

This chapter focuses on issues related to human health and safety that could potentially be affected by implementation of the action alternatives, particularly with respect to water quality, the potential to cause or worsen water borne illness, the potential to create habitat for vectors that may carry diseases; and to address potential health related concerns from additional electric transmission lines needed under most of the alternatives. Although some potential health-related impacts of the alternatives are discussed in other chapters of this EIR/EIS (please see Chapter 8, *Water Quality*, Chapter 9, *Geology and Seismicity*, Chapter 10, *Soils*, Chapter 11, *Fish and Aquatic Resources*, Chapter 12, *Terrestrial Biological Resources*, Chapter 14, *Agricultural Resources*, Chapter 22, *Air Quality and Greenhouse Gas Emissions*, Chapter 23, *Noise*, Chapter 24, *Hazards and Hazardous Materials*, and Chapter 28, *Environmental Justice*), the primary focus of those other chapters is not on public health. The specific topics addressed in this chapter are listed below.

- Drinking water quality as related specifically to humans.
- Bioaccumulation of toxicants in fish and aquatic organisms that are consumed by humans.
- Pathogens in recreational waters.
- Vectors—specifically, disease carrying mosquitoes.
- Electromagnetic fields from transmission lines that may be required by an alternative and that could affect the public.

This chapter does not duplicate the information provided in other sections of the EIR/EIS, but rather focuses the discussion on potential impacts on human health of implementing the action alternatives. As indicated above, this chapter also includes a discussion of the potential effects of implementing the action alternatives on human health related to pathogens in recreational waters and disease-carrying vectors, topics not addressed in any other chapter of the EIR/EIS.

The reader is referred to Chapter 6, *Surface Water*, Chapter 22, *Air Quality and Greenhouse Gas Emissions*, and Chapter 24, *Hazards and Hazardous Materials*, for a discussion of potential public health and safety effects related to potential levee failure and flooding, air quality, and release of hazardous materials, respectively, as a result of project implementation. Chapter 20, *Public Services and Utilities*, discusses the ability of existing public services in the Plan Area to provide fire protection, emergency response, and hospital and medical services facilities.

25.0 Summary Comparison of Alternatives

A summary comparison of important public health impacts is provided in Figure 25-0. This figure provides information on the magnitude of the most pertinent and quantifiable public health impacts that are expected to result from all alternatives. Important impacts to consider include the increase in surface water that could result in an increase in vector-borne diseases as a result of the construction and operation of the water conveyance facilities or as a result of an increase in habitat from the implementation of conservation actions.

1 As depicted in Figure 25-0, increases in surface water because of construction and operation of the
 2 water conveyance facilities could result in an increase in vector-borne disease in the Plan Area.
 3 Alternative 2D would result in the greatest number of water bodies that could host disease vectors,
 4 26. No such water bodies would be created under the No Action Alternative or Alternative 9.
 5 Alternatives 4 and 4A would fall near the top of this range, at 24 water bodies.

6 Each alternative, with the exception of the No Action Alternative, would provide restored habitat
 7 that could be a breeding ground for disease vectors. Of the BDCP alternatives, almost all would
 8 include the greatest amount of restoration, 83,839 acres. The non-HCP alternatives would provide
 9 far less habitat restoration. Alternative 5A would restore the least amount of habitat, 15,516 acres.
 10 Alternative 4A would restore 15,836 acres of habitat, and Alternative 2D would restore 18,097 acres
 11 of habitat.

12 Table ES-8 in the Executive Summary provides a summary of all impacts disclosed in this chapter.

13 **25.1 Environmental Setting/Affected Environment**

14 This section summarizes existing conditions related to drinking water, the bioaccumulation of
 15 toxicants in aquatic resources, pathogens in recreational waters, disease-carrying vectors, and
 16 electromagnetic fields from proposed project transmission lines within the study area.

17 The discussion of drinking water covers various nutrients, metals, chemicals, and the physical
 18 conditions that affect the quality of water resources as related to human health. Bioaccumulation
 19 concerns the uptake of toxicants into the tissues of fish and shellfish, and has the potential to affect
 20 the health of those who consume fish and shellfish on a regular basis. Pathogens (disease-causing
 21 micro-organisms) in water can create adverse health effects in people who use the Delta for
 22 recreational activities. The discussion of vectors concerns the spread of disease through mosquitoes.
 23 While the California Public Utilities Commission (CPUC) does not recognize the potential adverse
 24 health impacts related to electromagnetic field (EMF) exposure generated by transmission power
 25 lines, this chapter discusses the potential for adverse health effects associated with EMF exposure in
 26 relation to new transmission lines in the study area and extending immediately outside of the study
 27 area. Proposed transmission lines for each alternative are depicted in detail in Mapbook Figures M3-
 28 1, M3-2, M3-3, M3-4, and M3-5 in Chapter 3, *Description of Alternatives*.

29 Federal, state, and local agencies responsible for water quality regulations and standards for
 30 drinking water under which bioaccumulation of toxicants and waterborne pathogens are managed,
 31 are discussed in Section 25.2, *Regulatory Setting*.

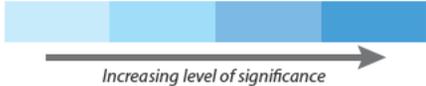
32 **25.1.1 Potential Environmental Effects Area**

33 For the purposes of this analysis, the study area (the area in which impacts may occur) for public
 34 health is defined as the Plan Area (the area covered by the action alternatives) and Areas of
 35 Additional Analysis. As defined in Chapter 1, *Introduction*, the Plan Area encompasses the aquatic
 36 and terrestrial ecosystems, the natural communities and adjacent riparian and floodplain natural
 37 communities within the statutory Delta (as defined in Water Code Section 12220), as well as the
 38 Suisun Marsh and Yolo Bypass (see Figure 1-9 in Chapter 1). The statutory Delta includes parts of
 39 Yolo, Solano, Contra Costa, San Joaquin, and Sacramento Counties. The Areas of Additional Analysis
 40 are two areas outside the defined Plan Area that encompass power transmission corridors. One area

Chapter 25 – Public Health	Alternative																			
	Existing Condition	No Action	1A	1B	1C	2A	2B	2C	3	4	5	6A	6B	6C	7	8	9	4A	2D	5A
PH-1: Increase in surface water in Plan Area that could result in increase in vector-borne diseases as a result of construction and operation of the water conveyance facilities (Number of lagoons/basins/forebays/inundation areas)	n/a	0	28	26	26	23	21	26	11	24	7	23	26	26	15	18	0	24	26	22
	n/a	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA
PH-5: Increase in surface water in Plan Area that could result in increase in vector-borne diseases as a result of implementing CM2-CM7, CM10 and CM11 (Acres of restoration)	n/a	0	83,839	83,839	83,839	83,839	83,839	83,839	83,839	83,839	43,839	83,839	83,839	83,839	93,839	83,839	83,839	15836	18,097	15,516
	n/a	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA

Key

Level of significance or effect **before** mitigation (Quantity of impact: number of sites, structures, acres, etc. affected)



Increasing level of significance

n/a not applicable
> greater than
< less than
≈ about equal to

Level of significance or effect **after** mitigation (CEQA Finding / NEPA Finding)

<p>CEQA Finding</p> <p>NI No Impact</p> <p>LTS Less than significant</p> <p>S Significant</p> <p>SU Significant and unavoidable</p>		<p>NEPA Finding</p> <p>B Beneficial</p> <p>NE No Effect</p> <p>NA Not Adverse</p> <p>A Adverse</p>
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Figure 25-0
Comparison of Impacts on Public Health

1 lies west of the Plan Area and is considered in analysis of proposed action alternatives that include
2 the western alignment (Alternatives 1C, 2C, and 6C); the other area lies east of the Plan Area and
3 represents the transmission line alignment analyzed for Alternative 4) (see Mapbook Figures M3-1,
4 M3-2, M3-3, M3-4, and M3-5 in Chapter 3, *Description of Alternatives*).

5 Potential public health impacts occurring as a result of the action alternatives primarily would be
6 localized. Given downstream flows, potential health effects from water quality-related impacts
7 would not be transported upstream, and therefore this chapter does not discuss public water
8 related health effects in the Upstream of the Delta Region. Potential drinking water impacts would
9 occur first and most prominently in the study area because, after water is exported to other areas of
10 the state, it is treated and distributed by water purveyors and districts; thus, this chapter discusses
11 the State Water Project (SWP)/Central Valley Project (CVP) Export Service Areas only as necessary.
12 Potential spread of disease through mosquitoes is expected to occur only within the study area
13 because of the life cycle of mosquitoes and the distance they travel. It is not expected that there
14 would be significant impacts from vectors outside of the study area. Additionally, potential effects
15 on public health from EMF exposure would be limited to the areas surrounding the new
16 transmission lines, which would be confined within the Plan Area and in the Areas of Additional
17 Analysis. If an alternative that includes one of these corridors is selected, the extension will be
18 incorporated into the Plan Area.

19 **25.1.1.1 Drinking Water**

20 Water conveyed through the Delta and water from the Delta provides drinking water for two-thirds
21 of California's population (CALFED Bay-Delta Program 2000). Surface water and groundwater
22 resources are both used to provide drinking water resources for populations in the study area, as
23 well as throughout California.

24 **Constituents of Concern**

25 Constituents that are of concern in Delta waters are those that, at elevated concentrations, have the
26 potential to directly or indirectly adversely affect or impair one or more of the Delta's beneficial uses
27 related to drinking water, species habitat, or recreational facilities. Table 25-1 lists the regulatory
28 standards and goals for each of the constituents of direct concern to public health in the Delta. At
29 high enough concentrations, these constituents can be directly harmful to human health if
30 consumed. Further discussion of constituent regulations can be found in Section 25.2, *Regulatory*
31 *Setting*. Constituents of concern are discussed in detail in Chapter 8, *Water Quality*, Section 8.1.1. The
32 constituents of concern with regard to drinking water quality that are discussed in this impact
33 analysis include disinfection byproducts, non-bioaccumulative pesticides, and trace metals, and are
34 described below.

1 **Table 25-1. Constituents of Concern for Drinking Water Quality**

Contaminant	Maximum Contaminant Level (mg/L)	
	EPA	California
Trace Metals (Inorganics)		
Aluminum	0.05–0.2	1 to 0.2 ^b
Arsenic	0.010	0.010
Cadmium	0.005	0.005
Copper ^a	1.3	1.3
Lead ^a	0.015	0.015
Mercury	0.002	0.002
Nickel	Remanded	0.1
Synthetic Organic Chemicals		
Benzo(a)Pyrene	0.0002	0.0002
2,3,7,8-TCDD (Dioxin)	3x10 ⁻⁸	3x10 ⁻⁸
Disinfection Byproducts		
Bromate	0.01	0.01
Chlorite	0.1	1
Total Trihalomethanes	–	0.08

Source: California Department of Public Health 2008.
mg/L = milligrams per liter; EPA = U.S. Environmental Protection Agency.

^a The listed contaminant is regulated by a regulatory action level (RAL) rather than a maximum contaminant level (MCL). If contaminant levels exceed the listed RAL, additional actions, such as educating the public about the effects lead in drinking water and ways to reduce their exposure, are required (U.S. Environmental Protection Agency 2012b).

^b Secondary MCL.

2

3 **Disinfection Byproducts**

4 Trihalomethanes (THMs) and haloacetic acids (HAA5) are chemicals that are formed along with
5 other disinfection byproducts (DBP) when chlorine or other disinfectants used to control microbial
6 contaminants in drinking water react with naturally occurring organic and inorganic matter in
7 water. THMs are chloroform, bromodichloromethane (BDCM), dibromochloromethane (DBCM), and
8 bromoform. HAA5 chemicals include monochloroacetic acid, dichloroacetic acid, trichloroacetic acid,
9 monobromoacetic acid, and dibromoacetic acid. The disinfection process for drinking water includes
10 adding chlorine to drinking water sources prior to release into public drinking water distribution
11 systems. The chlorine reacts with the organic carbon (total [TOC] and dissolved [DOC]) and bromide
12 that are in water sources and forms DBPs. Generally, if organic carbon is not chlorinated, or bromide
13 is not present, the risk of DBP formation at drinking water plants is greatly reduced. The U.S.
14 Environmental Protection Agency (EPA) indicates that ingestion of water containing DBPs over
15 many years could lead to liver, kidney, or central nervous system problems, and an increased risk of
16 cancer (U.S. Environmental Protection Agency 2012a). Table 8-21 (Chapter 8, *Water Quality*)
17 presents DOC concentrations at selected north- and south-of-Delta stations for water years 2001–
18 2006; total organic carbon concentrations at Delta intakes and major tributaries are provided in
19 Table 8-20. Bromide concentrations at various locations in the Plan Area are identified in Chapter 8,
20 Section 8.1.3.3.

1 Trace Metals

2 Trace metals occur naturally in the environment, and can be toxic to human and aquatic life in high
 3 concentrations. Trace metals include aluminum, arsenic, cadmium, copper, iron, lead, nickel, silver,
 4 and zinc. The beneficial uses of Delta waters most affected by trace metal concentrations include
 5 aquatic life uses (cold freshwater habitat, warm freshwater habitat, and estuarine habitat),
 6 harvesting activities that depend on aquatic life (shellfish harvesting, commercial and sport fishing),
 7 and drinking water supplies (municipal and domestic supply) (See Table 8-1 in Chapter 8, *Water*
 8 *Quality*).

9 Pesticides

10 Pesticides may be described in two general categories: current use pesticides and legacy pesticides.
 11 Current use pesticides include carbamates (e.g., carbofuran), organophosphates (e.g., chlorpyrifos,
 12 diazinon, diuron, malathion), thiocarbamates (e.g., molinate, thiobencarb), and more recently,
 13 pyrethroids (e.g., permethrin, cypermethrin), a class of synthetic insecticides applied in urban and
 14 agricultural areas. These chemicals have toxic effects on the nervous systems of terrestrial and
 15 aquatic life, and some are toxic to the human nervous system. EPA has begun to phase out certain
 16 uses of organophosphates because of their potential toxicity in humans, which has led to the gradual
 17 replacement of organophosphates by pyrethroids (Werner et al. 2008).

18 Legacy pesticides include primarily organochlorine pesticides, such as
 19 dichlorodiphenyltrichloroethane (DDT) and “Group A Pesticides” (aldrin, dieldrin, chlordane,
 20 endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexane [including lindane], endosulfan, and
 21 toxaphene). These chemicals are highly persistent in the environment and can bioaccumulate
 22 (discussed in Section 25.1.1.2); organophosphates and pyrethroids generally are not considered
 23 persistent bioaccumulative compounds. Please see Chapter 8, *Water Quality*, Section 8.1.3.13,
 24 *Pesticides and Herbicides*, for a detailed discussion on the prior use of legacy pesticides in the Plan
 25 Area.

26 25.1.1.2 Bioaccumulating Constituents

27 As discussed in Chapter 8, *Water Quality*, Section 8.1.3, toxins are present in the existing aquatic
 28 environment of the Delta and may be mobilized into the food chain. The toxins that biomagnify
 29 through the food chain, such as methylmercury, organochlorine and other legacy pesticides, and
 30 PCBs, resulting in higher concentrations in predator fish such as striped bass, commonly consumed
 31 by humans, are of particular concern for public health.

32 *Bioavailability* is a measure of the ability of a toxin to cross the cellular membrane of an organism, to
 33 become incorporated in that organism, and to enter the food chain (Semple et al. 2004). Not all
 34 toxins are in a form that can be taken up by an organism. Bioavailability is not only chemical-
 35 specific, but it also can be specific to the chemical form that a constituent takes. For instance,
 36 mercury in an organic complex as methylmercury is much more bioavailable and toxic than
 37 elemental mercury or mercury complexed with an inorganic compound.

38 In addition to the availability of the chemical to be taken up by biota, some chemicals are magnified
 39 more through the food chain. *Bioaccumulation* often is loosely used interchangeably with the term
 40 *biomagnification*. Strictly speaking, bioaccumulation occurs at any one trophic level or in any one
 41 species (and age-class) as a pollutant is ingested inside of food items or absorbed from the
 42 environment and thereby *accumulates* to some concentration in tissues of organisms at that

1 particular trophic level or in that particular species (and age-class). In contrast, *biomagnification*
 2 more properly refers to increases in tissue concentrations of a pollutant as it passes upward through
 3 the food chain, from prey to predator, to the topmost, mature predators. In these top predators
 4 tissue concentrations may be harmful both to the animal (especially to offspring) and to those that
 5 consume it. In summary, bioaccumulation happens within a specific trophic level; biomagnification
 6 occurs over multiple trophic levels.

7 Bioaccumulation is a function of the chemical's specific characteristics and the way the organism
 8 metabolizes the chemical—such as whether it is metabolized and excreted, or stored in fat. Toxins
 9 that are bioavailable and lipophilic (tend to accumulate in fatty tissue of an organism and are not
 10 very water soluble) typically bioaccumulate at higher rates. If stored, these chemicals can
 11 biomagnify in the food chain, as do mercury and some pesticides, such as organochlorine pesticides
 12 (e.g., lindane), which are most likely to biomagnify.

13 In the Delta, the toxins of primary concern to human health are mercury, pesticides and
 14 polychlorinated biphenyls (PCBs). Selenium can also biomagnify through the food chain under
 15 certain conditions, but selenium is a metal required in human diets and does not pose a high level of
 16 risk to humans at low concentrations. PCBs are currently present at various levels in Delta fish. As
 17 explained in Appendix 8C, *Screening Analysis*, are not anticipated to change under implementation of
 18 any of the action alternatives.

19 For evaluation of risks to human health, analyses of fish fillets are most common because of the
 20 limited information that is generally available. If additional information is available and appropriate,
 21 fish consumption effects could be analyzed in the form that people may eat (California Office of
 22 Environmental Health Hazard Assessment 2008). Please see Chapter 28, *Environmental Justice*,
 23 Section 28.2.1.7, for a discussion of fish consumption patterns among ethnic groups in the Delta.

24 **Study Area**

25 **Mercury**

26 Various regulatory criteria exist for mercury and methylmercury, and the applicable water quality
 27 criteria for judging the degree of contamination and effects of future changes in concentrations are
 28 summarized below.

- 29 • The national recommended water quality criterion for total mercury is 770 nanograms per liter
 30 (ng/L)¹ to protect freshwater aquatic life chronic exposure, and 940 ng/L for marine life (U.S.
 31 Environmental Protection Agency 2006).
- 32 • The Delta methylmercury total maximum daily load (TMDL) recommended water column
 33 concentration of methylmercury, to protect fish from bioaccumulation, is 0.06 ng/L (Central
 34 Valley Regional Water Quality Control Board 2008a).
- 35 • The San Francisco Bay mercury TMDL recommended water column concentration of total
 36 mercury is 25 ng/L (4-day average).
- 37 • The Delta TMDL recommendation for small, whole-fish mercury content for protection of fish
 38 and wildlife is 0.03 milligram per kilogram (mg/kg) wet weight (Central Valley Regional Water
 39 Quality Control Board 2008a).

¹ Approximately equal to parts per trillion (U.S. Geological Survey 1995).

- 1 • The Central Valley Water Board has recommended fish tissue goals (fillet concentrations, wet
2 weight mercury) of 0.24 milligrams of mercury (Hg) per kilogram (mg Hg/kg) wet weight in
3 trophic level 4 fish (adult, top predatory sport fish, such as largemouth bass) (Central Valley
4 Regional Water Quality Control Board 2008b).
- 5 • EPA recommends a water quality criterion for fish tissue of 0.3 mg Hg/kg wet weight for
6 protection of human health and wildlife (U.S. Environmental Protection Agency 2001).

7 Further discussion on water quality standards can be found in Chapter 8, *Water Quality*, Section
8 8.1.1.

9 The Sacramento River is the primary transport route of methylmercury to the study area and
10 contributes about 80% of riverborne mercury inputs (Stephenson et al. 2007; Wood et al. 2010).
11 Chapter 8, Section 8.1.3.9, *Mercury*, provides a detailed description of mercury and methylmercury
12 presence in the Delta. Table 8-14 provides surface water concentrations of mercury and
13 methylmercury at tributary inputs and the Delta's major outputs. In the Sacramento River
14 watershed, the highest concentrations of mercury are found in Cache Creek and the Yolo Bypass
15 where Cache Creek terminates. Cache Creek is the largest contributor of mercury to the Delta. The
16 creek drains 2% of the area in the Central Valley and contributes 54% of the Delta's mercury (Foe et
17 al. 2008). Methylmercury concentrations decrease significantly (by 30%–60%) downstream of Rio
18 Vista, where concentrations were at or below 0.05 ng/L (Foe 2003; Wood et al. 2010).

19 Relative to the Sacramento River, the San Joaquin River is a minor contributor of methylmercury to
20 the Delta. In the San Joaquin watershed, the Mokelumne-Cosumnes River is the greatest contributor
21 of mercury, accounting for 2.1% of the total methylmercury in the Delta, with an average
22 concentration of 0.17 ng/L (Wood et al. 2010). Marsh Creek, which drains the Mt. Diablo mining
23 area, contributes a small percentage (0.04%) because of its size, but it does have relatively high
24 average concentrations of methylmercury, estimated at 0.25 ng/L (Wood et al. 2010). Bear Creek
25 and Mosher Creek, which drain a former mining area, are also high in mercury, with concentrations
26 reported at 0.31 ng/L (Wood et al. 2010). These creeks are also small and contribute a relatively
27 small percentage to the overall mercury budget in the Delta.

28 To resolve the mercury impairment in the Delta, the Central Valley Water Board has developed a
29 water quality attainment strategy that contains two components: (1) a methylmercury TMDL for the
30 Delta; and (2) an amendment of the Basin Plan for the Sacramento and San Joaquin River Basins
31 (Basin Plan) to implement the TMDL program. The Delta methylmercury TMDL was approved by the
32 Central Valley Water Board in 2010. The San Francisco Bay Mercury TMDL has been adopted and is
33 currently being implemented (State Water Resources Control Board 2008).

