enough yearly
22 income to fund annual project management. Because only the interest is available for use and the
23 principal is not withdrawn, an endowment is *nonwasting*, providing a perpetual source of funding.
24 An endowment may be funded upfront or in increments.

25 According to Senate Bill 1094 filed in September 2012, if a state or local agency authorizes nonprofit
26 organizations to hold lands or natural resources created for mitigation purposes, the state or local
27 agency may require an administrative endowment from the project proponent for costs associated
28 with reviewing qualifications, approving holders, and regular oversight of compliance and
29 performance. The state or local public agency may also require project proponents to provide a
30 separate account managed by the state or a third party that will provide for initial management
31 costs while the endowment matures. The state managed approach deposits funds in the state
32 treasury special deposit fund and the state reimburses the third-party land managers for annual
33 expenses from the endowment interest earnings. The third-party approach allows a state approved
34 entity to hold and manage endowment funds. Interest earnings on the department are disbursed
35 directly by the third party to land managers for land management purposes.

36 At the end of the permit term, certain management and administrative costs will continue *in*
37 *perpetuity*. It is assumed these costs will be paid from a nonwasting endowment that will be funded
38 over the course of the permit term. Interest from the fund will be used for ongoing management and
39 administrative costs following the end of the permit. Costs to be paid from the endowment include
40 ongoing costs for preserve management, administration, and land use monitoring. Endowment costs
41 are assumed to end in year 50.

1 The annual rate of return on the endowment funds affects the availability of annual funds: the lower
 2 the rate earned on endowment funds, the higher the initial principal endowment costs. Under *CM11*
 3 *Natural Communities Enhancement and Management*, an endowment will be established for post-
 4 permit term costs of CM3 through CM10. The endowment is to provide funding for the costs of land
 5 management and limited monitoring following the 50-year permit term for these conservation
 6 measures (estimated at an average of \$7.6 million per year). Endowment funding assumes an
 7 average annual nominal rate of return of 4.4%—consistent with a conservatively invested portfolio
 8 of bonds and T-bills—and an average annual inflation rate of 2.1%. For the BDCP, annual funding for
 9 the endowment is expected to come from the water bonds,⁷⁰ the state and federal water contractors,
 10 and federal contributions to the BDCP.

11 **8.3.7.3 State Tax Credit for Donation of Conservation Lands**

12 The Natural Heritage Preservation Tax Credit Act of 2000 (Public Resources Code 37000 *et seq.*)
 13 protects wildlife habitat, parks and open space, archaeological resources, and agricultural land and
 14 water by providing state tax credits for donations of qualified land in fee title or conservation
 15 easement.⁷¹ The program has been extended twice. The current authorization extends until June 30,
 16 2015. To date, \$48.2 million in tax credits have been approved under the program. The BDCP could
 17 benefit from this program, if extended further, by cost-sharing land acquisition with the federal
 18 government. Future bonds would provide funding for the state portion of the tax credit. Eligible
 19 donors would also be able to deduct the full value of land as a tax deduction from the federal
 20 government, for up to 60% of the value of the land. Using this method, the BDCP could save up to
 21 60% on the cost of land acquisition for protection (CM3) or restoration purposes (CM4 to CM10).
 22 The amount of this savings is unknown, so no amount is assumed as part of the funding strategy.

23 **8.4 Funding Assurances**

24 As shown in Table 8-37, funding sources are expected to meet all anticipated costs of the BDCP. The
 25 potential funding sources described in this chapter have been estimated conservatively. That is,
 26 costs may be lower than estimated, or actual funding from state and federal sources may exceed
 27 these projections. For example, actual funding from the 2014 state water bond may exceed
 28 projected amounts. Specific funding assurances from the state and federal water contractors are
 29 described in Section 8.3.4.4, *Funding Assurances from Participating State and Federal Water*
 30 *Contractors*. As such, adequate funding to implement the BDCP has been assured.

31 The Implementation Office will annually evaluate the performance of the funding mechanisms and,
 32 notwithstanding other provisions of the Plan, will develop any necessary modifications to the
 33 funding mechanisms to address additional funding needs (such review would be included in the
 34 Annual Progress Report, Five-Year Implementation Plan, and Five-Year Comprehensive Review).
 35 Additionally, this annual evaluation will include an assessment of the funding plan and anticipate
 36 funding needs over the next several years to identify any potential deficiencies in cash flow. If
 37 deficiencies are identified through this evaluation, then the Implementation Office will develop
 38 strategies to address any additional funding needs consistent with the terms and conditions of the

⁷⁰ California Water Code Section 79044 allows state grants to be used for “trust funds” to pay for maintaining land as long as the amount of the trust fund does not exceed 20% of the amount paid for the land acquisition.

⁷¹ See <http://www.wcb.ca.gov/Tax> for details.