34 The Delta and Suisun Marsh are both listed as impaired water bodies on the Clean Water Act (CWA)
35 Section 303(d) list for mercury in fish tissue (State Water Resources Control Board 2007). Mercury
36 concentrations in Delta and San Francisco Bay fish tissues exceed human health criteria. For
37 example, the Delta TMDL recommendation for small, whole-fish mercury content for protection of
38 fish and wildlife is 0.03 mg/kg wet weight (Central Valley Regional Water Quality Control Board
39 2008b). Most of these small fish from the Delta and Suisun Marsh exceed the recommended Delta
40 TMDL small fish guideline concentrations for mercury. Monitoring during 2005–2006 found
41 Mississippi silversides' whole-body mercury concentrations at 0.03–0.06 mg Hg/kg wet weight in
42 the Central Delta, 0.17 mg Hg/kg wet weight in the Yolo Bypass, and up to 0.20 mg Hg/kg wet
43 weight at a Cosumnes River site (Slotton et al. 2007). Results from a study of mercury in sportfish

1 from the study area found the median largemouth bass mercury concentration to be 0.53 mg/kg wet
2 weight (Davis et al. 2008).

3 **PCBs**

4 Historically, PCBs were associated with urban discharge, and these contaminants have been
5 detected in fish tissues in San Francisco Bay, although there is little research on PCB levels in the
6 study area. Fish tissue samples taken during 2005 indicate that while high concentrations of PCBs
7 can be found in older, fattier fish in specific regions of the Delta (north Delta, Sacramento, and
8 Stockton), Delta PCB concentrations are generally below California Office of Environmental Health
9 Hazard Assessment (OEHHA) screening values (deVlaming 2008). The 2005 results indicate that the
10 north Delta may be eligible for Section 303(d) de-listing, and the 2008 TMDL for PCBs in San
11 Francisco Bay states that PCBs in the Delta are expected to attenuate naturally, thus eliminating the
12 need for implementing actions to reduce PCBs in the study area waters (San Francisco Bay Regional
13 Water Quality Control Board 2008). Table 8-10 (Chapter 8, *Water Quality*) presents the sum
14 concentrations of all PCBs at the mouths of the Sacramento and San Joaquin Rivers for water years
15 2001–2006.

16 **Legacy Pesticides**

17 As discussed in Chapter 8, *Water Quality*, Section 8.1.3.13, legacy pesticides include primarily
18 organochlorine pesticides, such as DDT and “Group A Pesticides” (aldrin, dieldrin, chlordane, endrin,
19 heptachlor, heptachlor epoxide, hexachlorocyclohexane [including lindane], endosulfan, and
20 toxaphene). These chemicals are highly persistent in the environment. Although they were banned
21 in the 1970s because of their health and environmental effects, the compounds and their byproducts
22 are still found throughout the Delta at elevated concentrations (CALFED Bay-Delta Program 2008).
23 Organochlorines are prone to accumulation in sediments, and typically enter the Delta via rivers and
24 streams during high stream flow events. Organochlorines can still be found in terrestrial soils and
25 riverine sediments throughout the Central Valley, where they enter through surface water runoff
26 and erosion of terrestrial soils and through resuspension of riverine bottom sediments (Central
27 Valley Regional Water Quality Control Board 2010a).

28 There was a large monitoring effort from 1988 to 1993 to assess pesticides in the Delta for DDT
29 compounds (DDT, DDE, and DDD), the Group A Pesticides, and chlorpyrifos, diazinon, atrazine, and
30 thiobencarb (Bay Delta and Tributaries Project 2009). Analysis of monitoring data for the San
31 Joaquin River at Buckley Cove, Sacramento River at Hood (actually collected at Greene’s Landing
32 Sacramento River above Point Sacramento, San Joaquin River at Antioch Ship Channel, Old River at
33 Rancho Del Rio, Suisun Bay at Bulls Head Point near Martinez, and Franks Tract indicated that most
34 pesticides were near or below laboratory detection limits).

35 **Bioaccumulation in Fish and Shellfish**

36 Bioaccumulation in fish and shellfish results when fish and shellfish absorb a toxic substance in the
37 water or from food at a rate greater than that at which the substance is lost. The organisms then
38 concentrate these chemicals at levels higher than is found in the water. Most health advisories are
39 issued because of high levels of mercury in fish. In a few cases, fish are contaminated with PCBs or
40 other chemicals such as DDT.

41 OEHHA gives two sets of guidelines for fish with mercury. Because human babies and children are
42 most sensitive to possible health effects from mercury, OEHHA recommends that women ages 18 to

1 45 years (pregnant, nursing or who may be pregnant) and children 1 to 17 years eat fish less
2 frequently than men older than 17 and women older than 45 (California Office of Environmental
3 Health Hazard Assessment 2007).

4 In March 2004, the U.S. Food and Drug Administration (FDA) issued recommendations for the
5 consumption of fish or shellfish for women who might become pregnant, women who are pregnant
6 or nursing, and young children (no other sensitive receptors were identified). While FDA states fish
7 and shellfish are an important part of a healthy diet, nearly all fish and shellfish contain trace
8 amounts of mercury (U.S. Food and Drug Administration 2011). However, some species contain
9 higher amounts of the toxicant, and thus it is not recommended that women who might become
10 pregnant, women who are pregnant or nursing, or young children eat shark, swordfish, king
11 mackerel, or tilefish. None of these species are commonly found in the Delta. Further, local
12 advisories should be checked for the safety of locally caught fish and if these advisories are
13 unavailable, the weekly consumption of fish or shellfish species should be limited.

14 Waterways within the Delta have been found to have different levels of contaminants; thus, each
15 waterway has a different advisory for fish or shellfish caught in it. To protect public health, fish
16 consumption advisories have been issued for the Delta. These advisories are issued by OEHHA and
17 provide guidance on the specific types and amount of Delta fish that can be eaten safely.

18 Table 25-2 outlines the OEHHA recommended serving amounts for fish within the Delta waterways.

19 **Table 25-2. Advisories for Consumption of Fish and Invertebrate Species/Guilds for Each Waterway**

Species	Receptors*				Suggested Servings
	Children (age 1–17)	Men (age 17+)	Women (age 18–45)	Women (age 45+)	
Lower American River					
American Shad	X		X		4 Servings a Week
		X		X	7 Servings a Week
Redear and other Sunfish			X		1 Serving a Week
		X		X	2 Servings a Week
Sucker	X		X		1 Serving a Week
		X		X	2 Servings a Week
White Catfish	X		X		1 Serving a Week
		X		X	2 Servings a Week
All Bass	X		X		Do Not Eat
		X		X	1 Serving a Week
Pikeminnow	X		X		Do Not Eat
		X		X	1 Serving a Week
Sacramento River and Northern Delta					
American Shad	X		X		3 Servings a Week
		X		X	7 Servings a Week
Clams	X		X		3 Servings a Week
		X		X	7 Servings a Week
Salmon	X		X		3 Servings a Week
		X		X	7 Servings a Week

Species	Receptors*				Suggested Servings
	Children (age 1–17)	Men (age 17+)	Women (age 18–45)	Women (age 45+)	
Trout	X		X		3 Servings a Week
		X		X	7 Servings a Week
Bluegill and other Sunfish	X		X		1 Serving a Week
		X		X	3 Servings a Week
Catfish	X		X		1 Serving a Week
		X		X	3 Servings a Week
Carp and Goldfish	X		X		1 Serving a Week
		X		X	3 Servings a Week
Crayfish	X		X		1 Serving a Week
		X		X	3 Servings a Week
Crappie	X		X		1 Serving a Week
		X		X	3 Servings a Week
Hardhead	X		X		1 Serving a Week
		X		X	3 Servings a Week
Hitch	X		X		1 Serving a Week
		X		X	3 Servings a Week
Suckerfish	X		X		1 Serving a Week
		X		X	3 Servings a Week
Largemouth and other Black Bass (not including Striped Bass)	X		X		Do Not Eat
		X		X	1 Serving a Week
Pikeminnow	X		X		Do Not Eat
		X		X	1 Serving a Week
Sturgeon	X		X		1 Meal Per Month
		X		X	2 Meals Per Month
Striped Bass	X		X		1 Meal Per Month
		X		X	2 Meals Per Month
Striped Bass over 27 Inches	X	X	X	X	Do Not Eat
Striped Bass over 35 Inches	X	X	X	X	Do Not Eat
San Francisco Bay and Delta Region					
Sturgeon	X		X		1 Meal Per Month
		X		X	2 Meals Per Month
Striped Bass	X		X		1 Meal Per Month
		X		X	2 Meals Per Month
Striped Bass over 27 Inches	X	X	X	X	Do Not Eat
Striped Bass over 35 Inches	X	X	X	X	Do Not Eat
Shark	X	X	X	X	Do Not Eat
San Francisco Bay Sport Fish	X		X		1 Meal Per Month
		X		X	2 Meals Per Month

Species	Receptors*				Suggested Servings
	Children (age 1–17)	Men (age 17+)	Women (age 18–45)	Women (age 45+)	
Central and South Delta					
Bluegill	X		X		2 Servings a Week
		X		X	5 Servings a Week
Catfish	X		X		2 Servings a Week
		X		X	5 Servings a Week
Clams	X		X		2 Servings a Week
		X		X	5 Servings a Week
Crayfish	X		X		2 Servings a Week
		X		X	5 Servings a Week
Bass	X		X		1 Serving a Week
		X		X	2–3 Servings a Week
Carp	X		X		1 Serving a Week
		X		X	2–3 Servings a Week
Crappie	X		X		1 Serving a Week
		X		X	2–3 Servings a Week
Sucker	X		X		1 Serving a Week
		X		X	2–3 Servings a Week
Lower Cosumnes River					
Clams	X		X		5 Servings a Week
		X		X	7 Servings a Week
Carp	X		X		1 Serving a Week
		X		X	2 Servings a Week
Crayfish	X		X		1 Serving a Week
		X		X	2 Servings a Week
Redear and other Sunfish	X		X		1 Serving a Week
		X		X	2 Servings a Week
Sucker	X		X		1 Serving a Week
		X		X	2 Servings a Week
Bass	X		X		Do Not Eat
		X		X	1 Serving a Week
Catfish	X		X		Do Not Eat
		X		X	1 Serving a Week
Crappie	X	X	X	X	Do Not Eat
Lower Mokelumne River					
Clams	X		X		7 Servings a Week
		X		X	7 Servings a Week
Bluegill	X		X		1 Serving a Week
		X		X	2 Servings a Week
Crayfish	X		X		1 Serving a Week
		X		X	2 Servings a Week
Catfish	X		X		1 Serving a Week
		X		X	2 Servings a Week

Species	Receptors*				Suggested Servings
	Children (age 1–17)	Men (age 17+)	Women (age 18–45)	Women (age 45+)	
Bass	X		X		Do Not Eat
		X		X	1 Serving a Week
Pikeminnow	X	X	X	X	Do Not Eat
San Joaquin River between the Friant Dam and the Port of Stockton					
Bluegill	X		X		2 Servings a Week
		X		X	5 Servings a Week
Carp	X		X		1 Serving a Week
		X		X	2 Servings a Week
Catfish	X		X		1 Serving a Week
		X		X	2 Servings a Week
Sucker	X		X		1 Serving a Week
		X		X	2 Servings a Week
Bass (not including Striped Bass)	X		X		Do Not Eat
		X		X	1 Serving a Week
Port of Stockton					
Any Fish	X	X	X	X	Do Not Eat
Any Shellfish	X	X	X	X	Do Not Eat

Source: California Office of Environmental Health Hazard Assessment 2007.

* The placement of an “X” underneath a receptor indicates the suggested serving associated with that particular receptor and species.

1
2 The Delta Mercury Exposure Reduction Program is a collaborative effort of the Sacramento-San
3 Joaquin Delta Conservancy, the California Department of Public Health, and the Central Valley
4 Regional Water Quality Control Board to reduce human exposure from eating contaminated fish.
5 Program activities include convening a stakeholder advisory group, implementing outreach and
6 education projects, developing signs in the Delta and developing multilingual educational materials.

7 25.1.1.3 Pathogens

8 The Delta is commonly used for various recreational activities such as boating, swimming, and
9 fishing. Because the waterways within the Delta have the potential to contain common pathogens
10 (disease-causing micro-organisms), direct contact or ingestion can affect human health. Pathogens
11 of concern include bacteria, such as *Escherichia coli* (*E. coli*) and *Campylobacter*; viruses, such as
12 hepatitis and rotavirus; and protozoa, such as *Giardia* and *Cryptosporidium*. Sampling for bacterial
13 and viral pathogens involves collection of data for fecal indicators, such as total coliform or fecal
14 coliform.

15 Overview

16 Sources of pathogens include wild and domestic animals, aquatic species, urban stormwater runoff,
17 discharge from wastewater treatment plants, and agricultural point and nonpoint sources such as
18 confined feeding lots. Pathogens that have animal hosts can be transported from the watershed to
19 source waters from grazed lands and cattle operations; aquatic species such as waterfowl also
20 contribute pathogens directly to water bodies. Stormwater runoff from urban or rural areas can

1 contain pathogens carried in waste from domestic pets, birds, or rodents, as well as sewage spills.
 2 Although some pathogens have the ability to colonize within sediments, current research has not
 3 addressed this behavior in the Central Valley (Tetra Tech 2007), so information regarding effects of
 4 colonization within sediments is limited. Furthermore, sediment disturbance would be limited to
 5 localized areas under the alternatives because, based on the pathogen conceptual model (discussed
 6 in Section 25.3.1.2, *Pathogens and Water Quality*), some types of pathogens experience a rapid die-
 7 off the farther they travel from their source; thus, this issue is not discussed further.

8 Pathogen transport into Delta waterways can be expected to be higher during initial wet weather
 9 events, since they are carried by stormwater and agricultural runoff into the study area (as was
 10 observed with fecal coliform indicators by Tetra Tech 2007). Other sources of pathogens include
 11 wetland and inundated restoration areas due to increased biological activity associated with these
 12 habitats (e.g., birds and fish species). Some pathogens rapidly die off once excreted by their host.
 13 Once in the environment, die-off rates vary according to ambient water temperature and salinity,
 14 sunlight exposure, and the nature of the pathogen (Tetra Tech 2007). Humans can be exposed to and
 15 infected by certain pathogens (e.g., *E. coli*) in contaminated rivers, lakes, and coastal waters while
 16 participating in recreational activities including swimming, water skiing, surfing, and boating.
 17 Waterborne pathogenic microbes are capable of causing illness in people in a dose-dependent way
 18 and depending on the physical condition of the individual(s) exposed. Exposure to waterborne
 19 pathogens does not always result in infection, and infection with a pathogen does not always result
 20 in clinical illness (Pond 2005).

21 Although there are many potential pathogens that enter Delta waterways, the presence of pathogens
 22 identified in Table 25-3 is tested by wastewater treatment service districts, public drinking water
 23 service districts, and other public agencies as needed (e.g., Department of Public Health).

24 **Table 25-3. Pathogens**

Pathogen	Description and Source	Method of Transmittal	Public Health Concern
<i>Escherichia coli</i>	Anaerobic bacterium that lives in the gastrointestinal tract of warm-blooded animals	Fecal contamination by human waste, wastewater, or animal wastes	Generates toxicants that can result in diarrhea, inflammation, fever, and bacillary dysentery. Certain strains of <i>E. coli</i> can be severely toxic to some patients, particularly children, causing destruction of red blood cells and occasional kidney failure (Tetra Tech 2007)
<i>Campylobacter</i>	Present in the gastrointestinal tract of cattle, pigs, and poultry	Natural waters	Causes bacterial gastroenteritis. In rare cases, <i>Campylobacter</i> infection may be followed by Guillain-Barre Syndrome, a form of neuromuscular paralysis
Hepatitis	Viruses such as Hepatitis A and E	Fecal-oral route and via contaminated food and water	Causes liver inflammation
Rotavirus	Virus	Fecal-oral route and via contaminated food and water	Causes diarrhea

Pathogen	Description and Source	Method of Transmittal	Public Health Concern
Giardia	Parasite found in the intestinal linings of a wide range of animals and their feces, and in contaminated water	Wastewater	Causes diarrhea and abdominal pain
<i>Cryptosporidium</i>	Single-celled, intestinal parasites that infect humans and a variety of animals	Wastewater	Diarrhea, stomach cramps, upset stomach, and slight fever; more serious symptoms can result in weakened immune systems (U.S. Environmental Protection Agency 1999). Major cause of gastrointestinal illness

1

2 Water Treatment

3 EPA's Surface Water Treatment Rule (SWTR [discussed in detail in Section 25.2.2.5]) requires that
4 public water systems using surface water or groundwater under the direct influence of surface
5 water (1) disinfect water to destroy pathogens, and (2) either meet criteria for avoiding filtration or
6 filter water to remove pathogens so that the contaminants are controlled at the following levels (U.S.
7 Environmental Protection Agency 2013).

- 8 • Total Coliform: No more than 5.0% of samples for total coliform are positive in a month (for
9 water systems that collect fewer than 40 routine samples per month, no more than one sample
10 can be total coliform-positive per month). Every sample that is positive for total coliform must
11 be analyzed for either fecal coliform or *E. coli*. If two consecutive total coliform-positive samples
12 occur, and one is also positive for *E. coli*/fecal coliform, the system is deemed as having an acute
13 maximum contaminant level (MCL) violation.
- 14 • Viruses: 99.99% removal/inactivation.
- 15 • *Giardia lamblia*: 99.9% removal/inactivation.
- 16 • *Cryptosporidium*: 99% removal.

17 Water treatment processes that are focused on the removal of particulates, such as filtration and
18 bio-membranes, are generally effective at removing pathogens. Disinfection of bacteria pathogens
19 can be achieved effectively through either chemical oxidation using chlorine or ozone, or through
20 exposure to ultraviolet light. Viruses can also be removed effectively through chlorine or ozone
21 oxidation. The treatment of protozoa is more challenging, as cysts and oocysts of protozoa cannot be
22 fully removed by sand filtration and are resistant to chemical disinfection; however, disinfection
23 using ultraviolet light and ozonation has been found to be effective (Tetra Tech 2007).

24 Study Area

25 There are numerous potential sources of pathogens in the study area, including urban runoff,
26 wastewater treatment discharges, agricultural discharges, and wetlands (Tetra Tech 2007).
27 Specifically, tidal wetlands are known to be sources of coliforms originating from aquatic, terrestrial,
28 and avian wildlife that inhabit these areas (Desmarais et al. 2001; Grant et al. 2001; Evanson and
29 Ambrose 2006; Tetra Tech 2007).

1 Although this chapter represents an effort to fully disclose existing conditions of pathogens in the
 2 study area and the variable nature of pathogen and indicator concentrations in surface waters, and
 3 the rapid die-off of many of these organisms in the ambient environment, makes it very difficult to
 4 quantify the importance of different sources on a scale as large as the Central Valley, especially for
 5 coliforms that are widely present in water under a variety of conditions. A single source in proximity
 6 to the sampling location can dominate the coliform concentrations observed at a location
 7 downstream of several thousand square miles of watershed.

8 Of the known sources that deposit coliforms into the waters of the Central Valley, it was found that
 9 wastewater total coliform concentrations for most plants were low (less than 1,000 most probable
 10 number [MPN]/100 milliliters [ml]), whereas the highest total coliform concentrations in water
 11 (greater than 10,000 MPN/100 ml) were observed near samples influenced by urban areas (Tetra
 12 Tech 2007). In the San Joaquin Valley, comparably high concentrations of *E. coli* were observed for
 13 waters affected by urban areas and intensive agriculture (Tetra Tech 2007). Fecal indicator data
 14 showed minimal relationships with flow rates, although most of the high concentrations were
 15 observed during the wet months of the years, possibly indicating the contribution of stormwater
 16 runoff (Tetra Tech 2007).

17 Data for *Cryptosporidium* and *Giardia* along the Sacramento River showed that these parameters
 18 were often not detected, and when detected the concentrations were generally low, typically less
 19 than one organism per liter (Tetra Tech 2007). There may be natural or artificial barriers that limit
 20 transport of *Cryptosporidium* to water. Significant die-off of oocysts that do reach the water may
 21 contribute to the low frequency of detection *Cryptosporidium* oocysts in natural waters (Tetra Tech
 22 2007).

23 There was limited pathogen data at the locations examined, as indicated by Tetra Tech (2007).
 24 Where data were collected, these parameters were often not detected. However, when they were
 25 detected, the concentrations were typically less than one organism per liter. Pathogen
 26 concentrations are highly variable in time and space; monitoring programs that adequately address
 27 these constraints are very limited.

28 Pathogens are listed on the Section 303(d) list for the Stockton Deep Water Ship Channel (SDWSC),
 29 with sources including recreational and tourism activities (non-boating) and urban runoff/storm
 30 sewers. The Basin Plan addresses this on the basis of water contact recreation such that fecal
 31 coliform (minimum 5 samples in any 30-day period) shall not exceed a geometric mean of 200
 32 organisms/100 ml, nor shall more than 10% of the total number of samples taken during any 30-day
 33 period exceed 400 organisms/100 ml. These criteria have been exceeded at several of the water
 34 quality sampling locations in the Delta (Tetra Tech 2007). The Basin Plan water quality objectives
 35 for pathogens are detailed in Appendix 8A, *Water Quality Criteria and Objectives*.

36 **25.1.1.4 Microcystis**

37 *Microcystis aeruginosa* (*Microcystis*) is a species of cyanobacteria or blue-green algae that produces
 38 the cyanotoxin microcystin. Microcystin is a liver toxin and is the most widespread of the
 39 cyanotoxins. *Microcystis* is a photosynthetic bacterium which is naturally occurring in lakes,
 40 streams, ponds, and other surface waters. Because *Microcystis* is commonly found in surface water,
 41 microcystin is of relevance to drinking water supplies and recreational waters, and therefore to
 42 public health. In addition to producing surface scums that interfere with recreation and cause
 43 aesthetic problems, microcystin also produces taste and odor compounds.

1 Overview

2 There are at least 80 known microcystins, including microcystin-LR, which is generally considered
3 one of the most toxic (U.S. Environmental Protection Agency 2012c). Microcystin-LR is the most
4 widely studied congener of the known microcystins, and it has been associated with most incidents
5 of toxicity involving microcystins. *Microcystis* blooms can cause toxicity to phytoplankton,
6 zooplankton, and fish, and also can affect feeding success or food quality for zooplankton and fish.
7 Although cyanotoxins break down slowly over time in full sunlight, they are very stable and can
8 withstand boiling, indicating that cooking is not sufficient to destroy the toxins (California
9 Environmental Protection Agency 2009). There are many reports of a variety of health effects in
10 addition to liver damage (e.g., diarrhea, vomiting, blistering at the mouth, headache) following
11 human exposure to blue-green algae toxins (cyanobacteria) in drinking water or from swimming in
12 water in which are present. Such effects can occur within minutes to days following exposure to
13 cyanotoxins (World Health Organization 2003). However, there are no reported cases of human
14 deaths occurring from microcystin ingestion (California Environmental Protection Agency 2009).

15 Water treatment can effectively remove cyanotoxins in drinking water supplies. However, some
16 treatment options are effective for some cyanotoxins, but not for others (U.S. Environmental
17 Protection Agency 2012c). Thus, operators of drinking water treatment systems must remain
18 informed about the growth patterns and species of blue-green algae blooming in their surface water
19 supplies to determine appropriate treatment or actions, and monitor treated water for cyanotoxins.

20 Blooms of *Microcystis* require high levels of nutrients and low turbidity, but also require sufficiently
21 high water temperature (i.e., above 19°C) and long hydraulic residence time (low flow), since the
22 species is fairly slow growing (Lehman et al. 2008; Lehman et al. 2013). In addition, low vertical
23 mixing associated with long hydraulic residence time allows *Microcystis* colonies to float to the
24 surface of the water column, where they out compete other species for light.

25 The World Health Organization released a provisional drinking water guideline for microcystin-LR
26 in 1998. The guideline value for drinking water for microcystin-LR is 1.0 micrograms per liter
27 ($\mu\text{g/L}$), which is an advisory value developed to protect against adverse liver effects associated with
28 human consumption of this toxin. For recreational waters, the World Health Organization has issued
29 multiple guidance values for the relative probability of acute health effects due to recreational
30 exposure to cyanobacteria and microcystins because of the variety of possible exposures routes via
31 recreational activities (e.g., direct contact, ingestion, and inhalation) (Table 25-4). No federal
32 regulatory guidelines for cyanobacteria or their toxins in recreational waters exist at this time in the
33 United States. In 2015, EPA issued a 10-day health advisory value for microcystins of 0.3 $\mu\text{g/L}$ for
34 bottle-fed infants and preschool-age children and 1.6 $\mu\text{g/L}$ for school-age children and adults (U.S.
35 Environmental Protection Agency 2015). Guidance values for microcystin and other cyanotoxins in
36 drinking water have been adopted by three states (Minnesota, Ohio, and Oregon) and guidance
37 values for recreational water have been adopted by 20 states, including California (U.S.
38 Environmental Protection Agency 2014). The advisory value for microcystin for recreational waters
39 in California is 0.8 $\mu\text{g/L}$.

1 **Table 25-4. World Health Organization Guidance Values for the Relative Probability of Acute**
 2 **Health Effects during Recreational Exposure to Cyanobacteria and Microcystins**

Relative Probability of Acute Health Effects	Cyanobacteria (cells/ml)	Microcystin-LR ($\mu\text{g/L}$)
Low	< 20,000	< 10
Moderate	20,000–100,000	10–20
High	100,000–10,000,000	20–2,000
Very High	> 10,000,000	> 2,000

Source: U.S. Environmental Protection Agency 2014.

cells/ml = cells per milliliter; $\mu\text{g/L}$ = micrograms per liter.

3 4 **Study Area**

5 Like other types of algae, under favorable conditions *Microcystis* can multiply rapidly in surface
 6 water and cause algal “blooms” (U.S. Environmental Protection Agency 2012c). As described in
 7 Chapter 8, *Water Quality*, water temperatures greater than 19°C, low water velocities, and high
 8 water clarity are conditions necessary for *Microcystis* levels to reach bloom-forming scale (Paerl
 9 1988; Lehman et al. 2008; Lehman et al. 2013). Water temperature is considered the primary factor
 10 that restricts bloom development to the months of June through September (Lehman et al. 2013).

11 Sufficiently high water temperature (i.e., 19°C), low flow and thus sufficiently long hydraulic
 12 residence time, and increased clarity enable bloom formation, which occurs in the San Joaquin River,
 13 Old River, and Middle River earlier than other areas of the Delta. Blooms of *Microcystis* have been
 14 observed from June to November throughout the freshwater Delta since 1999 (Lehman et al. 2005,
 15 2008), with peaks in abundance in September (Acuña et al. 2012). Lehman and coauthors (2010)
 16 found abundance greatest in the western and central Delta, with the highest densities near Old River
 17 at Rancho Del Rio and the San Joaquin River at Antioch. The Delta’s shallow, submerged islands
 18 sustain high levels of *Microcystis* during the growing season because the physical drivers of bloom
 19 formation are amplified in these areas due to low flushing rates (Lehman et al. 2008). Although
 20 elevated pH is tolerated by *Microcystis*, pH is not currently thought to be a primary driver of
 21 seasonal and interannual variation in bloom formation (Lehman et al. 2013). Similarly, nutrient
 22 concentrations/ratios for constituents such as nitrogen and phosphorus do not appear to control
 23 seasonal or interannual variation in bloom formation.

24 As discussed in Chapter 8, *Water Quality*, issues related to *Microcystis* blooms upstream of the Delta
 25 have only occurred in highly eutrophic lakes, such as Clear Lake, because most upstream reservoirs
 26 have relatively low nutrient levels. Hydrodynamic conditions of upstream rivers and watersheds are
 27 not conducive to *Microcystis* bloom formation. Problematic *Microcystis* blooms have not occurred in
 28 the Export Service Areas, but microcystins produced in waters of the Delta have been exported from
 29 Banks and Jones pumping plants to the SWP and CVP (Archibald Consulting et al. 2012).

1 25.1.1.5 Vectors

2 A vector is an insect or any living carrier that transmits an infectious agent from one host to another.
 3 Vectors that can be found in the study area include mosquitoes and small mammals, such as mice
 4 and rats. Diseases carried by warm blooded animals, such as hantavirus² and plague³, are not of
 5 concern in the study area, as their occurrence is extremely rare in the nation, state, and the Delta
 6 (Sutter-Yuba Mosquito Vector Control District 2012a, 2012b). Given the low rate of infection for
 7 both hantavirus and plague in California, these diseases are not further discussed. Rabies is another
 8 vector-borne disease that occurs in California. This disease is a viral infection that is carried by
 9 infected animals, and is spread through the bite of an infected animal (Sutter-Yuba Mosquito Vector
 10 Control District 2012c). While rabies cases do occur in the Delta, this disease is not discussed in
 11 further detail, because the action alternatives would not increase the public's vulnerability or
 12 exposure to this disease, as it is not anticipated to increase rabies sources.

13 The vector of most concern in the study area is the mosquito because it is considered a nuisance to
 14 the public through irritating bites and can transmit various diseases, including the West Nile virus
 15 (WNV), to birds and humans. Recently, two invasive species of mosquitoes that can potentially
 16 transmit dengue⁴ and chikungunya⁵ viruses have been detected in Madera, Fresno, San Diego, San
 17 Mateo, Kern, and Tulare counties (*Aedes aegypti*), and in Los Angeles County (*Aedes albopictus* and
 18 *Aedes aegypti*) (California Department of Public Health 2014c). *Aedes albopictus* (Asian tiger
 19 mosquito) and *Aedes aegypti* (yellow fever mosquito). Currently, the risk of local dengue or
 20 chikungunya transmission is low, and there have been no reported cases of either of these diseases
 21 that have been acquired in California. Therefore, these mosquito species and diseases are not
 22 discussed further.

23 The focus of this section is on public nuisances associated with mosquito-borne diseases
 24 transmitted to humans. This section provides a description of the habitat and life history of
 25 mosquito species that exist in the study area.

26 Overview

27 Different cropping and land use patterns create differing amounts of suitable mosquito breeding
 28 habitat, which affect mosquito prevalence in the study area. Currently, the Delta consists primarily
 29 of agricultural lands and tidal, riparian and other water-related habitat that can provide suitable
 30 habitat for mosquitoes to breed and multiply. Deep, open-water habitats are poor mosquito
 31 breeding areas because the wave action generated over water bodies disrupts the ability of larvae to
 32 penetrate the water surface, and because vegetation necessary for egg laying and larvae survival is

² Hantavirus is a pulmonary disease that is carried by deer mice, white-footed mice, and rice rats, and is spread through inhalation or ingestion of contaminated particles of urine, saliva, or excrement. In the last 11 years, there have only been 35 cases of hantavirus in California.

³ Plague is a bacterial infection that is carried by fleas on small mammals, and is spread through the bite of infected fleas. Since the mid-1920s, there have been approximately 10 reported cases of the plague in the U.S. annually (Sutter-Yuba Mosquito Vector Control District 2012b).

⁴ Dengue is a mosquito-borne infection transmitted principally by the yellow fever mosquito and secondarily by the Asian tiger mosquito. With the exception of parts of Mexico, Puerto Rico, and small areas in southern Texas and southern Florida, dengue transmission does not occur in North America. Dengue virus cannot be transmitted from person to person (California Department of Public Health 2014a).

⁵ Chikungunya is a viral disease transmitted by the yellow fever mosquito and the Asian tiger mosquito. In California, chikungunya infections have been documented only in people who acquired the virus while travelling outside the United States; Chikungunya is not a contagious disease (California Department of Public Health 2014b).

1 lacking (U.S. Fish and Wildlife Service 1992). Tidally influenced marshes that lack sufficient tidal
 2 flow can provide suitable breeding habitat for mosquitoes (Kramer et al. 1992, 1995). The optimal
 3 conditions for mosquitoes to carry out their complete growth and reproduction cycles can be found
 4 in areas of standing water with non-stagnant pond surface water, such as ponds subject to daily tide
 5 flushes or wind-driven wave action. The majority of mosquitoes lay eggs on the surface of fresh or
 6 stagnant water. The water may be in various stagnant water locations, such as tin cans, barrels,
 7 horse troughs, ornamental ponds, swimming pools, puddles, creeks, ditches, catch basins, or marshy
 8 areas. The breeding habitat varies depending on the species of mosquito. The majority of mosquito
 9 species prefer water sheltered from the wind by grass and weeds.

10 The availability of preferable mosquito breeding habitat varies by season, and is reduced during dry
 11 periods of the year. Available open water habitat can be expected to increase during the wet season;
 12 however, changes in flow volume in the Delta would result in increased flow velocities, limiting
 13 preferable mosquito breeding habitat.

14 Suitable mosquito breeding habitat is in close proximity to urban areas along the Sacramento River
 15 and the south Delta; therefore, the current urban population is already exposed to vector-borne
 16 diseases (See *Potential Mosquito-Borne Diseases in Delta* below for additional information).

17 The islands and tracts within the Delta presently have mosquitoes and require varying degrees of
 18 mosquito control by existing mosquito and vector control districts (MVCDs). Mosquito control
 19 techniques employed by different MVCDs generally emphasize minimization and disruption of
 20 suitable habitat and control of larvae through chemical and biological means (Kwansy et al. 2004).
 21 Control techniques most often include source reduction and source prevention (e.g., drainage of
 22 water bodies that produce mosquitoes), application of larvicides, use of chemical larvicides, use of
 23 biological agents such as mosquitofish as larval predators, and monitoring of mosquito populations
 24 and vector-borne diseases (Kwansy et al. 2004). Furthermore, to address public health concerns
 25 about mosquito production in existing managed wetlands and tidal areas, MVCDs have developed
 26 guides and habitat management strategies to reduce mosquito production. MVCDs encourage
 27 Integrated Pest Management (IPM), which incorporates multiple strategies to achieve effective
 28 control of mosquitoes and includes the following.

- 29 ● Source reduction – designing wetlands and agricultural operations to be inhospitable to
 30 mosquitoes.
- 31 ● Monitoring – implementing monitoring and sampling programs to detect early signs of mosquito
 32 population problems.
- 33 ● Biological control – use of biological agents such as mosquitofish (*Gambusia affinis*) to limit
 34 larval mosquito populations.
- 35 ● Chemical control – use of larvicides and adulticides.
- 36 ● Cultural control – changing the behavior of people so their actions prevent the development of
 37 mosquitoes or the transmission of vector-borne disease.

1 Specifically, the following guidelines are incorporated for habitat management plans in different
2 MVCDDs in the study area.

- 3 • *Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands*, 2004.
- 4 • *Best Management Practices for Mosquito Control on California State Properties*, California
5 Department of Public Health, June 2008.
- 6 • *Mosquito Reduction Best Management Practices, Sacramento-Yolo County Mosquito and Vector
7 Control District*, 2008.

8 **Study Area**

9 The islands and tracts within the Delta presently have mosquitoes and require varying degrees of
10 mosquito control by MVCDDs. The change in mosquito prevalence in the study area is attributable to
11 changes in cropping and land use patterns. Different cropping and land use patterns create differing
12 amounts of suitable mosquito breeding habitat. Currently, the Delta consists primarily of
13 agricultural lands and tidal, riparian and other water-related habitat that can provide suitable
14 habitat for mosquitoes to breed and multiply.

15 Tidally influenced marshes that lack sufficient tidal flow can provide suitable breeding habitat for
16 mosquitoes (Kramer et al. 1992 and 1995). However, functional tidal marshes do not provide high-
17 quality habitat for many mosquito species, such as *Aedes dorsalis* (Meigen) and *Aedes squamiger*
18 (Coquillett), and maintenance and restoration of natural tidal flushing in marshes is effective at
19 limiting mosquito populations (Kramer et al. 1995; Williams and Faber 2004). Problems can occur
20 in seasonally ponded wetlands, in densely vegetated tidal areas that pond water between tides, or
21 where tidal drainage has been interrupted (Williams and Faber 2004). Therefore, tidal wetland
22 restoration can reduce mosquito populations as tidal fluctuations keep water moving so that
23 mosquitoes do not have standing water in which to breed (Williams and Faber 2004; Kramer et al.
24 1995). Semi-permanent and permanent non-tidal wetlands can produce *An. freeborni* and *Cx.*
25 *tarsalis*; however, because of their limited acreage, stable water levels, and abundance of mosquito
26 predators (fish, dragonflies, and other predatory invertebrates) such wetlands are not typically
27 considered mosquito production areas (Kwansy et al. 2004).

28 Existing land uses in the Delta are currently located in relatively close proximity to urban areas
29 along the Sacramento River and the south Delta; therefore, the current urban population is already
30 exposed to mosquitoes and the vector-borne diseases that mosquitoes carry.

31 **Common Mosquito Species**

32 There are multiple species of mosquito known to occur in the study area. Factors that affect the
33 productivity and breeding of mosquitoes include water circulation, organic content, vegetation,
34 temperature, humidity, and irrigation and flooding practices.

35 The habitat for the breeding of mosquitoes varies depending on the combination of habitat
36 conditions. The following discussion presents an overview of mosquito species and their habitat, as
37 well as mosquito-borne diseases, in the study area. Table 25-5 identifies the seasonal presence of
38 mosquitoes.

1 **Table 25-5. Seasonal Presence of Mosquito**

General Water Source/Preferred Habitat	Most Active Season			
	Winter	Spring	Summer	Fall
Standing Water (e.g., permanent wetlands or foul standing water sources; brackish or freshwater)	<ul style="list-style-type: none"> Cool weather mosquito (<i>Culiseta incidens</i>)² California salt marsh mosquito (<i>Ochlerotatus squamiger</i>)³ Winter salt marsh mosquito (<i>Aedes squamiger</i>) 	<ul style="list-style-type: none"> California salt marsh mosquito (<i>Ochlerotatus squamiger</i>)³ 	<ul style="list-style-type: none"> Encephalitis mosquito (<i>Culex tarsalis</i>) Northern house mosquito (<i>Culex pipiens</i>) Western malaria mosquito (<i>Anopheles freeborni</i>) 	<ul style="list-style-type: none"> Encephalitis mosquito (<i>Culex tarsalis</i>) Northern house mosquito (<i>Culex pipiens</i>) Western malaria mosquito (<i>Anopheles freeborni</i>) Cool Weather Mosquito (<i>Culiseta incidens</i>)²
Flood waters (e.g., seasonal/semi-permanent wetlands, including pastures and rice fields)		<ul style="list-style-type: none"> Wetlands mosquito (<i>Aedes melanimon</i>) Inland floodwater mosquito (<i>Aedes vexans</i>) Pale marsh mosquito (<i>Ochlerotatus dorsalis</i>)¹ 	<ul style="list-style-type: none"> Inland floodwater mosquito (<i>Aedes vexans</i>) Western malaria mosquito (<i>Anopheles freeborni</i>)⁵ 	<ul style="list-style-type: none"> Wetlands mosquito (<i>Aedes melanimon</i>) Inland floodwater mosquito (<i>Aedes vexans</i>)
Tule and Grasses		Tule mosquito (<i>Culex erythrothorax</i>) ⁴	Tule mosquito (<i>Culex erythrothorax</i>) ⁴	
Containers (e.g., holes in oak woodlands, containers of standing water, sumps)	Western treehole mosquito (<i>Aedes sierrensis</i>)	Western treehole mosquito (<i>Aedes sierrensis</i>)	Northern house mosquito (<i>Culex pipiens</i>)	Northern house mosquito (<i>Culex pipiens</i>)
Wooded areas, seasonal creeks and year-round rivers	Woodland malaria mosquito (<i>Anopheles punctipennis</i>)*			

Sources: Unless otherwise noted, sources in this table are from Sacramento-Yolo Mosquito and Vector Control District 2008.

¹ Solano County Mosquito Abatement District 2005a; Napa County Mosquito Abatement District 2006.

² Alameda County Mosquito Abatement District 2011.

³ Solano County Mosquito Abatement District 2005ba.

⁴ Santa Cruz County Government Environmental Health Services 2011.

⁵ Marin/Sonoma Mosquito and Vector Control District 2009; Solano County Mosquito Abatement District 2005a.

* Unknown what season the woodland malaria mosquito is most active.

2

1 Potential Mosquito-Borne Diseases in the Delta

2 Mosquitoes in the study area are known to carry six major diseases: malaria, cerebral encephalitis
 3 (CE), WNV, St. Louis encephalitis (SLE), dog heartworms, and Western equine encephalitis (WEE).
 4 Table 25-6 summarizes the types of mosquitoes known to occur in the study area and the types of
 5 diseases they commonly carry.

6 **Table 25-6. Mosquitoes Known to Occur in the Delta and the Diseases They Commonly Carry**

Mosquito	Distance Travels from Breeding Ground	Diseases
Pale marsh mosquito (<i>Ochlerotatus dorsalis</i>) ^a	20 miles	Cerebral Encephalitis (CE) virus; Dog heartworms
Cool weather mosquito (<i>Culiseta incidens</i>) ^b	5 miles	Western Equine Encephalitis (WEE) virus*
Western encephalitis mosquito (<i>Culex tarsalis</i>) ^{c, d}	Up to 16 miles	WEE virus; St. Louis Encephalitis (SLE) West Nile Virus (WNV)
California salt marsh mosquito (<i>Ochlerotatus squamiger</i>) ^d	Up to 20 miles or more	CE virus WNV in a limited number of this species in 2004
Western treehole mosquito (<i>Aedes sierrensis</i>) ^e	Limited	Dog heartworms
Wetlands mosquito (<i>Aedes melanimon</i>) ^d	10 or more miles	Secondary vector of the WEE virus Primary carrier of the CE virus Recently linked as a potential vector of the WNV
House mosquito (<i>Culex pipiens</i>) ^{d, f}	3 – 5 miles	Major vector of the SLE virus and the WNV**
Inland floodwater mosquito (<i>Aedes vexans</i>) ^e	10 or more miles	WEE virus; CE virus; and secondary vector for dog heartworms
Tule mosquito (<i>Culex erythrorhax</i>) ^g	Unavailable	SLE virus WEE virus
Salt marsh mosquito (<i>Ochlerotatus squamiger</i>) ^h	30 miles	Secondary vector of SLE virus Secondary vector of WEE virus
Winter salt marsh mosquito (<i>Aedes squamiger</i>) ⁱ	20 miles	Seasonal nuisance not considered a disease or virus vector
Western malaria mosquito (<i>Anopheles freeborni</i>) ^j	5 miles	Malaria
Woodland malaria mosquito (<i>Anopheles punctipennis</i>) ^k	Less than 1 mile	Malaria

^a Marin/Sonoma Mosquito and Vector Control District 2009; Solano County Mosquito Abatement District 2005a.

^b Napa County Mosquito Abatement District 2006; Solano County Mosquito Abatement District 2005a.

^c Marin/Sonoma Mosquito and Vector Control District 2009; Napa County Mosquito Abatement District 2006; Alameda County Mosquito Abatement District 2011; Reisen 1993.

^d Solano County Mosquito Abatement District 2005b.

^e Sacramento-Yolo Mosquito and Vector Control District 2009.

^f Marin/Sonoma Mosquito and Vector Control District 2009.

^g Marin/Sonoma Mosquito and Vector Control District 2009.

^h Solano County Mosquito Abatement District 2005a and Napa County Mosquito Abatement District 2006

ⁱ Napa County Mosquito Abatement District 2006.

^j Marin/Sonoma Mosquito and Vector Control District 2009, Solano County Mosquito Abatement District 2005a, and Marin/Sonoma Mosquito and Vector Control District 2009.

^k Napa County Mosquito Abatement District 2006.

* Recently identified under laboratory conditions as a vector for WEE, but has not yet been found in wild populations.

** Not considered a strong virus vector for humans in northern California but identified in southern California and the Gulf Coast as human virus vector.

1 Malaria

2 Malaria is a mosquito-borne disease caused by a single-celled parasite, *Plasmodium* (Reiter 2001).
3 This parasite infects and destroys the red blood cells of its host. The disease is usually transmitted
4 through the bite of an infected mosquito; a mosquito becomes infected from feeding on people
5 carrying malaria in the blood (Zucker 1996). Malaria occurs in tropical and subtropical areas with
6 high humidity and temperatures, including Africa and Central and South America. Although no
7 longer considered an endemic disease in California, malaria cases continue to be reported in the
8 United States (CalSurv 2012). In the United States there are approximately 1,200 diagnosed cases
9 each year (Marin/Sonoma Mosquito and Vector Control District 2009). In California, the primary
10 vectors of this disease are female western malaria mosquitoes.