1 BDCP. This section discusses potential causes of additional funding needs and how these needs will
2 be addressed.

3 **8.4.1 Additional Funds Needed for Restoration,** 4 **Management, or Monitoring**

5 The costs of restoration, management, and monitoring assumed contingencies in their estimates of
6 20, 10, and 20%, respectively. These contingency assumptions are designed to account for potential
7 increases in costs unrelated to inflation. However, despite these assumptions, costs may still exceed
8 estimates. If costs of restoration, management, or monitoring are predicted to exceed revenue on a
9 long-term basis, then the Implementation Office will consider the following actions.

- 10 • Funding sources will be adjusted to cover the costs of management, monitoring, or restoration
11 without jeopardizing other components of implementation.
- 12 • New funding sources will be identified to supplement existing funding, consistent with
13 regulatory assurances provided.
- 14 • Endowment funds may be advanced on a short-term basis to maintain the restoration,
15 management, or monitoring program requirements of the Plan.
- 16 • Management, restoration, or monitoring actions may be deferred until funding sources are
17 available as long as Plan requirements are still met, including the rough proportionality
18 standard described in Chapter 6, *Plan Implementation*.
- 19 • Adjust management or monitoring activities consistent with the goals of the Plan.

20 As described in Chapter 3, Section 3.6, *Adaptive Management and Monitoring Program*, the
21 monitoring and adaptive management program may identify that some conservation measures are
22 more effective than others at achieving the biological goals and objectives of the Plan. In this case, it
23 may be warranted to increase the effort or accelerate the timing of some conservation measures
24 over others. Decisions made through the adaptive management and monitoring program may result
25 in alterations to the implementation costs and funding allocations described in this chapter, and
26 such changes would be described in the Annual Workplan and Budget, Five-Year Implementation
27 Plan, Five-Year Comprehensive Review and any Plan amendment documentation.

28 For example, it may be more effective to improve survival of covered fish species to invest in more
29 aggressive control of IAV (e.g., CM13). If other conservation measures are found to be less effective
30 in achieving the same biological goals and objectives, funding for less effective conservation
31 measures could be reallocated to more effective conservation measures, within the requirements of
32 the funding sources (e.g., grant requirements). Another example is the potential to provide
33 additional funding for outflows in exchange for funding for habitat restoration if outflows are found
34 to be much more effective at conserving the covered species than tidal wetland restoration.

35 Some changes may require a minor or major amendment to the BDCP. See Chapter 6, *Plan*
36 *Implementation*, for rules regarding changes to the Plan.

8.4.2 Actions Required in the Event of a Shortfall in State or Federal Funding

The Plan participants have committed to provide substantial resources to ensure the proper implementation of the Plan. One goal of this chapter is to demonstrate that this funding will be adequate for such purposes and will be forthcoming. However, in the unanticipated event of a shortfall in state or federal funding, the Implementation Office will make reasonable adjustments to expenditures to continue to meet the obligations of the Plan. If these adjustments are inadequate to meet Plan requirements, the Implementation Office will confer with the fish and wildlife agencies to identify alternative courses of action. Actions that may be considered to address such shortfalls include adjusting the scope of the Plan in proportion to the public funding shortfall. Such actions may focus initially on the terrestrial components of the Plan and would be incorporated into the Plan through the major amendment process described in Chapter 6, Section 6.5, *Changes to the Plan or Permits*. The Authorized Entities will not be required to provide land, water, or monetary resources beyond their commitments in this Plan in the event of a shortfall in state or federal funding.

8.4.3 Funding for Management and Monitoring After the Permit Term

After the permit term, all of the Authorized Entities are obligated to continue to protect, manage, and maintain the reserve system. This includes adaptive management and monitoring at a level sufficient to determine whether management is effective. Other obligations, however, disappear after the permit term. For example, preservation, enhancement, and restoration obligations will be completed prior to the end of the permit term and will not continue after the permit term expires. Remedial measures and contingency also no longer need to be funded after the permit term.

Annual costs for activities after the permit term are estimated at \$7.6 million per year (2012 dollars). Costs include preserve management, program administration, monitoring, and legal defense of easements. Actual long-term costs may be lower if the Implementation Office can develop streamlined procedures for management and monitoring during the permit term or reduce administrative costs. Responsibility for funding long-term management and monitoring rests solely with the Authorized Entities.

Funding provided by interest on the endowment is expected to fully fund post permit costs. Any shortfalls in the endowment during the permit term will be identified by the 5-year funding assessments conducted by the Implementation Office. If the endowment is not growing fast enough to reach its target size, then the Implementation Office must make up the shortfall through additional funding sources. With these built-in safeguards in the endowment, post-permit funding is expected to be adequate to offset post-permit costs of management and monitoring.

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