11 Encephalitis

12 Encephalitis is a virus with symptoms characterized by swelling or inflammation of the brain and
13 spinal cord. Mosquito-borne encephalitis is directly transmitted to humans by mosquitoes and
14 maintained through the contact between virus-carrying birds and mosquitoes. It is most commonly
15 found in California as a consequence of the WNV, SLE virus, and WEE virus. Horses and birds are
16 usually the most important carriers and also the most vulnerable and susceptible to these viruses
17 (California Department of Public Health 2010a, 2010b).

18 West Nile Virus

19 WNV is a mosquito-borne virus introduced to North America in 1999 (San Joaquin County Mosquito
20 and Vector Control District 2009). The *Culex* mosquito genus has been identified as the primary
21 transmitting vector of the virus (Goodard et al. 2002). The majority of victims of this virus develop
22 very few or no symptoms. Some of the common symptoms identified are fever, nausea, body aches,
23 headache, and mild skin rash. A very small proportion (less than 1%) of victims may also develop
24 brain inflammation (encephalitis), which could lead to partial paralysis and death (Marin/Sonoma
25 Mosquito and Vector Control District 2009).

26 St. Louis Encephalitis

27 SLE is distributed throughout California and generally affects non-human mammals, principally
28 horses. The western encephalitis and house mosquitoes are the main transmitting vectors (CalSurv
29 2012). The main sources of infection for mosquitoes are birds; once infected, the mosquito can
30 transmit the virus to other animals and, on few occasions, humans. Symptoms tend to be very mild
31 and usually include fever, headache, and dizziness. However, the disease may also lead to
32 convulsions and death, and carries a fatality rate that ranges from 3–30% (Contra Costa Mosquito
33 and Vector Control District 2011; CalSurv 2012). From 1964 through 2009, an average of 102 cases
34 were reported annually in the United States. From 1964 through 2010, 123 cases of SLE were
35 reported in California (Centers for Disease Control and Prevention 2011)

1 **Western Equine Encephalitis**

2 Seasonal viral activity is at its highest for WEE from late spring to early summer, especially in areas
 3 with highly irrigated agriculture and stream drainages. The disease has a fatality rate of 33% and
 4 affects young children most severely (Marin/Sonoma Mosquito and Vector Control District 2009).
 5 The western encephalitis mosquitoes are generally identified as primary transmitters. In California,
 6 the pale marsh mosquito is also a major vector. Symptoms range from mild flu-like illness to
 7 encephalitis, which could lead victims into a coma and death (Napa County Mosquito Abatement
 8 District 2006). Between 1964 and 2005, 639 cases of WEE were reported in the United States
 9 (Centers for Disease Control 2005).

10 **Mosquito-Borne Disease Incidence**

11 Each county, following public health and safety code regulations, designs its individual Mosquito and
 12 Vector Control District Programs to control mosquito-borne disease incidence in its individual
 13 district. The most common mosquito-borne diseases each district is expected to control include
 14 WNV, WEE virus, SLE virus, heartworm disease, and malaria. Based on mosquito-borne disease
 15 surveillance and activity data, yearly reports show that WNV has the highest incidence reported
 16 within the Delta counties. This virus is commonly identified in small animals, such as squirrels and
 17 birds, and can also affect large mammals, including horses and humans. The ratio of dead birds
 18 infected with WNV to reported human cases within the statutory Delta counties is approximately
 19 10:1 (Table 25-8). The number of documented human cases of WNV in Delta counties is relatively
 20 low compared with the population of the counties, and the number of documented WNV-positive
 21 dead birds in Delta counties was less than 250 in 2015 (Table 25-8). Therefore, while WNV is a
 22 growing concern and a potential threat to the population within the study area and California, the
 23 documented human occurrences within the study area have been relatively limited.

24 **Table 25-7. Confirmed West Nile Virus Cases in California 2011–2015**

Cases	2011	2012	2013	2014	2015
Number of Counties	35	41	44	40	41
Human Cases	158	479	379	801	783
Horses	15	22	13	NA	NA
Dead Birds	688	1,644	1,251	2,442	1,349
Mosquito Samples	2,087	2,849	2,528	3,340	3,329
Sentinel Chickens	391	540	485	443	449
Squirrels	24	23	NA	NA	NA

Sources: California Department of Public Health et al. 2011, 2012, 2013, 2014, 2015, and 2016.

NA = not applicable because species is no longer monitored.

25

1 **Table 25-8. West Nile Virus Activity by County in Study Area, 2011–2015**

County	2011				2012				2013				2014				2015			
	Human Cases	Horses ^a	Dead Birds	Mosquito Samples	Human Cases	Horses ^a	Dead Birds	Mosquito Samples	Human Cases	Horses ^a	Dead Birds	Mosquito Samples	Human Cases	Horses ^a	Dead Birds	Mosquito Samples	Human Cases	Horses ^a	Dead Birds	Mosquito Samples
Alameda	-	-	-	-	2	-	15	-	-	-	22	-	1	-	96	16	-	-	19	16
Contra Costa	3	-	38	7	4	-	66	19	5	-	68	13	5	-	44	25	1	-	11	8
Sacramento	4	-	134	381	30	-	466	487	10	-	179	384	10	-	294	487	4	-	103	164
San Joaquin	5	-	27	51	13	-	58	169	8	-	34	163	9	-	53	239	2	-	18	208
Solano	-	-	1	-	2	-	28	3	1	-	15	1	5	-	33	11	1	-	10	6
Sutter	-	-	2	26	8	-	29	19	10	-	16	61	8	-	19	52	2	-	16	54
Yolo	-	-	9	7	10	-	98	154	6	-	106	146	15	-	71	221	8	-	61	173

Sources: California Department of Public Health et al. 2011, 2012, 2013, 2014, 2015, and 2016.

- = no record.

^a Species is no longer monitored.

2

1 **25.1.1.6 Electromagnetic Fields**

2 An EMF is an invisible line of force that is produced by an electrically charged object. It affects the
 3 behavior of other charged objects in the vicinity of the field. The EMF extends indefinitely
 4 throughout space and can be viewed as the combination of an electric field and a magnetic field.
 5 Electric fields are produced by voltage and increase in strength as the voltage increases. The electric
 6 field strength is measured in units of volts per meter. Magnetic fields result from the flow of current
 7 through wires or electrical devices and increase in strength as the current increases. Magnetic fields
 8 are measured in units of gauss or tesla. Most electrical equipment has to be turned on (i.e., current
 9 must be flowing) for a magnetic field to be produced. If current does flow, the strength of the
 10 magnetic field will vary with power consumption. Electric fields, on the other hand, are present and
 11 constant even when the equipment is switched off, as long as the equipment remains connected to
 12 the source of electric power (World Health Organization 2012.)

13 Electric fields are shielded or weakened by materials that conduct electricity (including trees,
 14 buildings, and human skin). Magnetic fields, on the other hand, pass through most materials and are
 15 therefore more difficult to shield. Both electric and magnetic fields decrease as the distance from the
 16 source increases (California Public Utility Commission 2007).

17 Electromagnetic fields are present everywhere in our environment but are invisible to the human
 18 eye. Besides natural sources, such as thunderstorms, the electromagnetic spectrum includes fields
 19 generated by human-made sources, such as X-rays. The electricity that comes out of every power
 20 socket has associated low-frequency electromagnetic fields, and various kinds of higher frequency
 21 radio waves are used to transmit information (World Health Organization 2012).

22 Electric fields and magnetic fields can be characterized by their wavelength, frequency, and
 23 amplitude or strength. The frequency of the field, measured in hertz (Hz), describes the number of
 24 cycles that occur in one second. Electricity in North America alternates through 60 cycles per
 25 second, or 60 Hz. The time-varying electromagnetic fields produced by electrical appliances are an
 26 example of extremely low-frequency (ELF) fields. ELF fields generally have frequencies up to 300
 27 Hz. Other technologies produce intermediate-frequency (IF) fields with frequencies from 300 Hz to
 28 10 megahertz (MHz) and radiofrequency (RF) fields with frequencies of 10 MHz to 300 gigahertz
 29 (GHz). The effects of electromagnetic fields on the human body depend not only on their field level
 30 but on their frequency and energy. Our electricity power supply and all appliances using electricity
 31 are the main sources of ELF fields; computer screens, anti-theft devices, and security systems are the
 32 main sources of IF fields; radio, television, radar, cellular telephone antennas, and microwave ovens
 33 are the main sources of RF fields (World Health Organization 2012). Electromagnetic fields are
 34 commonly measured in units of gauss; a milligauss (mG) is 1,000 times smaller than a gauss. High
 35 voltage transmission line EMF levels range from 30–90 mG underneath the wires, based on the
 36 voltage, height, and placement of the lines. Most household appliances' EMF levels range from 3 mG–
 37 1,600 mG.

38 **Potential Health Concerns**

39 There has been extensive research done over the past 20 years on the relationship of EMF exposure
 40 and human health risks. To date, the potential health risk caused by EMF exposure remains
 41 unknown and inconclusive. Two national research organizations (the National Research Council and
 42 the National Institute of Health) have concluded that there is no strong evidence showing that EMF
 43 exposures pose a health risk. However, some studies have shown an association between household

1 EMF exposure and a small increased risk of childhood leukemia at average exposures greater than
 2 3 mG (Greenland et al. 2000). For cancers other than childhood leukemia, there is less evidence for
 3 an effect. For example, workers that repair power lines and railway workers can be exposed to much
 4 higher EMF levels than the general public. The results of cancer studies in these workers are mixed.
 5 Some studies have suggested a link between EMF exposure in electrical workers and leukemia and
 6 brain cancer while other similar studies have not found such associations (Ahlbom et al. 2001).
 7 There is also some evidence that utility workers exposed to high levels of EMF may be at increased
 8 risk of developing amyotrophic lateral sclerosis (ALS, or Lou Gehrig's disease). The current scientific
 9 evidence provides no definitive answers as to whether EMF exposure can increase health risks
 10 (California Public Utilities Commission 2007).

11 **Proximity to Power Lines**

12 Residences and other sensitive receptors located 300 feet or more from power lines with kilovolts
 13 (kV) of 230 kV or less are not considered to be at risk of high EMF exposure (National Institute of
 14 Environmental Health Sciences and National Institutes of Health 2002). At this distance, EMF
 15 exposure from power lines is no different than from typical levels around the home. Furthermore,
 16 recognizing that transmission lines carry different voltages, the California Department of Education
 17 created regulations that require schools to be set back from transmission line right-of-ways based
 18 on the voltage of the lines. Schools must be placed 100 feet or greater from 50–133 kV lines; 150 feet
 19 or greater from 220–230 kV lines; and 350 feet or greater from 500–550 kV lines. Similar to the
 20 National Institute of Health's 300-foot setback for sensitive receptors, these distances were based on
 21 the fact that the electrical fields from the transmission lines decrease to background levels at the
 22 corresponding distances (California Department of Public Health 1999).

23 There are currently approximately 621 miles of transmission lines in the study area. Sensitive
 24 receptors to EMFs include schools, hospitals, parks and fire stations. Parks and schools provide a
 25 location for people to congregate, and fire stations and hospitals could have sensitive
 26 communications and health equipment that could be affected by EMF interference. The following list
 27 summarizes the types of existing transmission lines and sensitive receptors within the study area or
 28 immediately adjacent to the study area.

- 29 ● No hospitals are located within 300 feet of existing 230 kV or 69 kV lines.
- 30 ● No schools are located within 300 feet of existing 230 kV or 69 kV lines.
- 31 ● One fire station (Station 52 of Sacramento Metro District at 9780 Elder Creek Road, Sacramento)
 32 is within 300 feet of existing 230 kV lines located just outside the study area.
- 33 ● Three sections of Cosumnes River Ecological Reserve and the Woods (Jones) park (part of
 34 Cosumnes River Admin Area) are within 300 feet of existing 230 kV lines (lines run through
 35 parks).

36 **25.2 Regulatory Setting**

37 Numerous acts, plans, policies, and programs define the framework for regulating water quality,
 38 safety from vectors, and EMF in California. The following discussion focuses on requirements that
 39 are applicable to drinking water (including pathogens and bioaccumulation), vectors, and EMF
 40 within the study area. Additional water quality regulations can be found in Chapter 8, *Water Quality*,
 41 Section 8.2.

25.2.1 Federal and State Agencies Responsible for Regulating Water Quality

EPA provides guidance and oversight to California in regulating water quality, as it does for other states and tribes. EPA delegates authorities for establishing water standards and regulating controllable factors affecting water quality in the state. In California, this authority is delegated to the State Water Resources Control Board (State Water Board). The State Water Board, in turn, delegates authority to its nine Regional Water Quality Control Boards to implement the state's water quality management responsibilities in the nine geographic regions. The two regional boards that regulate the Delta region are the Central Valley Regional Water Quality Control Board and the San Francisco Bay Regional Water Quality Control Board. Although the state generally takes the lead on developing and adopting water quality standards for California, EPA must approve new or modified standards. Thus, EPA, the State Water Board, and the two Regional Water Boards have worked together to establish existing water quality criteria/objectives and beneficial uses for the Delta. Applicable regulations and standards are listed below and additional regulations and standards are discussed in Chapter 8, *Water Quality*, Section 8.1.1.6.

25.2.1.1 Bureau of Reclamation

The Bureau of Reclamation (Reclamation) owns and manages several dams and distribution canals upstream of and within the Delta for water supply. Reclamation consults with the state and provides technical assistance related to reservoir reoperation studies (California Department of Water Resources 2008). Reservoir operations are covered in Chapter 5, *Water Supply*.

25.2.1.2 Other Federal Agencies

Other federal agencies have programs related to floodplain management. These include the U.S. Geological Survey (USGS) and the Natural Resources Conservation Service (NRCS) (California Department of Water Resources 2009). USGS, in cooperation with the California Department of Water Resources (DWR), is responsible for collecting surface water data, which becomes the essential database used to develop the hydrology required for defining hydraulic studies. NRCS is involved in watershed planning, and has programs that can provide assistance to local governments and the state in constructing flood relief facilities and preventing flood damage.

25.2.2 Federal Plans, Policies, and Regulations

25.2.2.1 Clean Water Act

The CWA (33 U.S.C. Section 1251 et seq.) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and gives EPA the authority to implement pollution control programs. The CWA sets water quality standards for all contaminants in surface waters. In California, such responsibility has been delegated to the State, which administers the CWA through the Porter-Cologne [Water Quality Control] Act (California Water Code, Section 13000 et seq.). Under the Porter-Cologne Act, the State Water Board oversees nine Regional Water Quality Control Boards that regulate the quality of waters within their regions.

1 **25.2.2.2 Clean Water Act Section 303(d)**

2 If the CWA's permit program fails to clean up a river or river segment, states are required to identify
 3 such waters and list them in order of priority. Thus, under CWA Section 303(d), states, territories,
 4 and authorized tribes are required to develop a ranked list of water quality-limited segments of
 5 rivers and other water bodies under their jurisdiction. Listed waters are those that do not meet
 6 water quality standards, even after point sources of pollution have had the minimum required levels
 7 of pollution control technology incorporated. The law requires that action plans or TMDLs (Total
 8 Maximum Daily Load) be developed to monitor and improve water quality.

9 **25.2.2.3 National Toxics Rule**

10 In 1992, pursuant to the CWA, EPA promulgated the National Toxics Rule (NTR) to establish water
 11 quality criteria for 12 states and two territories, including California, that had not complied fully
 12 with Section 303(c)(2)(B) of the CWA (57 Federal Register 60848). As described in the preamble to
 13 the final NTR, when a state adopts, and EPA approves, water quality criteria that meet the
 14 requirements of CWA Section 303(c)(2)(B), EPA will issue a rule amending the NTR to withdraw the
 15 federal criteria for that state. If the state's criteria are no less stringent than the promulgated federal
 16 criteria, EPA will withdraw its criteria without formal rulemaking because additional comment on
 17 the criteria would be unnecessary (65 Federal Register 19659). However, if a state adopts criteria
 18 that are less stringent than the federally promulgated criteria, but in EPA's judgment fully meet CWA
 19 requirements, EPA will provide an opportunity for public comment before withdrawing the
 20 federally promulgated criteria (57 Federal Register 60860, December 22, 1992).

21 **25.2.2.4 Safe Drinking Water Act**

22 The Safe Drinking Water Act (SDWA) was established to protect the public health and quality of
 23 drinking water in the United States, whether from aboveground or underground sources. The SDWA
 24 directed EPA to set national standards for drinking water quality. It required EPA to set MCLs for a
 25 wide variety of potential drinking water pollutants (see Appendix 8A, *Water Quality Criteria and*
 26 *Objectives*). The owners or operators of public water systems are required to comply with federal
 27 primary (health-related) MCLs and encouraged to comply with federal secondary (nuisance- or
 28 aesthetics-related) MCLs. SDWA drinking water standards apply to treated water as it is served to
 29 consumers. See Section 25.2.3.2, *California Safe Drinking Water Act*, for applicable state drinking
 30 water regulations.

31 **25.2.2.5 Surface Water Treatment Rule**

32 The federal SWTR is implemented by the California SWTR, which satisfies three specific
 33 requirements of the SDWA by: (1) establishing criteria for determining when filtration is required
 34 for surface waters; (2) defining minimum levels of disinfection for surface waters; and (3)
 35 addressing *Cryptosporidium* spp., *Giardia lamblia*, *Legionella* spp., *E. coli*, viruses, turbidity, and
 36 heterotrophic plate count (procedure used to estimate the number of live heterotrophic bacteria
 37 that are present in a water sample) by prescribing a treatment technique. A treatment technique is
 38 prescribed in lieu of an MCL for a contaminant when it is not technologically or economically
 39 feasible to measure that contaminant. The California SWTR applies to all drinking water supply
 40 activities in California and its implementation is overseen by the California Department of Public
 41 Health (CDPH).

1 **25.2.3 State Plans, Policies, and Regulations**

2 **25.2.3.1 California Toxics Rule**

3 In 1992, pursuant to the CWA, EPA promulgated the NTR to establish numeric criteria for priority
 4 toxic pollutants for California. The NTR established water quality standards for 42 pollutants not
 5 covered, at that time, under California’s statewide water quality regulations. As a result of a court-
 6 ordered revocation of California’s statewide Water Quality Control Plan (WQCP) for priority
 7 pollutants in September 1994, EPA initiated efforts to promulgate additional numeric water quality
 8 criteria for California. In May 2000, EPA issued the California Toxics Rule (CTR) that promulgated
 9 numeric criteria for priority pollutants not included in the NTR. The CTR documentation (Federal
 10 Register 65 31682, May 18, 2000) carried forward the previously promulgated standards of the
 11 NTR, thereby providing a single document listing California’s fully adopted and applicable water
 12 quality criteria for priority pollutants.

13 **25.2.3.2 California Safe Drinking Water Act**

14 EPA has designated CDPH as the primary agency to administer and enforce the requirements of the
 15 federal SDWA in California. A state or a tribe with primacy has direct oversight of the regulated
 16 public water systems and is responsible for ensuring that the systems meet all of the requirements
 17 of the drinking water regulations. Public water systems are required to be monitored for regulated
 18 contaminants in their drinking water supply. California’s drinking water standards (e.g., MCLs) are
 19 the same as or more stringent than the federal standards, and include additional contaminants not
 20 regulated by EPA. Like the federal enforceable MCLs, California’s primary MCLs address health
 21 concerns, while secondary MCLs address aesthetics, such as taste and odor. Although federal
 22 secondary drinking water standards are established only as guidelines, California secondary MCLs,
 23 like primary MCLs, are legally enforceable. The California SDWA is administered by CDPH, primarily
 24 through a permit system.

25 **25.2.3.3 Assembly Bill 1200**

26 Assembly Bill 1200 amended Section 139.2 of the State Water Code to require DWR to evaluate the
 27 potential impacts on water supplies derived from the Delta based on 50-, 100-, and 200-year
 28 projections for each of these possible impacts on the Delta.

- 29 • Subsidence
- 30 • Earthquakes
- 31 • Floods
- 32 • Changes in precipitation, temperature, and ocean levels
- 33 • A combination of these impacts

34 **25.2.3.4 The California Department of Public Health’s *Best Management*** 35 ***Practices for Mosquito Control in California***

36 The *Best Management Practices for Mosquito Control in California* was prepared by CDPH in
 37 collaboration with the Mosquito and Vector Control Association of California to promote mosquito
 38 control on California properties and enhance early detection of WNV. This plan describes mosquito

1 control Best Management Practices (BMPs) to be implemented by property owners and managers to
 2 reduce mosquito populations through a variety of ways including: 1) reducing or eliminating
 3 breeding sites; 2) increasing the efficacy of biological control, and 3) decrease the amount of
 4 pesticides applied while increasing the efficacy of chemical control measures (California Department
 5 of Public Health 2012). In addition to these recommended practices, the plan stresses coordination
 6 between property owners and local vector control agencies regarding control practices on lands
 7 located within or near a local agency’s jurisdiction and appropriate integrated pest management
 8 strategies that are most suitable for specific land-use types.

9 **25.2.4 Regional Agencies and Programs Responsible for** 10 **Regulating Drinking Water**

11 **25.2.4.1 Regional Water Quality Control Board Water Rights Decisions,** 12 **Water Quality Control Plans, and Water Quality Objectives**

13 The preparation and adoption of WQCPs is required by California Water Code Section 13240 and
 14 supported by the CWA. Section 303 of the CWA requires states to adopt water quality standards that
 15 “consist of the designated uses of the navigable waters involved and the water quality criteria for
 16 such waters based upon such uses.” According to Water Code Section 13050, WQCPs consist of a
 17 designation or establishment for the waters within a specified area of beneficial uses to be
 18 protected, water quality objectives to protect those uses, and a program of implementation needed
 19 for achieving the objectives. Water Code Section 13050(f) defines beneficial uses to include
 20 domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic
 21 enjoyment; navigation; and the preservation and enhancement of fish, wildlife, and other aquatic
 22 resources or preserves. Because beneficial uses, together with their corresponding water quality
 23 objectives, can be defined per federal regulations as water quality standards, the WQCPs are
 24 regulatory references for meeting the state and federal requirements for water quality control. One
 25 substantial difference between the state and federal programs is that California’s WQCPs establish
 26 standards for groundwater in addition to surface water. Adoption or revision of surface water
 27 standards is subject to EPA approval.

28 The State Water Board Water Rights Division has primary regulatory authority over water supplies
 29 and issues permits for water rights—specifying amounts, conditions, and construction timetables—
 30 for diversion and storage facilities. Water rights decisions implement the objectives adopted in the
 31 Delta WQCP and reflect water availability, recognize prior water rights and flows needed to
 32 preserve instream uses (such as water quality and fish habitat), and whether the diversion of water
 33 is in the public interest.

34 WQCPs adopted by Regional Water Boards are primarily implemented through the National
 35 Pollutant Discharge Elimination System permitting system and issuance of waste discharge
 36 requirements to regulate waste discharges. Basin plans provide the technical basis for determining
 37 waste discharge requirements and authorize the Regional Water Boards to take regulatory
 38 enforcement actions if deemed necessary.

1 **25.2.4.2 Water Quality Control Plan for the Sacramento River and San** 2 **Joaquin River Basins**

3 The Basin Plan defines the beneficial uses, water quality objectives, implementation programs, and
4 surveillance and monitoring programs for waters of the Sacramento River and San Joaquin River
5 basins. The narrative water quality objectives and numeric freshwater criteria/objectives for
6 priority pollutants (i.e., trace metals) adopted for the Delta are included in Appendix 8A, *Water*
7 *Quality Criteria and Objectives*. The Basin Plan contains specific numeric water quality objectives
8 that are applicable to certain water bodies or portions of water bodies. Numerical objectives have
9 been established for bacteria, dissolved oxygen, pH, pesticides, electrical conductivity, total
10 dissolved solids, temperature, turbidity, and trace metals. The Basin Plan also contains narrative
11 descriptions of water quality objectives for certain parameters that must be attained through
12 pollutant control measures and watershed management. Narrative water quality objectives also
13 serve as the basis for the development of detailed numerical objectives. The water quality objectives
14 apply to all surface waters in the Delta, unless otherwise specified (Central Valley Regional Water
15 Quality Control Board 2007).

16 **25.2.4.3 Water Quality Control Plan for the San Francisco Bay Basin**

17 The Water Quality Control Plan for the San Francisco Bay Basin is the State Water Resources Control
18 Board's master water quality control planning document. It designates beneficial uses and water
19 quality objectives for waters of the state, including surface waters and groundwater. It also includes
20 programs of implementation to achieve water quality objectives. The Basin Plan has been adopted
21 and approved by the State Water Board, EPA, and the Office of Administrative Law where required
22 (San Francisco Bay Regional Water Quality Control Board 2011).

23 **25.2.4.4 Central Valley Regional Water Quality Control Board Drinking** 24 **Water Policy**

25 As directed in Resolution R5-2010-0079, Central Valley Water Board staff is developing a proposed
26 Drinking Water Policy to include additions and modifications to three chapters of the *Water Quality*
27 *Control Plan for the Sacramento River and San Joaquin River Basins: Water Quality Objectives,*
28 *Implementation, and Surveillance and Monitoring*. The policy provisions will apply to surface waters
29 only.

30 **25.2.4.5 California Drinking Water Standards Incorporated by Reference** 31 **in Basin Plans**

32 CDPH establishes state drinking water standards, enforces both federal and state standards,
33 administers water quality testing programs, and issues permits for public water system operations.
34 The drinking water regulations are found in Title 22 of the California Code of Regulations. The state
35 drinking water standards for public water systems consist of enforceable primary and secondary
36 maximum MCLs. Primary MCLs are established for the protection of environmental health and
37 secondary MCLs are established for constituents that affect the aesthetic qualities of drinking water,
38 such as taste and odor. Both the Central Valley and San Francisco Bay Basin Plans incorporate by
39 reference the CDPH numerical drinking water MCLs. The incorporation into the Basin Plans of the
40 MCLs makes these standards also applicable to ambient receiving waters regulated by the Regional

1 Water Boards. The state primary and secondary MCLs applicable to the Central Valley and San
2 Francisco Bay Basin Plans are provided in Appendix 8A, *Water Quality Criteria and Objectives*.

3 **25.2.4.6 Safe, Clean, Reliable, Water Supply Act**

4 The Safe, Clean, Reliable Water Supply Act declares that the basic goals for the Delta include the
5 protection of the state’s water supply system from catastrophic failure attributable to earthquakes
6 and flooding.

7 **25.2.5 Regional Agencies and Programs Responsible for Vector** 8 **Control**

9 California’s Health and Safety Code (Sections 2001–2007; 2060–2067 and 2001 b[2]) provide the
10 legal procedures that each district in the State of California must follow to achieve effective vector
11 control programs. The Health and Safety Code outlines the physical, biological, and chemical
12 controls by which each district must achieve effective mosquito abatement.

13 Under the Health and Safety Code, local mosquito and vector control agencies have the authority to
14 conduct surveillance for vectors, prevent the occurrence of vectors, and legally abate production of
15 vectors, any water that is a breeding place for vectors, and “any activity that supports the
16 development, attraction, or harborage of vectors, or that facilitates the introduction or spread of
17 vectors (Section 2002[j] and 2040). Further, vector control agencies are authorized to participate in
18 review, comment, and make recommendations regarding local, state, or federal land use planning
19 and environmental quality processes, permits, licenses, entitlements, and documents for projects
20 with potential effects with respect to vector production (Section 2041).

21 **25.2.5.1 Alameda County Vector Control Services District**

22 The Alameda County Vector Control Services District was established in June 1984 as a County
23 Service Area (VC 1984-1). The District serves all of the cities in Alameda County, as well as the
24 unincorporated area. In the City of Berkeley, the Vector Control Services Section is under the
25 Division of Community Health Protection, Health and Human Services Department (Alameda County
26 Vector Control Services District 2009).

27 **25.2.5.2 Contra Costa Mosquito and Vector Control District**

28 The Contra Costa Mosquito and Vector Control District began service in 1927 as the Contra Costa
29 Mosquito Abatement District. The district’s mission is to maintain the public healthy by preventing
30 the transmission of diseases and improving the quality of life. The district employs a number of
31 techniques, services, and programs to combat emerging disease while preserving and/or enhancing
32 the environment (Contra Costa Mosquito and Vector Control District 2011).

33 **25.2.5.3 Sacramento-Yolo Mosquito and Vector Control District**

34 The Sacramento County-Yolo County Mosquito Abatement District was formed in 1946 to protect
35 the public against diseases transmitted by mosquitoes and provide relief from serious pest nuisance.
36 The district’s mission is to “provide safe, effective, and economical mosquito and vector control for
37 Sacramento and Yolo counties” (Sacramento-Yolo Mosquito and Vector Control District 2009).

1 **25.2.5.4 San Joaquin County Mosquito and Vector Control District**

2 San Joaquin County Mosquito and Vector Control District provides comprehensive vector
3 surveillance and control services to enhance the public health and quality of life for the residents
4 and visitors of San Joaquin County. This independent agency seeks to fulfill its mission by utilizing
5 advanced technology; educating the public regarding the health implications of disease-transmitting
6 pests; providing services consistent with a concern for environmental protection; and maintaining a
7 safe and effective public health pest management program.

8 **25.2.5.5 Solano County Mosquito Abatement District**

9 The Solano County Mosquito Abatement District is a special district responsible for mosquito
10 abatement throughout the incorporated and unincorporated areas of Solano County. The function of
11 the district is to control all mosquitoes that may bring disease or harassment to humans and
12 domestic animals. The district uses a variety of preventive correctional management, naturalistic,
13 physical, and chemical control measures singly or in combination. Preventive measures are
14 emphasized, principally naturalistic and physical control. Chemical control is integrated with other
15 measures as necessary (Solano County Mosquito Abatement District 2013).

16 **25.2.5.6 Sutter-Yuba Mosquito Abatement District**

17 The Sutter-Yuba Mosquito Abatement District covers 486 square miles within Sutter County and
18 220 square miles within Yuba County. The district is responsible for suppressing mosquito
19 populations and thereby preventing the spread of mosquito-borne diseases. The district's integrated
20 mosquito management program uses physical control (source reduction/elimination), biological
21 control (mosquitofish), public education, and chemical control to reduce mosquito populations.

22 **25.2.5.7 The Central Valley Joint Venture's Technical Guide to *Best*** 23 ***Management Practices for Mosquito Control in Managed*** 24 ***Wetlands***

25 This document was prepared by the Central Valley Joint Venture to present a full range of BMP
26 options specific to managed wetlands. The BMPs were identified from the scientific literature as well
27 as applications from MVCDs and wetland managers. The information in the guide is applicable to
28 managed wetlands in the Central Valley of California, including the Sacramento and San Joaquin
29 Valleys and the Delta-Suisun region. It is intended to be a reference for wetland stewards including
30 the private wetland owner or caretaker, refuge or wildlife area manager, wetland biologist, or
31 mosquito and vector control technician. The guide is intended to be as comprehensive as possible
32 and describe BMPs based on the best available information.

33 The BMPs identified in the guide are also an essential component of IPM for mosquitoes. IPM
34 incorporates knowledge of mosquito biology and the use of effective treatments to control
35 mosquitoes. IPM employs a variety of mosquito control methods that include habitat management,
36 biological control agents, and pesticide application. Ideally, BMPs can be used to lower the
37 production of mosquitoes and reduce the need for chemical treatment without significantly
38 disrupting the ecological character, habitat function, or wildlife use of managed wetlands.

1 BMPs to achieve mosquito control should not greatly disrupt the ecological character or habitat
2 function of the wetland site. Not all BMPs can be effectively implemented in every wetland
3 environment. Some initial investigation will be required of wetland managers, in cooperation with
4 MVCDS, to identify those BMPs most applicable to an individual site. Prior to the implementation of
5 BMPs, consultation should be conducted with MVCDS and appropriate resource agencies to
6 determine the suitability of BMPs, and to ensure compliance with state and federal wetland
7 regulations and conservation easements.

8 The BMPs included in the guide are organized into five categories and are generally used in
9 combination.

- 10 ● Water Management Practices
- 11 ● Vegetation Management Practices
- 12 ● Wetland Infrastructure Maintenance
- 13 ● Wetland Restoration and Enhancement Features
- 14 ● Biological Controls

15 Water management practices include changes to the timing of flooding; changes in the speed of
16 flooding; controlling the water such that elevations do not dramatically fluctuate; and, modifying the
17 frequency and duration of irrigation.

18 Vegetation management practices include methods to reduce thick vegetation, such as mowing,
19 burning, disking, haying, and grazing.

20 Wetland infrastructure maintenance includes levee and water control structure inspection and
21 repair; ditch and swale cleaning; and pump test repair. These actions would be conducted to
22 correctly operate water control structures and maintain pumps to avoid unnecessary production of
23 mosquitoes through neglect.

24 Wetland restoration and enhancement features include design features to reduce mosquito
25 production such as independent flooding or drainage capabilities. These features would promote
26 habitats for mosquito predators and allow predators to access mosquitoes.

27 Biological controls include encouraging onsite predator populations and providing predator access
28 to mosquitoes.

29 In addition to the BMPs discussed above, the guidelines identify that coordination with the MVCDS is
30 needed to provide them with information regarding habitat and water management schedules and
31 identify targeted implementation of certain BMPs. MVCDS can provide input on site design and
32 project enhancement that can consider mosquito reducing techniques. Use of IPM by the MVCDS
33 depends on the cooperation and sharing of information on habitat and water management
34 schedules, collaborating on the identification of problem areas, and monitoring the effectiveness of
35 the BMPs selected for application on the wetland restoration and enhancement projects.

1 **25.2.5.8 County General Plan Policies Related to Vector Control**

2 **Sacramento County General Plan**

3 The Sacramento County General Plan Safety Element considers the issue of vector habitat in the
4 context of flooding hazards.

5 GOAL: Minimize the loss of life, injury, and property damage due to flood hazards.

6 Policy SA-5. A comprehensive drainage plan for major planning efforts shall be prepared for
7 streams and their tributaries prior to any development within the 100-year floodplain defined by
8 full watershed development without channel modifications. The plan shall:

9 j. Develop and ensure implementation of measures that would reduce vector larvae.

10 Implementation Measure B states, “In cooperation with the Sacramento-Yolo Mosquito & Vector
11 Control District (SYMVCD), siting and design of wetlands near residential and commercial areas
12 should consider the SYMVCD Best Management Practices and the County’s Stormwater Quality
13 Design Manual” (Sacramento County 2011).

14 **25.2.6 State and Regional Agencies and Programs Responsible** 15 **for Regulating Electromagnetic Fields**

16 **25.2.6.1 California Public Utilities Commission EMF Design Guidelines for** 17 **Electrical Facilities**

18 In 1993, CPUC issued Decision 93-11-013 establishing EMF policy for California’s regulated electric
19 utilities. In recognizing the scientific uncertainty, CPUC addressed public concern over EMF by
20 establishing a no-cost and low-cost EMF reduction policy that utilities would follow for proposed
21 electrical facilities.

22 In 2006, CPUC updated its EMF Policy in Decision 06-01-042. The decision reaffirmed that health
23 hazards from exposures to EMF have not been established and that state and federal public health
24 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
25 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should
26 remain in place. In the decision, CPUC required utilities to update their EMF Design Guidelines to
27 reflect the following key elements of the updated EMF Policy.

28 A) “The Commission [CPUC] has exclusive jurisdiction over issues related to EMF exposure from
29 regulated utility facilities.”

30 B) “...while we continue our current policy of low-cost and no-cost EMF mitigation, as defined by a
31 4% benchmark of total project cost, we would consider minor increases above the 4%
32 benchmark if justified under unique circumstances, but not as a routine application in utility
33 design guidelines. We add the additional distinction that any EMF mitigation cost increases
34 above the 4% benchmark should result in significant EMF mitigation to be justified, and the total
35 costs should be relatively low.”

36 C) For low-cost mitigation, the “EMF reductions will be 15% or greater at the utility ROW [right-of-
37 way]...”

- 1 D) "Parties generally agree on the following group prioritization for land use categories in
 2 determining how mitigation costs will be applied:
- 3 1. Schools and licensed day care
 - 4 2. Residential
 - 5 3. Commercial/industrial
 - 6 4. Recreational
 - 7 5. Agricultural
 - 8 6. Undeveloped land"
- 9 E) "Low-cost EMF mitigation is not necessary in agricultural and undeveloped land except for
 10 permanently occupied residences, schools or hospitals located on these lands."
- 11 F) "Although equal mitigation for an entire class is a desirable goal, we will not limit the spending
 12 of EMF mitigation to zero on the basis that not all class members can benefit."
- 13 G) "... We [CPUC] do not request that utilities include non-routine mitigation measures, or other
 14 mitigation measures that are based on numeric values of EMF exposure, in revised design
 15 guidelines..."

16 CPUC also clarified utilities' roles on EMF during the Certificate of Public Convenience and Necessity
 17 (CPCN) and Permit to Construct (PTC) proceedings. CPUC stated, "EMF concerns in future CPCN and
 18 PTC proceedings for electric transmission and substation facilities should be limited to the utility's
 19 compliance with the Commission's low-cost and no-cost policies."

20 Furthermore, CPUC directed "the Commission's Energy Division to monitor and report on new EMF
 21 related scientific data as it becomes available." The EMF Design Guidelines will be revised as more
 22 information or direction from CPUC becomes available (California Public Utilities Commission
 23 2006).

24 **25.2.6.2 Local Utility Policies Regulating Electromagnetic Fields**

25 There are five electrical utility districts within the study area, including Lodi Electric Utility, Modesto
 26 Irrigation District (MID), Pacific Gas and Electric Company (PG&E), Port of Stockton, and
 27 Sacramento Municipal Utility District (SMUD). Lodi Electric Utility and MID are publicly owned
 28 utilities, PG&E is an investor-owned utility, and the Port of Stockton and SMUD are municipal
 29 utilities. The utilities are responsible for reliably delivering electricity to consumers within their
 30 service boundaries. At this time, it is unknown which of the existing utility districts will be the
 31 provider for operations of the alternatives. However, the local utility policies regarding EMFs
 32 generally follow CPUC and federal policies regarding EMFs.

33 Most utilities, such as PG&E, rely on information from the federal and state health agencies that
 34 conduct EMF research and monitor this issue to help evaluate potential risks (Pacific Gas and
 35 Electric Company 2011a). PG&E's EMF policy states that it will provide reasonable EMF
 36 measurement service at no cost for property near electrical facilities owned by PG&E (Pacific Gas
 37 and Electric Company 2011b). Additionally, PG&E has procedures to consider EMF exposure in the
 38 designs, plans, and communications regarding new and upgraded facilities (Pacific Gas and Electric
 39 Company 2011c). SMUD's Board of Directors passed Resolution No. 91-04-18 on April 18, 1991,

1 establishing an EMF policy statement and authorizing the implementation of an EMF program. This
2 program also requires EMF considerations during the planning of facilities.

3 **25.2.6.3 County General Plan Policies Related to Electromagnetic Fields**

4 **Sacramento County General Plan**

5 Sacramento County's *General Plan of 2005–2030*, Public Facilities Element (Sacramento County
6 2011) includes a policy addressing electromagnetic fields.

7 **Electric and Magnetic Fields Policy**

8 **PF-111.** It is the policy of Sacramento County not to locate public school buildings or grant
9 entitlements for private school buildings within, or directly adjacent to power line corridors as
10 specified below:

11 Power Line Capacity	12 Setback from the Corridor (measured from edge of easement)
13 100-133 kV	100 feet
14 220-230 kV	150 feet
15 500-550 kV	350 feet

16 The construction of transmission lines proximate to an existing and/or planned public or private
17 school site and subject to the County Siting Process (100 kV or greater) should also comply with
18 the distance criteria listed above unless compliance with these setbacks would result in a greater
19 EMF impact on other adjacent uses.

20 **Alameda County East County Area Plan**

21 The Environmental Health and Safety Element of the *East County Area Plan* (Alameda County 2000)
22 also includes an Electromagnetic Fields policy.

23 **Policy 325:** The County shall not approve sensitive uses (e.g., hospitals, schools, and retirement
24 homes) within setbacks recommended by the California Department of Education from sources
25 of electromagnetic fields such as major electrical transmission lines and substations. The County
26 shall also consider appropriate setbacks in siting residential subdivisions based on the best
27 information available at the time.

28 **25.3 Environmental Consequences**

29 Potential public health consequences associated with the different alternatives are described below.
30 Section 25.3.1, *Methods for Analysis* identifies the methodology and thresholds used to evaluate the
31 effects of different alternatives. Section 25.3.2, *Determination of Effects*, explains the significance
32 criteria used to evaluate effects on public health. Section 25.3.3, *Effects and Mitigation Approaches*,
33 provides the detailed analysis of the criteria, effects associated with each alternative, and any
34 mitigation measures used to reduce the significance of impacts.

35 Effects associated with construction, and operation and maintenance of the water conveyance
36 facilities are evaluated at a project level, whereas effects associated with implementation of CM2–
37 CM21 under the BDCP alternatives, or Environmental Commitments under the non-HCP
38 alternatives, are evaluated at a program level. If the effect mechanism is common to construction or
39 operation of the water conveyance facilities and other CMs or Environmental Commitments, for

1 example vectors, the effects associated with the water conveyance facilities are discussed first and
 2 then combined, as necessary, with the discussion of other CMs or Environmental Commitments to
 3 capture the whole of the effect.

4 **25.3.1 Methods for Analysis**

5 The proposed action alternatives may affect public health in the study area through the following
 6 mechanisms.

- 7 • Construction of the water conveyance facilities and water supply operations under all action
 8 alternatives would result in an increase in sedimentation basins and solids lagoons. These new
 9 features could result in an increase in standing water, thereby potentially increasing vector
 10 breeding locations and vector-borne diseases in the study area.
- 11 • Water conveyance facilities operation activities could mobilize or increase the amount of trace
 12 metals or pesticides in surface waters.
- 13 • Water conveyance facilities operation activities under all action alternatives could change
 14 hydraulic residence times and increase water temperatures, which could cause an increase in
 15 the frequency, magnitude, and geographic extent of *Microcystis* blooms. This could result in
 16 negative effects on drinking water quality and recreational waters, which would represent a
 17 potential public health concern.
- 18 • Habitat restoration and enhancement activities under all action alternatives could change
 19 hydraulic residence times and increase water temperatures, which could cause an increase in
 20 the frequency, magnitude, and geographic extent of *Microcystis* blooms. This could result in
 21 negative effects on drinking water quality and recreational waters, which would represent a
 22 potential public health concern.
- 23 • Water conveyance facilities operation activities under all action alternatives would generally
 24 result in a change in source water inflow to the study area, thereby potentially influencing
 25 parameters that bioaccumulate (e.g., methylmercury).
- 26 • Water conveyance facilities operation activities under all action alternatives would require new
 27 transmission lines (with lines at 69 kV and 230 kV), electrical substations and transformers,
 28 thereby potentially increasing exposure of people to EMFs.
- 29 • Habitat restoration and enhancement activities under all action alternatives would increase the
 30 amount of tidal and wetland areas in the study area (including Suisun Marsh and the Yolo
 31 Bypass), which are known to generate pathogens that represent a potential public health
 32 concern to recreational activities.
- 33 • Habitat restoration activities under all action alternatives could increase standing water in the
 34 Delta throughout the year, thereby potentially resulting in an increase in vector breeding
 35 locations and in vector-borne diseases in the study area.
- 36 • Habitat restoration activities under all action alternatives could change the water quality such
 37 that there is an increase DOC in the study area, thereby potentially increasing the amount of
 38 DBPs in the water, which represents a potential drinking water public health concern.
- 39 • Restoration and certain habitat enhancement activities (e.g., channel margin enhancement)
 40 under all action alternatives could disturb and re-suspend existing sediment that is

1 contaminated with parameters which bioaccumulate (e.g., methylmercury) or result in
2 mobilization of toxic constituents into the food chain (e.g., methylation of mercury).

3 The methodologies to evaluate these different mechanisms are described below.

4 **25.3.1.1 Vectors**

5 Most species of mosquitoes lay their eggs on the surface of stagnant water, although some species
6 use damp soil. A body of standing water represents potential breeding habitat, with the exception of
7 areas that are flushed daily by tidal action and that are either too saline or not stagnant long enough
8 to support mosquito larvae to maturity. The increase in the public's risk of exposure is evaluated by
9 describing the alternative actions during operation that could result in more potential breeding
10 habitat, qualitatively evaluating it against the existing amount of potential breeding habitat and the
11 existing level of documented illnesses associated with mosquitoes in the study area. A qualitative
12 determination is made as to whether the alternative actions would result in a substantial⁶ increase
13 in the public's risk of exposure to vector-borne diseases.

14 **25.3.1.2 Pathogens and Water Quality**

15 There are numerous potential sources of pathogens in the study area, including urban runoff,
16 wastewater treatment discharges, agricultural discharges, and wetlands (Tetra Tech 2007). Tidal
17 wetlands are known to be sources of coliforms originating from aquatic, terrestrial, and avian
18 wildlife that inhabit these areas (Desmarais et al. 2001; Grant et al. 2001; Evanson and Ambrose
19 2006; Tetra Tech 2007). As described in Chapter 8, *Water Quality*, Section 8.3.3, the findings of the
20 Pathogen Conceptual Model state that pathogen concentrations are greatly influenced by proximity
21 to the pathogen-generating source, and pathogen concentrations in the study area are generally not
22 influenced by flow rates or inputs from the Sacramento and San Joaquin Rivers because of travel
23 time and rapid die-off rates of some types pathogens.

24 Human exposure to pathogens primarily occurs through drinking water or contact with pathogen
25 sources in water. The removal of pathogens in drinking water happens prior to distribution and
26 treatment techniques generally have a greater than 99% removal rate, as described in Section
27 25.1.1.3; therefore, pathogens would have a very limited effect on drinking water quality. Thus, the
28 analysis below focuses on recreationists as receptors to any potential increase in pathogens caused
29 by each action alternative in the study area. The findings in Chapter 8, *Water Quality*, are
30 summarized for each action alternative and a qualitative determination is made as to whether
31 recreationists would experience a substantial increase of exposure to pathogens.

32 **25.3.1.3 Microcystis**

33 The conceptual model for evaluating effects of the action alternatives on *Microcystis* in the Plan Area
34 is described in Chapter 8, *Water Quality*, Section 8.3.1.7, and includes consideration of abiotic factors
35 considered to be the primary drivers of seasonal and interannual variation in abundance of

⁶ Section 15064(b) of the State CEQA Guidelines states: “[t]he determination whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on factual and scientific data. An ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting. For example, an activity which may not be significant in an urban area may be significant in a rural area.” Accordingly, the significance of a potential impact will be determined qualitatively, depending on the location of the alternative.

1 *Microcystis* in the Delta. These factors include water temperature, hydraulic residence time,
 2 nutrients, and water clarity. Nutrient (i.e., ammonia, nitrate, and phosphorus) and water clarity
 3 effects on *Microcystis* abundance under the action alternatives relative to Existing Conditions and
 4 the No Action Alternative were determined to not be substantial (see Chapter 8).

5 In Chapter 8, *Water Quality*, a qualitative evaluation was done to determine if the action alternatives
 6 would result in an increase in frequency, magnitude, and geographic extent of *Microcystis* blooms in
 7 the Delta based on the following two additional abiotic factors that may affect *Microcystis*: 1)
 8 changes to water operations and creation of tidal and floodplain restoration areas that change
 9 hydraulic residence times within Delta channels, and 2) increases in Delta water temperatures. The
 10 findings from Chapter 8 are summarized for each action alternative and a qualitative determination
 11 is made as to whether recreationists would experience a substantial increase in exposure to
 12 *Microcystis* and whether there would be adverse effects on drinking water due to increases in
 13 *Microcystis*.

14 **25.3.1.4 Constituents of Concern and Water Quality**

15 As discussed in Chapter 8, *Water Quality*, Section 8.1.1.6, numerical water quality objectives and
 16 standards have been established to protect beneficial uses, and therefore represent concentrations
 17 or values that should not be exceeded. The beneficial uses provide standards that indirectly
 18 maintain public health, such as contact recreation to protect individuals against illness. Chapter 8,
 19 *Water Quality*, discusses the different water quality standards evaluated through modeling and
 20 determines whether these standards would be exceeded as a result of implementation of the action
 21 alternatives. Therefore, this analysis summarizes the qualitative and quantitative results presented
 22 in Chapter 8 to identify whether the construction and operation of the facilities associated with the
 23 alternatives would exceed water quality standards for pesticides that do not bioaccumulate (for this
 24 assessment, only present use pesticides for which substantial information is available, namely
 25 diazinon, chlorpyrifos, pyrethroids, and diuron, are addressed); trace metals of human health and
 26 drinking water concern (i.e., arsenic, iron, and manganese); and DBP precursors, DOC and bromide⁷.

27 Qualitative assessments were conducted to determine whether operation of the action alternatives
 28 would result in adverse effects on drinking water quality as represented by an exceedance in water
 29 quality standards for these constituents of concern. Drinking water is generally treated for various
 30 standard constituents prior to distribution and use in the drinking water supply.

31 **25.3.1.5 Bioaccumulation**

32 Bioaccumulation by living organisms is a function of a chemical's specific properties and the way a
 33 chemical is metabolized—such as whether it is metabolized and excreted, or stored in fat. Toxics
 34 that are bioavailable and lipophilic (i.e., fat soluble), tend to accumulate in the fatty tissue of an
 35 organism. Lipophilic compounds have a higher potential to bioaccumulate relative to more water
 36 soluble compounds. If stored by organisms, chemicals such as mercury can biomagnify in the food
 37 chain. The study area is already out of compliance for many of the constituents that are known to
 38 bioaccumulate. Specifically addressed in the analysis are pesticides known to bioaccumulate (legacy
 39 organochlorine pesticides)) and methylmercury.

⁷ Because organic carbon, such as DOC, and bromide can react with disinfectants during the water treatment disinfection process to form DBPs, such as THMs and HAAs, as described in Section 25.1.1.1, DOC and bromide concentrations can be an indicator of DBPs (discussed in detail in Chapter 8, *Water Quality*, Section 8.1.3.11).

1 The general methodology used to assess the potential for bioaccumulation effects as a result of
2 project implementation was to examine existing conditions (i.e., levels and locations) of constituents
3 that bioaccumulate in fish in the study area, and then to determine whether bioaccumulation in fish
4 tissue would be expected to increase above existing levels and locations under the action
5 alternatives. If bioaccumulation is expected to increase under the action alternatives, then a
6 qualitative description of the populations that would be affected is discussed and a qualitative
7 determination is made as to whether the increase would result in a public health concern. It is
8 assumed any additional bioaccumulation that is detected is a potential effect.

9 As discussed in Appendix 8C, *Screening Analysis*, it is not possible at this time to accurately model
10 sediment re-suspension and subsequent transport of PCBs in the Bay-Delta. Regardless, if sediment-
11 transport dynamics were to change under the alternatives, it is not possible to predict how
12 bioaccumulation of PCBs in the Delta would be altered, if at all. Many of the larger fish that
13 bioaccumulate PCBs to problematic levels migrate through the San Francisco Bay and the Delta,
14 resulting in low residence times in these waters, and therefore, would likely not experience
15 substantially different bioaccumulation if distribution of sediment high in PCBs were to change
16 under the alternatives. Information about fish migration and residence times within the Delta can be
17 found in BDCP Chapter 5, *Effects Analysis*. Finally, because PCBs are no longer in production, the
18 2008 TMDL for PCBs in San Francisco Bay states that PCBs are expected to attenuate naturally and
19 be lost through outflow from the Golden Gate (San Francisco Bay Regional Water Quality Control
20 Board 2008). Therefore, any changes in PCB concentrations in water or sediment that may occur
21 within the Delta would not be of frequency, magnitude, and geographic extent that would adversely
22 affect any beneficial uses or substantially degrade the quality of the water bodies within the affected
23 environment, with regards to PCBs (see Appendix 8C for more detail). Therefore, PCBs are not
24 discussed further in the analysis.

25 **Habitat Restoration**

26 Methylmercury would be produced as a result of implementing select conservation measures or
27 Environmental Commitments (e.g., tidal habitat restoration), and erosion and resuspension or
28 mobilization of existing mercury in sediments could occur. The microbial conversion of mercury in
29 soils to methylmercury, a much more toxic and bioavailable form of mercury, would occur in newly
30 inundated restoration areas. There is insufficient information on soil mercury and methylmercury
31 concentrations and the rate of transformation (which is determined by site-specific
32 biogeochemistry, length of inundation, drying out of soils, and how often inundation occurs) to
33 provide a quantitative analysis.

34 Therefore, factors that could result in increased methylmercury availability to the food chain and
35 potential human exposures are qualitatively discussed, but the resulting concentrations in the
36 different restored marshes and floodplains cannot be quantified.

37 **Water Supply Construction and Operations**

38 Bioaccumulation related to construction activities for the water conveyance facilities is discussed
39 qualitatively. Due to restricted access, sediment samples were not obtained. Given this restriction,
40 published scientific reports were used to determine the state of the sediment in question. Sediment
41 sampling may be included in the Erosion and Sediment Control Plans as it will likely require testing
42 prior to disturbance and then treatment and proper disposal of contaminated sediment.

1 There is insufficient data for some of the factors that result in toxics becoming more available in the
 2 food chain. For example, the full extent and magnitude of potential in-water sediment contamination
 3 is unknown along the Sacramento River where water supply facilities would be constructed. Also,
 4 mobilization of potentially toxic sediments would be directly related to levels of turbidity and
 5 suspended sediments resulting from construction. Although resulting turbidity has not been
 6 modeled, it is anticipated to be low given the permit requirements for controls. Furthermore, as an
 7 environmental commitment, DWR would develop and implement Erosion and Sediment Control
 8 Plans and Stormwater Pollution Prevention Plans (SWPPP). BMPs implemented as part of these
 9 plans would reduce turbidity levels and maintain water quality during construction (Appendix 3B,
 10 *Environmental Commitments, AMMs, and CMs*). Therefore, the disturbance of potentially
 11 contaminated sediment will be discussed qualitatively as it relates to public health.

12 Bioaccumulation models that link the concentration of methylmercury in the water to resultant
 13 concentrations in fish tissues for methylmercury have been developed and are presented in Chapter 8,
 14 *Water Quality*. The model is based on the DSM2-predicted blending of various source waters and
 15 measured average concentrations of total mercury and methylmercury in source water. Levels of
 16 methylmercury in the water column under the water conveyance alternatives are modeled, and the
 17 resultant accumulation in fish tissue is also modeled based on the known relationship between
 18 methylmercury in the water column and largemouth bass fillet concentrations of mercury. The
 19 resulting model allows the prediction of future, altered average fish tissue mercury concentrations
 20 under the various alternatives.

21 The model captures effects resulting from water conveyance facilities operations and does not
 22 estimate the potential for methylation in existing or newly created environments (e.g., Restoration
 23 Opportunity Areas [ROAs]). The detailed, site-specific information needed for modeling, with
 24 acceptable margins of error, is currently lacking. Once specific locations for restoration activities are
 25 identified within the ROAs, future evaluations of actions can be made (see discussion above
 26 concerning key processes controlling mercury fate, transport, and risk determination). Agricultural
 27 lands and existing wetlands may be very different in production of methylmercury and uptake into
 28 various trophic levels and are not easily generalized or modeled (Windham-Myers et al. 2009).

29 **25.3.1.6 Electromagnetic Fields**

30 Electromagnetic fields from power lines vary continuously as electrical load varies on individual
 31 transmission lines. As such, EMF would vary with load during water conveyance facilities construction
 32 and operation. When the transmission lines are energized, there would likely be some change in the
 33 level of EMFs in the environment. The magnitude of the change would fluctuate over time based on
 34 load variations. These effects are anticipated to be localized within the immediate proximity of the
 35 transmission lines. Exposure to EMFs from new transmission lines, substations and transformers is
 36 dependent on the load on the transmission lines and the location of these structures in relation to
 37 sensitive receptors (e.g., hospitals, schools, parks) or densely populated urban areas given the
 38 strength of a magnetic field decreases dramatically with increasing distance from the source (National
 39 Institute of Environmental Health Sciences and National Institutes of Health 2002). For this analysis
 40 schools, hospitals, parks, and fire stations are considered to be sensitive receptors. Parks and schools
 41 provide a location for people to congregate, and fire stations and hospitals could have sensitive
 42 communications and health equipment that could be affected by EMF interference. Residences and
 43 other sensitive receptors located 300 feet or more from power lines are not considered to be at risk of
 44 high EMF exposure (National Institute of Environmental Health Sciences and National Institutes of
 45 Health 2002). At this distance, EMF exposure from power lines is no different than from typical levels

1 around the home. Therefore, the methodology for analyzing EMFs involves identifying existing
2 transmission line locations and comparing them with the location of proposed transmission lines and
3 the population densities and sensitive receptors associated with existing and proposed transmission
4 lines.

5 The length of the new temporary and permanent transmission lines for the alternatives is related to
6 the number of intakes required by alternative and the differing location options for transmission
7 lines to serve the different water conveyance options. Under the modified pipeline/tunnel
8 alignment, the method of delivering power to construct and operate the water conveyance facilities
9 is assumed to be a “split” system that would connect to the existing grid in two different locations to
10 permanent transmission lines—one in the northern section of the alignment, and one in the
11 southern section of the alignment. While only one of these points of interconnection would be used,
12 the effects of constructing transmission lines leading from both sites are combined and accounted
13 for the impact analysis. The northern point of interconnection would be located north of Lambert
14 Road and west of Highway 99. From here, a new transmission line would run west, along Lambert
15 Road, where one segment would run south to the intermediate forebay on Glannvale Tract; and one
16 segment would run north to connect to a substation where temporary 69 kV lines would connect to
17 the intakes. While this new transmission line could be 230 kV, 115 kV, or 69 kV depending on
18 further study, a 230 kV line was conservatively assumed for the purposes of analysis. At the
19 southern end of the modified pipeline/tunnel alignment, the point of interconnection may be in one
20 of two possible locations: southeast of Brentwood or adjacent to the Jones pumping plant. From a
21 substation northwest of Clifton Court Forebay, a potential 230 or 34.5 kV underbuild
22 subtransmission line would run south to Clifton Court Forebay, and north following tunnel shaft
23 locations, to Bacon Island. There, a potential 230 or 115 kV transmission line would connect Bacon
24 Island to Mandeville Island. From that point a potential 230 and 34.5 kV underbuild
25 subtransmission line would run north to Bouldin Island. Because the power required for operation
26 of the water conveyance facilities would be much less than that required for construction, and
27 because it would largely be limited to the pumping plants, the “split” system would enable all of the
28 new power lines in the northern part of the alignment to be temporary. Additionally, part of the
29 proposed permanent 230 kV transmission line alignment for the west water conveyance alignment
30 alternatives (i.e., 1C, 2C, and 6C) would be outside of the study area (near Rio Vista) and end at an
31 interconnection point in Suisun City.

32 Table 25-9 identifies each alternative and potential lengths of new temporary and permanent
33 transmission lines. Temporary transmission lines would be removed once construction was
34 completed.

1 Table 25-9. Potential Range of New Permanent and Temporary Transmission Lines (miles)

Alternative	Permanent Transmission Lines (69 kV)		Temporary Transmission Lines (69 kV)		Permanent Transmission Lines (230 kV)		Temporary Transmission Lines (230 kV)		Permanent 230 kV/34.5 kV underbuild Transmission Lines		Temporary 230 kV/34.5 kV underbuild Transmission Lines	
	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors
1A (Dual Conveyance with Pipeline/Tunnel)	8.94	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	NA	NA	NA	NA	NA	NA
1B (Dual Conveyance with East Alignment)	36.79	Stone Lakes National Wildlife Refuge (Elk Grove)	13.49	None	16.35	None	NA	NA	NA	NA	NA	NA
1C (Dual Conveyance with West Alignment)	17.61	None	13.73	Fire Station 63 (9699 Highway 220, Walnut Grove)	18.45	None	NA	NA	NA	NA	NA	NA
2A (Dual Conveyance with Pipeline/Tunnel)	14.46	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	NA	NA	NA	NA	NA	NA
2B (Dual Conveyance with East Alignment)	40.5	Stone Lakes National Wildlife Refuge (Elk Grove)	13.49	None	16.35	None	NA	NA	NA	NA	NA	NA
2C (Dual Conveyance with West Alignment)	17.61	None	13.73	Fire Station 63 (9699 Highway 220, Walnut Grove)	18.45	None	NA	NA	NA	NA	NA	NA
3 (Dual Conveyance with Pipeline/Tunnel)	8.68	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	NA	NA	NA	NA	NA	NA

Alternative	Permanent Transmission Lines (69 kV)		Temporary Transmission Lines (69 kV)		Permanent Transmission Lines (230 kV)		Temporary Transmission Lines (230 kV)		Permanent 230 kV/34.5 kV underbuild Transmission Lines		Temporary 230 kV/34.5 kV underbuild Transmission Lines	
	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors
4 (Dual Conveyance with Modified Pipeline/Tunnel)	None	None	6.08	Courtland Fire Station 92 (154 Magnolia Ave, Courtland)	14.96	Clifton Court Forebay	18.72	Stone Lakes National Wildlife Refuge (Elk Grove) Cosumnes River Ecological Reserve (Galt)	1.00	Clifton Court Forebay	11.28	None
5 (Dual Conveyance with Pipeline/Tunnel)	8.68	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	NA	NA	NA	NA	NA	NA
6A (Isolated Conveyance with Pipeline/Tunnel)	8.94	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	NA	NA	NA	NA	NA	NA
6B (Isolated Conveyance with East Alignment)	36.79	Stone Lakes National Wildlife Refuge (Elk Grove)	13.49	None	16.35	None	NA	NA	NA	NA	NA	NA
6C (Isolated Conveyance with West Alignment)	17.61	None	13.73	Fire Station 63 (9699 Highway 220, Walnut Grove)	18.45	None	NA	NA	NA	NA	NA	NA
7 (Dual Conveyance with Pipeline/Tunnel)	7.03	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	NA	NA	NA	NA	NA	NA
8 (Dual Conveyance with Pipeline/Tunnel)	7.03	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	NA	NA	NA	NA	NA	NA
9 (Through Delta/Separate Corridors)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Alternative	Permanent Transmission Lines (69 kV)		Temporary Transmission Lines (69 kV)		Permanent Transmission Lines (230 kV)		Temporary Transmission Lines (230 kV)		Permanent 230 kV/34.5 kV underbuild Transmission Lines		Temporary 230 kV/34.5 kV underbuild Transmission Lines	
	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors
4A (Dual Conveyance with Modified Pipeline Tunnel)	None	None	6.08	Courtland Fire Station 92 (154 Magnolia Ave, Courtland)	14.96	Clifton Court Forebay	18.72	Stone Lakes National Wildlife Refuge (Elk Grove) Cosumnes River Ecological Reserve (Galt)	1.00	Clifton Court Forebay	11.28	None
2D (Dual Conveyance with Modified Pipeline/Tunnel)	4.97	None	3.13	Courtland Fire Station 92 (154 Magnolia Ave, Courtland)	14.96	Clifton Court Forebay	18.72	Stone Lakes National Wildlife Refuge (Elk Grove) Cosumnes River Ecological Reserve (Galt)	1.00	Clifton Court Forebay	11.28	None
5A (Dual Conveyance with Modified Pipeline/Tunnel)	4.97	None	4.59	Courtland Fire Station 92 (154 Magnolia Ave, Courtland)	14.96	None	18.76	Stone Lakes National Wildlife Refuge (Elk Grove) Cosumnes River Ecological Reserve (Galt)	1.00	Clifton Court Forebay	11.28	None

NA = not applicable.

1

1 25.3.2 Determination of Effects

2 Implementation of an alternative could result in an adverse effect under NEPA and a significant
3 impact under CEQA if it would result in any of the following.

- 4 • Substantial increase in the public’s risk of exposure to vector-borne diseases. For purposes of
5 this analysis, “substantial increase” is evaluated qualitatively, depending on the location of the
6 alternative, in accordance with Section 15064(b) of the State CEQA Guidelines (see footnote 4,
7 Section 25.3.1.1, *Vectors*).
- 8 • Exceedance(s) of water quality criteria for constituents of concern such that an adverse effect
9 would occur to public health from drinking water sources. This analysis is based on the
10 qualitative and quantitative results presented in Chapter 8, *Water Quality*, to identify whether
11 the construction and operation of the alternatives would exceed water quality standards for
12 pesticides that do not bioaccumulate (present use pesticides for which substantial information
13 is available, namely diazinon, chlorpyrifos, pyrethroids, and diuron); trace metals of human
14 health and drinking water concern (i.e., arsenic, iron, and manganese); and DBP precursors, DOC
15 and bromide.
- 16 • Substantial mobilization or substantial increase of constituents known to bioaccumulate. For
17 purposes of this analysis, an expected increase in bioaccumulation above existing conditions
18 (levels and locations) in fish in the study area as a result of implementing an alternative would
19 be considered a potential effect and is discussed qualitatively in terms of the populations
20 affected and potential public health concerns. (See also Section 25.3.1.4, *Bioaccumulation*.)
- 21 • Exposing substantially more people to transmission lines (including electrical substations and
22 power converter facilities) that provide new sources of EMFs. Exposure to EMFs from new
23 transmission lines is dependent on the location of the transmission lines in relation to sensitive
24 receptors. For purposes of this analysis, schools, hospitals, parks, and fire stations are
25 considered to be sensitive receptors. Residences and other sensitive receptors located 300 feet
26 or more from power lines are not considered to be at risk of high EMF exposure (National
27 Institute of Environmental Health Sciences and National Institutes of Health 2002). (See the
28 discussion in Section 25.3.1.5, *Electromagnetic Fields*.) Temporary transmission lines are those
29 that would be removed once construction was completed.
- 30 • Substantial increase in recreationists’ exposure to pathogens. For purposes of this analysis, a
31 “substantial increase in recreationists’ exposure” is based on the amount of tidal habitat
32 restored, because pathogens in drinking water are effectively removed prior to distribution and
33 have little effect on drinking water; and findings in Chapter 8, *Water Quality* (see also Section
34 25.3.1.2, *Pathogens and Water Quality*.)
- 35 • Increase in *Microcystis* in water bodies in the study area such that municipal and domestic
36 supply and water contact recreation beneficial uses are negatively affected. This analysis is
37 based on the results of the qualitative analysis presented in Chapter 8, *Water Quality*. As
38 described in Chapter 8, assumptions regarding how certain habitat restoration activities (*CM2*
39 *Yolo Bypass Fisheries Enhancement*, and *CM4 Tidal Natural Communities Restoration* or
40 Environmental Commitment 4: Tidal Natural Communities Restoration) would affect Delta
41 hydrodynamics were included in the modeling scenario assumptions. To the extent that project
42 restoration actions would alter hydrodynamics within the Delta, which would affect mixing of

1 source waters, these effects are included in the assessment of operations-related changes of
2 hydraulic residence times and its effects on *Microcystis* production (Impact PH-8).

3 **Compatibility with Plans and Policies**

4 Constructing the proposed water conveyance facilities and implementing CM2–CM21 (under the
5 BDCP alternatives) or the Environmental Commitments (under Alternatives 4A, 2D, and 5A), could
6 potentially result in incompatibilities with plans and policies related to the effects of water quality
7 constituents and vector-borne diseases on public health. Section 25.2, *Regulatory Setting*, provides
8 an overview of federal, state, regional, and agency-specific plans and policies applicable to the public
9 health effects of water quality and vector-borne diseases. This section summarizes ways in which
10 the proposed project is compatible or incompatible with those plans and policies. Potential
11 incompatibilities with local plans or policies do not necessarily translate into adverse environmental
12 effects under NEPA or CEQA. Even where an incompatibility “on paper” exists, it does not by itself
13 constitute an adverse physical effect on the environment, but rather may indicate the potential for a
14 proposed activity to have a physical effect on the environment. The relationship among plans,
15 policies, and regulations, and impacts on the physical environment is discussed in Chapter 13, *Land*
16 *Use*, Section 13.2.3.

17 Consistent with requirements of California’s Health and Safety Code (Sections 2001–2007; 2060–
18 2067 and 2001 b[2]), the Alameda County Vector Control Services District, Contra Costa Mosquito
19 and Vector Control District, Sacramento-Yolo Mosquito and Vector Control District, San Joaquin
20 County Mosquito and Vector Control District, Solano County Mosquito Abatement District, and the
21 Sutter-Yuba County Mosquito Abatement District, with jurisdictions in the study area, all have
22 policies related to maintaining and protecting public health and quality of life by preventing the
23 spread of mosquito-borne diseases and relieving pest nuisance. Implementing a selected action
24 alternative could potentially create temporary, additional breeding habitat for mosquitoes during
25 construction of the water conveyance facilities; and permanently increase mosquito breeding
26 habitat as a result of restoration activities under the action alternatives, as described under Impact
27 PH-1: *Increase in vector-borne diseases as a result of construction and operation of the water*
28 *conveyance facilities*; and Impact PH-5: *Increase in vector-borne diseases as a result of implementing*
29 *CM2–CM7, CM10, and CM11* (BDCP alternatives) or *Increase in Vector-Borne Diseases as a Result of*
30 *Implementing Environmental Commitments 3, 4, 7–10* (Alternatives 4A, 2D, and 5A). The project
31 proponents would implement an environmental commitment to conduct preconstruction
32 consultation and coordinate with local MVCDs, and to prepare mosquito management plans (MMPs)
33 (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). As part of that environmental
34 commitment, project proponents would also follow guidelines provided in the Central Valley Joint
35 Venture’s Technical Guide to *Best Management Practices for Mosquito Control in Managed Wetlands*
36 and CDPH’s *Best Management Practices for Mosquito Control in California* to develop and implement
37 BMPs to manage and control the risk of mosquito-borne disease. This environmental commitment
38 would ensure that the proposed project is compatible with the mission and goals of the applicable
39 MVCDs.

40 California Water Code Section 13240 requires preparation and adoption of WQCPs. The WQCPs are
41 regulatory references for meeting the state and federal requirements for water quality control, and
42 are primarily implemented through the National Pollutant Discharge Elimination System (NPDES)
43 permitting system. Basin plans provide the technical basis for determining waste discharge
44 requirements and authorize the Regional Water Boards to take regulatory enforcement actions if
45 deemed necessary. Accordingly, the *Water Quality Control Plan for the Sacramento River and San*

1 *Joaquin River Basins, Water Quality Control Plan for the San Francisco Bay Basin, and the Central*
 2 *Valley Regional Water Quality Control Board Drinking Water Policy* deal with beneficial uses, water
 3 quality objectives, implementation programs, and surveillance and monitoring programs for waters
 4 in their respective jurisdictions. California Drinking Water Standards for primary and secondary
 5 maximum MCLs, found in Title 22 of the California Code of Regulations, are incorporated by
 6 reference in Central Valley and San Francisco Bay Basin Plans. DWR and/or project proponents
 7 would be required to apply for and comply with NPDES permits, and thereby would be compatible
 8 with these plans and policies.

9 The potential effects of implementing the action alternatives on constituents of concern and
 10 *Microcystis* and microcystin related to drinking water and recreationists' exposure to pathogens and
 11 *Microcystis* and microcystin are discussed under Impact PH-2: *Exceedances of water quality criteria*
 12 *for constituents of concern such that there is an adverse effect on public health as a result of operation*
 13 *of the water conveyance facilities* (for constituents that do not bioaccumulate); Impact PH-3:
 14 *Substantial mobilization of or increase in constituents known to bioaccumulate as a result of*
 15 *construction, operation or maintenance of the water conveyance facilities* (which assesses risk in
 16 terms of bioaccumulation in fish that people might eat); Impact PH-6: *Substantial increase in*
 17 *recreationists' exposure to pathogens as a result of implementing the restoration conservation*
 18 *measures* (which examines the extent of potential for recreationists to come in contact with
 19 pathogens in water while using restored tidal habitat); Impact PH-8: *Increase in Microcystis bloom*
 20 *formation as a result of operation of the water conveyance facilities* (which examines the potential for
 21 public health impacts due to *Microcystis* and microcystin in drinking water and recreational waters
 22 due to operation of the water conveyance facilities and hydrodynamic effects of habitat restoration
 23 under CM2 and CM4 or Environmental Commitment 4); and Impact PH-9: *Increase in Microcystis*
 24 *bloom formation as a result of implementing CM2 and CM4* for the BDCP alternatives or Impact PH-9:
 25 *Increase in Microcystis Bloom Formation as a Result of Implementing Environmental Commitment 4*
 26 for Alternatives 4A, 2D, and 5A; this impact analysis examines the potential for public health impacts
 27 implementation of restoration activities of CM2 and CM4 or Environmental Commitment 4. Most of
 28 the action alternatives would not create an adverse effect under NEPA or a significant impact under
 29 CEQA and therefore are compatible with the plans and policies related to water quality. However,
 30 implementing the action alternatives has the potential to be incompatible with the Basin Plan
 31 because projected increases in *Microcystis* and microcystin would affect beneficial uses of waters in
 32 the Delta and would result in an adverse effect under NEPA and a significant and unavoidable
 33 impact under CEQA. While Mitigation Measure WQ-32a, *Design Restoration Sites to Reduce Potential*
 34 *for Increased Microcystis Blooms* and Mitigation Measure WQ-32b, *Investigate and Implement*
 35 *Operational Measures to Manage Water Residence Time* would reduce the severity of the impact, the
 36 effectiveness of these mitigation measures to result in feasible measures for reducing water quality
 37 effects, and therefore potential public health effects, is uncertain.

38 However, implementing the proposed action alternatives has the potential to be incompatible with
 39 the Basin Plan, because long-term average concentrations of DOC (Alternatives 6A–6C, and 7–9) and
 40 bromide (Alternatives 1A–9) and, by extension, DBPs are estimated to substantially increase various
 41 Delta locations in the study area as described under these alternatives in Impact PH-2: *Exceedances*
 42 *of water quality criteria for constituents of concern such that there is an adverse effect on public health*
 43 *as a result of operation of the water conveyance facilities*. Such increases could trigger the need for
 44 substantial and costly changes in drinking water treatment plant design or operations in order to
 45 achieve EPA Stage 1 Disinfectants and Disinfection Byproduct Rule action thresholds. If upgrades
 46 were not undertaken, the increase in DOC and/or bromide concentrations could create an increased

1 risk of adverse effects on public health from increases in DBPs in drinking water. While Mitigation
 2 Measure WQ-5, *Avoid, minimize, or offset, as feasible, adverse water quality conditions; site and design*
 3 *restoration sites to reduce bromide increases in Barker Slough* and implementing the North Bay
 4 Aqueduct Alternative Intake Project (AIP) could reduce the effects of bromide, and Mitigation
 5 Measure WQ-17, *Consult with Delta water purveyors to identify means to avoid, minimize, or offset*
 6 *increases in long-term average DOC concentrations*, is available to reduce the effects of DOC, the
 7 feasibility and effectiveness of these measures are uncertain, and it is not known if implementation
 8 would reduce the severity such that it would not be an adverse effect.

9 The CPUC regulates electric utilities in the state and has established design guidelines for regulating
 10 EMFs. Recognizing that there is scientific uncertainty as to the health effects of EMFs on receptors in
 11 proximity to power lines, the CPUC affirmed that setting numeric exposure limits is not appropriate
 12 but established precautionary no-cost and low-cost policies that utilities would follow for proposed
 13 electrical facilities. The various electrical utilities in the Delta region that might be selected to
 14 provide power to the proposed project generally follow CPUC guidelines. The CPUC ranked land use
 15 categories for mitigation priority. In descending order these are: schools and licensed day care;
 16 residential; commercial/industrial; recreational; agricultural; and undeveloped land. The California
 17 Department of Education established minimum set-back distances for schools in relation to power
 18 lines of different voltages. These are similar to the National Institute of Health's 300- foot setback for
 19 sensitive receptors. The proposed project would be generally compatible with the policies
 20 established by CPUC and adopted by the selected utility because most new permanent and
 21 temporary power lines would be in sparsely populated areas, would be at least 300 feet from
 22 sensitive receptors, and would not expose new receptors or increase the exposure of current
 23 receptors. However, the proposed project could be considered incompatible with the guidelines
 24 because one or both of four new sensitive receptors, two fire stations and two parks, would be
 25 affected by alternatives. The proposed project would become compatible because the proponents
 26 would implement an environmental commitment that the location and design of the proposed new
 27 transmission lines would be conducted in accordance with CPUC's EMF Design Guidelines for
 28 Electrical Facilities, and would include one or more of three measures to reduce EMF exposure.

- 29 ● Shielding by placing trees or other physical barriers along the transmission line right-of-way.
- 30 ● Cancellation by configuring the conductors and other equipment on the transmission towers.
- 31 ● Increasing the distance between the source of the EMF and the receptor either by increasing the
 32 height of the tower or increasing the width of the right-of-way.

33 The *Sacramento County General Plan of 2005–2030* and Alameda County East Area General Plan have
 34 policies related to safety concerns about electromagnetic fields. These policies reference power line
 35 setbacks for sensitive receptors such as schools. By implementing the environmental commitment to
 36 comply with CPUC's EMF Design Guidelines for Electrical Facilities, the proposed project would be
 37 compatible with these policies.

1 **25.3.3 Effects and Mitigation Approaches**

2 **25.3.3.1 No Action Alternative**

3 The No Action Alternative describes expected future conditions resulting from a continuation of
 4 existing policies and programs by federal, state, and local agencies in the absence of the BDCP, and
 5 projects that are permitted or are assumed to be constructed, by the year 2060. Under the No Action
 6 Alternative, none of the proposed action alternatives would be implemented; however,
 7 implementation of operations and maintenance of the CVP and SWP, and enforcement and
 8 protection programs by federal, state, and local agencies and nonprofit groups would be ongoing.
 9 Climate change projections are also assumed within the No Action Alternative. Table 25-10
 10 identifies the projects assumed to be in the No Action Alternative and potential effects on public
 11 health.

12 **Water Supply Facilities**

13 New water supply facilities would be constructed under the No Action Alternative as listed in Table
 14 25-10; therefore, there could be a disruption to existing sources of methylmercury associated with
 15 this type of construction. Water supply operations under the No Action Alternative likely would not
 16 involve the operation of solids lagoons or sedimentation basins; therefore, there would be no
 17 increase in the public's risk of exposure to vector-borne diseases. Under the No Action Alternative,
 18 there would be a change in various source waters throughout the Delta (i.e., upstream water, Bay
 19 water, and agricultural return flow), due to potential changes in inflows, particularly from the
 20 Sacramento River watershed because of increased water demands or changes to climate and
 21 precipitation levels. Water supply operations under the No Action Alternative would continue to use
 22 the existing source(s) of drinking water from the study area. These sources generally meet
 23 regulatory standards for most constituents or experience some exceedances for constituents such as
 24 arsenic (see Chapter 8, *Water Quality*, Section 8.3.3.1). However, under the No Action Alternative,
 25 existing exceedances would not increase above baseline conditions (see Chapter 8) to levels that
 26 adversely affect any beneficial uses or substantially degrade water quality. Furthermore, drinking
 27 water from the study area would continue to be treated prior to distribution into the drinking water
 28 system.

29 Any modified reservoir operations under the No Action Alternative are not expected to promote
 30 *Microcystis* production upstream of the Delta since large reservoirs upstream of the Delta are
 31 typically low in nutrient concentrations and phytoplankton outcompete cyanobacteria, including
 32 *Microcystis*. As indicated in Chapter 8, *Water Quality*, modeled hydraulic residence times in the Delta
 33 during *Microcystis* bloom season (June through September) would increase somewhat in most Delta
 34 areas, with hydraulic residence times in the East Delta having the greatest increase. The changes in
 35 hydraulic residence times are driven by several factors accounted for in the modeling, including
 36 climate change, sea level rise, and changes in operations and maintenance that affect net Delta
 37 outflows. Because the change is relatively small, it is unknown whether the increase in modeled
 38 hydraulic residence times expected under the No Action Alternative relative to Existing Conditions
 39 would result in measurable increases in the frequency, magnitude, and geographic extent of
 40 *Microcystis* blooms throughout the Delta. Projected future water temperature changes in the Delta
 41 under the No Action Alternative indicate that water temperatures would increase due to climate
 42 change. This increase in temperature could lead to earlier attainment of the water temperature
 43 threshold of 19°C required to initiate *Microcystis* bloom formation, and thus earlier occurrences of

1 *Microcystis* blooms in the Delta. As explained in Chapter 8, *Water Quality*, ambient meteorological
2 conditions are anticipated to be the primary driver of the projected increase of water temperatures
3 in the Delta, and not water conveyance operations. However, because it is possible that increases in
4 the frequency, magnitude, and geographic extent of *Microcystis* blooms in the Delta would occur due
5 to increased water temperatures from climate change under the No Action Alternative, long-term
6 water quality degradation may occur in the Delta and water exported from the Delta to the
7 SWP/CVP Export Service Areas. Therefore, impacts on beneficial uses, including drinking water and
8 recreational waters, could occur and, as such, public health could be affected. Accordingly, this
9 would be considered an adverse effect.

10 **New Transmission Lines**

11 The No Action Alternative may involve the operation of new transmission lines should additional
12 sources of electricity be needed by either the water supply projects or as part of a general plan
13 buildout. It is likely that with population growth projected by various general plans and regional
14 plans would also result in an additional need for electricity and the construction and operation of
15 new transmission lines. Furthermore, as more renewable energy sources such as solar power are
16 developed, new transmission lines will likely be needed to convey power from the renewable energy
17 source to users. Although, it is unknown where new transmission lines would be and if they would
18 be located within close proximity to sensitive receptors (e.g., hospitals, schools, parks), it is likely
19 some of them would be within close proximity to sensitive receptors and present new sources of
20 EMFs. However, the utilities must implement the CPUC design criteria and guidelines regarding
21 EMFs, and CPUC reviews all proposals for transmission lines. Investor-owned utilities are required
22 to obtain a permit from CPUC for construction of certain specified infrastructure (including
23 transmission lines) listed under Public Utilities Code Section 1001 (California Public Utilities
24 Commission 2011). CPUC reviews permit applications under two concurrent processes: (1) an
25 environmental review pursuant to CEQA, and (2) the review of project need and costs pursuant
26 to Public Utilities Code Sections 1001 et seq. and General Order 131-D (CPCN or PTC) (California
27 Public Utilities Commission 2011). Therefore, the No Action Alternative is not likely to result in
28 adverse effects on public health with respect to EMFs.

29 **Habitat Restoration**

30 Habitat restoration activities in the study area already approved, such as those associated with the
31 Suisun Marsh Habitat Management, Preservation, and Restoration Plan, would be implemented
32 under the No Action Alternative. These habitat restoration activities would generally be located in
33 areas that are already potential sources of vectors, such as existing channels or agricultural areas.
34 Furthermore, activities would be designed to maximize water exchange and flow, thereby minimize
35 stagnant water and the production of mosquitoes. Finally, all of the restoration activities would
36 occur in consultation with existing MVCDS. Therefore, it is not expected that habitat restoration
37 under the No Action Alternative would result in a substantial increase in the public's risk of
38 exposure to vector-borne diseases.

1 **Table 25-10. Effects on Public Health from the Plans, Policies, and Programs for the No Action Alternative**

Agency	Program/Project	Status	Description of Program/Project	Potential Effects on Public Health
California Department of Fish and Wildlife, US Fish and Wildlife Service, Bureau of Reclamation, California Department of Water Resources, Suisun Resource Conservation District	Suisun Marsh Habitat Management, Preservation, and Restoration Plan	EIR/EIS completed December 2011	Permanently restore 7,000 acres of tidal habitat over 30 years and maintain and operate managed wetlands.	No adverse effect on public health from vector-borne diseases or mobilization of constituents known to bioaccumulate during construction and operation.
California Department of Water Resources	Mayberry Farms Subsidence Reversal and Carbon Sequestration Project	Completed October 2010	Permanently flood 308-acre parcel of DWR-owned land (Hunting Club leased) and restore 274 acres of palustrine emergent wetlands within Sherman Island to create permanent wetlands and to monitor waterfowl, water quality, and greenhouse gases.	No adverse effect on public health from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
Contra Costa Water District	Contra Costa Canal Fish Screen Project (Rock Slough)	Completed in 2011.	Installation of a fish screen at Rock Slough Intake.	No effect on public health.
Contra Costa Water District, U.S. Bureau of Reclamation, and California Department of Water Resources	Middle River Intake and Pump Station (previously known as the Alternative Intake Project)	Completed in 2011.	Construction of a potable water intake and pump station to improve drinking water quality for Contra Costa Water District customers.	No effect on public health.
Freeport Regional Water Authority and U.S. Bureau of Reclamation	Freeport Regional Water Project	Project was completed late 2010.	Construction of an intake/pumping plant near Freeport on the Sacramento River and a conveyance structure to transport water through Sacramento County to the Folsom South Canal.	No adverse effect on public health from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
California Department of Water Resources and Solano County Water Agency	North Bay Aqueduct Alternative Intake Project	In development	Construction of an alternative intake on the Sacramento River and a new segment of pipeline to connect it to the North Bay Aqueduct system.	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
Reclamation District 2093	Liberty Island Conservation Bank	Completed in 2011.	Restoration of inaccessible, flood prone land, zoned as agriculture but not actively farmed, to area enhancement of wildlife resources.	No effect on public health.

Agency	Program/Project	Status	Description of Program/Project	Potential Effects on Public Health
City of Stockton	Delta Water Supply Project	Completed in 2012.	Construction of a new intake structure and pumping station adjacent to the San Joaquin River; a water treatment plant along Lower Sacramento Road; and water pipelines along Eight Mile, Davis, and Lower Sacramento Roads.	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
U.S. Bureau of Reclamation, California Department of Fish and Wildlife, and Natomas Central Mutual Water Company	American Basin Fish Screen and Habitat Improvement Project	Anticipated completion in 2012.	This project involves consolidation of diversion facilities; removal of decommissioned facilities; aquatic and riparian habitat restoration; and installing fish screens in the Sacramento River. Total project footprint encompasses about 124 acres east of the Yolo Bypass. Permanent conversion of 70 acres of farmland (including 60 acres of rice) during Phases I and II.	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during or after conversion.
U.S. Bureau of Reclamation	Delta-Mendota Canal/California Aqueduct Intertie	Completed in 2012.	Construct an intertie to better coordinate water delivery operations between the California Aqueduct (state) and the Delta-Mendota Canal (federal) and to provide better pumping capacity for the Jones Pumping Plant. New project facilities include a pipeline and pumping plant.	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
Yolo County	General Plan Update	Adopted November 10, 2009.	Anticipated implementation of policies and programs such as the Farmland Conversion Mitigation Program would minimize conversion of agricultural land to nonagricultural uses through mitigation.	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
Central Valley Regional Water Quality Control Board	Sacramento – San Joaquin Delta Estuary TMDL for Methylmercury	Basin Plan amendment adopted 2010.	Establish a TMDL for methylmercury in the Sacramento-San Joaquin Delta Estuary (the Delta).	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
Semitropic Water Storage District	Delta Wetlands	EIR/EIS completed 2011	Water storage and wildlife enhancement on four Delta islands.	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
National Marine Fisheries Service and U.S. Fish and Wildlife Service	2008 and 2009 Biological Opinions	Ongoing.	The Biological Opinions issued by NMFS and USFWS establish RPAs to be implemented requiring habitat restoration	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.

1 Under the No Action Alternative, as described in Appendix 3D, *Defining Existing Conditions, No*
2 *Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, there would be some
3 change in inflows from the Sacramento River due to climate change-related changes in precipitation
4 patterns; therefore, the amount of Delta waters consisting of agricultural return flow would increase
5 slightly. Approximately 5% of the in-Delta agricultural use is livestock, the primary type of
6 agricultural use that generates pathogens. The relatively small increase in the percentage of Delta
7 waters consisting of agricultural return flow is not expected to cause a measureable change in the
8 pathogen concentrations in the Delta waters because livestock is a small percentage of the overall
9 agricultural use and none of the assumed No Action Alternative conditions would substantially
10 change the amount of livestock in the study area. Therefore, under the No Action Alternative, the
11 concentrations of pathogens would remain relatively similar to existing concentrations and
12 recreationists would not experience a substantial increase in exposure.

13 Construction of habitat restoration projects that are reasonably foreseeable or approved and/or
14 under construction under the No Action Alternative would likely temporarily mobilize existing
15 constituents within sediments known to bioaccumulate, such as methylmercury or pesticides. This
16 potential effect is expected in varying degrees depending on the location of restoration projects
17 because the study area is generally known to be out of compliance with methylmercury levels.
18 Construction effects would not be adverse because the mobilization would occur during a limited
19 time and would be localized around the area of construction. Once operational, other habitat
20 restoration projects could result in an increase of methylmercury as a result of biogeochemical
21 processes and sediment conditions established in tidal wetlands. However, it is expected these
22 projects either have, or would evaluate the potential for, methylmercury production and would
23 implement measures to monitor and adaptively manage methylmercury production. For example,
24 the Suisun Marsh Plan EIS/EIR evaluated the potential for methylmercury production due to tidal
25 restoration and determined it would result in less than significant impacts and that monitoring and
26 other measures would be incorporated into the adaptive management plan to manage
27 methylmercury concerns. Therefore, the habitat restoration projects that would occur under the No
28 Action Alternative are not likely to adversely affect public health.

29 **Catastrophic Seismic Risks**

30 The Delta and vicinity are within a highly active seismic area, with a generally high potential for
31 major future earthquake events along nearby and/or regional faults, and with the probability for
32 such events increasing over time. Based on the location, extent and non-engineered nature of many
33 existing levee structures in the Delta area, the potential for significant damage to, or failure of, these
34 structures during a major local seismic event is generally moderate to high. In the instance of a large
35 seismic event, levees constructed on liquefiable foundations are expected to experience large
36 deformations (in excess of 10 feet) under a moderate to large earthquake in the region. A major
37 earthquake event could result in breaching/failure of existing levees within the Delta area, with a
38 substantial number of these structures exhibiting moderate to high failure probabilities. The most
39 immediate and significant effect to water quality under such a scenario would be the influx of large
40 volumes of seawater and/or brackish water into the Delta, which would alter the “normal” balance
41 of freshwater/seawater flows and result in flooding of the associated islands. The corresponding
42 shift in Delta water quality conditions would be characterized by an increase in salinity levels,
43 including specific associated constituents such as bromide (which affects total dissolved solids
44 concentrations and can contribute to the formation of undesirable chemical byproducts in treated
45 drinking water). (See Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water*

1 *Supplies*, for more detailed discussion). Flooding caused by levee failure could result in a substantial
2 increase in the public's risk of exposure to vector-borne diseases due to large bodies of standing
3 water prior to flood waters being pumped off inundated Delta islands. Additionally, flood events
4 could cause exceedance(s) of water quality criteria for constituents of concern such that an adverse
5 effect would occur to public health from drinking water sources.

6 **CEQA Conclusion:** It is expected that implementation of existing plans, or existing and reasonably
7 foreseeable habitat restoration projects, would not result in a substantial increase in the public's
8 risk of exposure to vector-borne diseases because of the location of existing vector habitat,
9 restoration design, and consultation with MVCDs. This is because habitat restoration would be
10 located in areas that are already potential sources of vectors, such as existing channels or
11 agricultural areas. Furthermore, activities would be designed to maximize water exchange and flow,
12 thereby minimizing stagnant water and the production of mosquitoes. Finally, all of the restoration
13 activities would occur in consultation with existing MVCDs. Therefore, it is not expected that habitat
14 restoration under the No Action Alternative would result in a substantial increase in the public's risk
15 of exposure to vector-borne diseases.

16 Construction impacts associated with No Action Alternative habitat restoration projects would not
17 be adverse because the mobilization of existing sediment-bound contaminants (e.g., methylmercury)
18 would occur during a limited time and would be localized around the area of construction. Once
19 operational, other habitat restoration projects could result in an increase of methylmercury as a
20 result of biogeochemical processes and sediment conditions established in tidal wetlands. However,
21 it is expected these projects either have, or would evaluate the potential for, methylmercury
22 production and would implement measures to monitor and adaptively manage methylmercury
23 production.

24 Water supply operations under the No Action Alternative would continue to use the existing
25 source(s) of drinking water from the study area. These sources generally meet regulatory standards
26 for most constituents or experience some exceedances for constituents such as arsenic (see Chapter
27 8, *Water Quality*, Section 8.3.1.16). Under the No Action Alternative, existing exceedances would not
28 increase above baseline conditions (see Chapter 8, Section 8.3.3.1).

29 It is unknown where new transmission lines would be and if they would be located in close
30 proximity to sensitive receptors (e.g., hospitals, schools, parks); however, it is likely some of them
31 would be within close proximity to sensitive receptors and present new sources of EMFs. Utilities
32 must implement the CPUC design criteria and guidelines regarding EMFs, and CPUC reviews all
33 proposals for transmission lines.

34 Because it is possible that increases in the frequency, magnitude, and geographic extent of
35 *Microcystis* blooms in the Delta would occur due to increased water temperatures associated with
36 climate change under the No Action Alternative, long-term water quality degradation may occur in
37 the Delta and in water exported from the Delta to the SWP/CVP Export Service Areas. Thus, impacts
38 on beneficial uses, including drinking water and recreational waters, could occur and could affect
39 public health. As such, this would be considered significant impact.

1 **25.3.3.2 Alternative 1A—Dual Conveyance with Pipeline/Tunnel and** 2 **Intakes 1–5 (15,000 cfs; Operational Scenario A)**

3 Alternative 1A includes changes to the SWP and CVP water conveyance infrastructure and
 4 operations as a result of five new north Delta intakes to be constructed and operated under CM1 and
 5 Operational Scenario A.

6 Construction and operation of the water conveyance facilities could create suitable mosquito habitat
 7 because of the need for solids lagoons and sedimentation basins. Additionally, construction and
 8 operation of the water conveyance facilities could result in exceedances of constituents of concern,
 9 such as disinfection byproducts, trace metals, and pesticides, in Delta waters as a result of
 10 potentially decreasing flow from the Sacramento River and increased relative contribution of the
 11 San Joaquin River. Construction and operation of the water conveyance facilities could result in
 12 mobilization or increase in constituents known to bioaccumulate during sediment disturbing in-
 13 water construction activities such as pile driving, and because of potential decreased flows from the
 14 Sacramento River. The water conveyance facilities would also require new temporary and
 15 permanent transmission lines, consisting of 69 kV or 230 kV, which could potentially expose more
 16 people to EMFs (the transmission lines are depicted in detail in Mapbook Figures M3-1, M3-2, M3-3,
 17 M3-4, and M3-5 in Chapter 3, *Description of Alternatives*). Finally, the remaining conservation
 18 measures could potentially increase suitable mosquito habitat and result in a potential increase of
 19 methylmercury or pathogens in the study area as a result of up to 65,000 acres of tidal habitat
 20 restoration and other habitat restoration and enhancement. These potential public health effects are
 21 discussed below.

22 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 23 **the Water Conveyance Facilities**

24 **NEPA Effects:** Five intakes, up to 15 solids lagoons, five sedimentation basins, two forebays and a
 25 forebay inundation area would be constructed and operated under Alternative 1A. The
 26 sedimentation basins would be approximately 120 feet long by 40 feet wide by 55 feet deep, and the
 27 solids lagoons would be approximately 165 feet long by 86 feet wide by 10 feet deep. Construction
 28 of intake cofferdams would take place from June through October, and it is expected that dewatering
 29 of the cofferdams (i.e., removing water from behind the cofferdams) would occur after the
 30 construction of the cofferdams, when generally there are fewer mosquitoes breeding, as mosquitoes
 31 in northern California typically breed April–October (Sacramento–Yolo Mosquito and Vector Control
 32 District 2008). DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo
 33 County MVCDs and prepare and implement MMPs (Appendix 3B, *Environmental Commitments,*
 34 *AMMs, and CMs*). BMPs to be implemented as part of the MMPs would help control mosquitoes and
 35 would be consistent with practices presented in CDPH's *Best Management Practices for Mosquito*
 36 *Control in California* (California Department of Public Health 2012). BMP activities will include, but
 37 not necessarily be limited to, the following.

- 38 ● Maintain stable water levels.
- 39 ● Circulate water to avoid stagnation.
- 40 ● Implement monitoring and sampling programs to detect early signs of mosquito population
 41 problems.
- 42 ● Use biological agents such as mosquito fish to limit larval mosquito populations.

- 1 • Use larvicides and adulticides, as necessary.
- 2 • Test for mosquito larvae during the high mosquito season (June through September).
- 3 • Reduce or eliminate emergent vegetation in and along the edges of water.
- 4 • Manage the spread and density of floating and submerged vegetation that encourages mosquito
- 5 production.
- 6 • Introduce physical controls to areas of standing water (e.g., discharging water more frequently
- 7 or increasing circulation) if mosquitoes are present.

8 Implementation of these BMPs would reduce the likelihood that BDCP operations would require an
9 increase in abatement activities by the local MVCDS.

10 The sedimentation basins and solids lagoons of Intakes 1 and 2 would be located within 1 mile of
11 Clarksburg, and the sedimentation basins and solids lagoons of Intakes 3 and 4 would be located
12 within 1 mile of Hood. The sedimentation basin and solids lagoons of Intake 5 would be located
13 within 2.5 miles of Hood. The sedimentation basins would have a mat slab foundation and interior
14 concrete walls to create separate sedimentation channels. The solids lagoons would be concrete-
15 lined and approximately 10 feet deep. Up to three solids lagoons would be used in a rotating cycle
16 for each intake, with one basin filling, one settling, and the third being emptied of settled and
17 dewatered solids. The rate of filling and settling would depend on the volume of water pumped by
18 the intakes; however, water would continuously move through the basins at a relatively slow but
19 regulated rate so that the solids and sediments can be removed from the water prior to discharge
20 into the conveyance facilities (i.e., fall out of the water via gravity) (Figure 25-1). The flow rates
21 would be high enough to prevent water from stagnating, as stagnant water would not facilitate
22 conveying the water to the conveyance system or removing the sediment from the water. As
23 discussed in Section 25.1.1.4, mosquitoes typically prefer shallow stagnant water with little
24 movement. The sedimentation basins and solids lagoons would be considered too deep and have too
25 much regulated water movement to provide suitable mosquito habitat. Furthermore, during
26 sediment drying and basin cleaning operations, flow would be stopped completely and the moisture
27 in the sediment would be reduced to a point at which the sediment would not support
28 insect/mosquito larvae production. Therefore, these basins would not substantially increase
29 suitable vector habitat and would not substantially increase the public's exposure to vector-borne
30 diseases. Accordingly, adverse effects on public health with respect to vector-borne diseases are not
31 expected.

32 There would be an approximately 350-acre inundation area adjacent to the proposed intermediate
33 forebay to accommodate emergency overflow from the forebay. Water would enter this area only
34 during forebay emergency overflow situations; however, these situations could result in standing
35 water approximately 2 feet deep. While water of this depth would be suitable habitat for
36 mosquitoes, such events would be more likely to occur during high flow events in winter, when
37 fewer mosquitoes are breeding (Sacramento–Yolo Mosquito and Vector Control District 2008).
38 Water in the emergency overflow area would be pumped out and back to the intermediate forebay.
39 The pumping would create circulation that would minimize the amount of suitable habitat for
40 mosquitoes. Because the area would be used only during emergencies and the water would be
41 pumped from the area, the potential for creating suitable mosquito habitat would be low and
42 adverse effects on public health with respect to vector-borne diseases are not expected.

1 Although the proposed intermediate forebay and Byron Tract Forebay would increase surface water
2 within the study area, it is unlikely that these water bodies would provide suitable breeding habitat
3 for mosquitoes given that the water in these forebays would not be stagnant and would be too deep.
4 However, the shallow edges of the forebays could provide suitable mosquito breeding habitat if
5 emergent vegetation or other aquatic plants (e.g., pond weed) were allowed to grow. However, as
6 part of the regular maintenance of these forebay areas, floating vegetation such pond weed would be
7 harvested to maintain flow and forebay capacity. Further, BMPs to control mosquitoes would be
8 implemented as part of this alternative. As such, operation of these forebays is not expected to result
9 in an increase in mosquitoes or vector-borne diseases in the Plan Area.

10 In summary, although construction and operation of the water conveyance facilities would increase
11 surface water area in the Plan Area and therefore potentially provide habitat for vectors that
12 transmit diseases (e.g., mosquitoes), consultation and coordination with San Joaquin County and
13 Sacramento-Yolo County MVCDs and preparation and implementation of MMPs would ensure that
14 there would be no adverse effects on public health with respect to mosquito-borne diseases.

15 **CEQA Conclusion:** Sedimentation basins, solids lagoons, the Byron Tract Forebay, an intermediate
16 forebay, and the intermediate forebay inundation area have the potential to provide habitat for
17 vectors that transmit diseases (e.g., mosquitoes) because of the large volumes of water that would
18 be held within these areas. During operations, the depth, design, and operation of the sedimentation
19 basins and solids lagoons would prevent the development of suitable mosquito habitat. Specifically,
20 the basins would be too deep and the constant movement of water would prevent mosquitoes from
21 breeding and multiplying. Furthermore, the 350-acre inundation area adjacent to the intermediate
22 forebay would be limited to forebay emergency overflow situations and water would be physically
23 pumped back to the intermediate forebay, creating circulation such that the area would have a low
24 potential for creating suitable vector habitat. Similarly, water in the intermediate forebay and Byron
25 Tract Forebay would be circulated regularly and, with the exception of shallower areas around the
26 periphery, would be too deep to provided suitable mosquito breeding habitat. However, the shallow
27 edges of the forebays could provide suitable mosquito breeding habitat if emergent vegetation or
28 other aquatic plants (e.g., pond weed) were allowed to grow. As part of the regular maintenance of
29 these forebays, floating vegetation such pond weed would be harvested to maintain flow and
30 forebay capacity.

31 To minimize the potential for any impacts related to increasing suitable vector habitat within the
32 study area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo
33 County MVCDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs
34 would help control mosquitoes, thereby reducing the need for local MVCDs to increase abatement
35 activities in response to BDCP operations. These BMPs would be consistent with practices presented
36 in CDPH's *Best Management Practices for Mosquito Control in California* (California Department of
37 Public Health 2012). Therefore, construction and operation of Alternative 1A would not result in a
38 substantial increase in vector-borne diseases and the impact on public health would be less than
39 significant. No mitigation is required.

1 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
2 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
3 **Facilities**

4 **NEPA Effects:** Changes in water quality could result from decreased flows in the Sacramento River
5 by two mechanisms: increased contributions from the San Joaquin River relative to the Sacramento
6 River, and the decreased dilution capacity of the Sacramento River for contaminants.

7 **Disinfection Byproducts**

8 Changes to DOC and bromide concentrations and, by extension, DBPs, under Alternative 1A suggest
9 that, for the most part, there would not be exceedances of DBP criteria due to operations, because
10 long-term average DOC and bromide concentrations would be only slightly higher under this
11 alternative relative to the No Action Alternative (Chapter 8, *Water Quality*, Section 8.3.3.2). However,
12 under Alternative 1A, long-term average bromide concentrations are expected to increase at the
13 North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton on the Sacramento River relative
14 to the No Action Alternative. This increase would be greatest at Barker Slough (43%). Increases at
15 Barker Slough would be more substantial during the drought period (93%).

16 The Stage 1 Disinfectants and Disinfection Byproduct Rule, adopted by EPA in 1998 as part of the
17 SDWA, requires drinking water utilities to reduce total organic carbon (TOC) concentrations by
18 specified percentages prior to disinfection. These requirements were adopted because organic
19 carbon, such as DOC, can react with disinfectants during the water treatment disinfection process to
20 form DBPs such as THMs and HAAs, which can pose potential lifetime carcinogenic risks to humans.
21 Water treatment plants that utilize Delta water are designed and operated to meet EPA's 1998
22 requirements based on the ambient concentrations and seasonal variability that currently exist in
23 the Delta. Ambient DOC and bromide concentrations would need to change substantially to trigger
24 significant changes in plant design or operations. With the exception of Barker Slough, the increases
25 in long-term average DOC and bromide concentrations estimated to occur at most modeled Delta
26 locations under Alternative 1A are of sufficiently small magnitude that they would not require
27 existing drinking water treatment plants to substantially upgrade treatment. However, the long-
28 term average increase predicted for the North Bay Aqueduct at Barker Slough could necessitate
29 upgrades or changes in operations at certain water treatment plants. While treatment technologies
30 sufficient to achieve the necessary bromide removal exist, implementation of such technologies
31 would likely require substantial investment in new or modified infrastructure. Should treatment
32 plant upgrades not be undertaken, a change of such magnitude in long-term average bromide
33 concentrations in drinking water sources would represent an increased risk for adverse effects on
34 public health from DBP in drinking water sources. Mitigation Measure WQ-5 is available to reduce
35 these effects. Implementation of this measure along with a separate other commitment as set forth
36 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, relating to the potential increased
37 treatment costs associated with bromide-related changes would reduce these effects. Further, DWR
38 issued a Notice of Preparation on December 2, 2009 to construct and operate the AIP that would
39 establish an alternative surface water intake on the Sacramento River upstream of the Sacramento
40 Regional Wastewater Treatment Plant discharge. The AIP would connect to the existing North Bay
41 Aqueduct system by a new segment of pipe. The proposed alternative intake would be operated in
42 conjunction with the existing North Bay Aqueduct intake at Barker Slough. The proposed project
43 would be designed to improve water quality and to provide reliable deliveries of State Water Project
44 supplies to its contractors, the Solano County Water Agency and the Napa County Flood Control and
45 Water Conservation District. The timing of DWR's implementation of the AIP is uncertain at this

1 time. The adverse water quality effects on the North Bay Aqueduct at Barker Slough may be avoided
2 or minimized by implementation of the AIP.

3 **Trace Metals**

4 Water quality modeling results indicate that water conveyance facilities operations would not
5 substantially change concentrations of metals of primarily human health and drinking water
6 concern (arsenic, iron, manganese) in Delta waters relative to the No Action Alternative. The arsenic
7 criterion was established to protect human health from the effects of long-term chronic exposure,
8 while secondary MCLs for iron and manganese were established as reasonable federal regulatory
9 goals for drinking water quality, and are enforceable standards in California. Average concentrations
10 for arsenic, iron, and manganese in the primary source water (Sacramento River, San Joaquin River,
11 and the bay at Martinez) are below these criteria. No mixing of these three source waters could
12 result in a metal concentration greater than the highest source water concentration, and, given that
13 the modeled average water concentrations for arsenic, iron, and manganese do not exceed water
14 quality criteria, more frequent exceedances of drinking water criteria in the Delta would not be an
15 expected result under this alternative. Accordingly, no adverse effect on public health related to the
16 trace metals arsenic, iron, or manganese from drinking water sources is anticipated.

17 **Pesticides**

18 Sources of pesticides to the study area include direct input of surface runoff from in-Delta
19 agriculture and Delta urbanized areas as well as inputs from rivers upstream of the Delta. These
20 sources would not be affected by implementing Alternative 1A. However, under Alternative 1A
21 operations, the distribution and mixing of Delta source waters would change. Relative to the No
22 Action Alternative, these modeled changes in the source water fractions of Sacramento, San Joaquin
23 and Delta agriculture water would not be of sufficient magnitude to substantially increase pesticide
24 concentrations in Delta waters and would not adversely affect beneficial uses of the Delta (see
25 Chapter 8, *Water Quality*, Section 8.3.3.2). Therefore, adverse effects on public health from drinking
26 water sources are not expected with respect to pesticides.

27 **CEQA Conclusion:** Under Alternative 1A, water supply operations would increase relative
28 contributions from the San Joaquin River relative to the Sacramento River, and decrease the dilution
29 capacity of the Sacramento River for contaminants. This could result in changes in water quality.
30 Water quality modeling results indicate that changes in flows under Alternative 1A operations
31 would not, for the most part, result in increased exceedances of water quality criteria for
32 constituents of concern (DBPs, trace metals and pesticides) in the study area (Chapter 8, *Water*
33 *Quality*, Section 8.3.3.2). However, relative to Existing Conditions bromide concentrations would
34 increase at the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton on the
35 Sacramento River under Alternative 1A, with the greatest increase occurring at Barker Slough. The
36 increase in long-term average bromide concentrations predicted for Barker Slough (38%) would
37 result in a substantial change in source water quality to existing drinking water treatment plants
38 drawing water from the North Bay Aqueduct. During drought periods, this increase would be more
39 substantial (94%). These modeled increases in bromide at Barker Slough could lead to adverse
40 changes in the formation of DBPs at drinking water treatment plants such that considerable water
41 treatment plant upgrades would be necessary to achieve equivalent levels of drinking water health
42 protection. This would be a significant impact.

43 While treatment technologies sufficient to achieve the necessary bromide removal exist,
44 implementation of such technologies would likely require substantial investment in new or modified

1 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
 2 long-term average bromide concentrations in drinking water sources would represent an increased
 3 risk for adverse effects on public health from DBP in drinking water sources. Assuming the adverse
 4 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
 5 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
 6 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
 7 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
 8 based on currently available information.

9 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
 10 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
 11 separate other commitment to address the potential increased water treatment costs that could
 12 result from bromide-related concentration effects on municipal water purveyor operations.
 13 Potential options for making use of this financial commitment include funding or providing other
 14 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
 15 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
 16 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
 17 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
 18 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
 19 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
 20 treatment entities will be fully funded or implemented successfully prior to the project's
 21 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
 22 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
 23 or implemented before the project's contribution to the impact is made, a significant impact in the
 24 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
 25 significant and unavoidable. If, however, all financial contributions, technical contributions, or
 26 partnerships required to avoid significant impacts prove to be feasible and any necessary
 27 agreements are completed before the project's contribution to the effect is made, impacts would be
 28 less than significant.

29 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 30 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 31 **Slough**

32 It remains to be determined whether, or to what degree, the available and existing salinity
 33 response and countermeasure actions of SWP and CVP facilities or municipal water purveyors
 34 would be capable of offsetting the actual level of changes in bromide that may occur from
 35 implementation of Alternative 1A. Therefore, to determine the feasibility of reducing the effects
 36 of increased bromide levels, and potential adverse effects on beneficial uses associated with
 37 CM1 operations (and hydrodynamic effects of tidal restoration under CM4), the proposed
 38 mitigation requires a series of phased actions to identify and evaluate existing and possible
 39 feasible actions, followed by development and implementation of the actions, if determined to
 40 be necessary. The development and implementation of any mitigation actions shall be focused
 41 on those incremental effects attributable to implementation of Alternative 1A operations only.
 42 Development of mitigation actions for the incremental bromide effects attributable to climate
 43 change/sea level rise are not required because these changed conditions would occur with or
 44 without implementation of Alternative 1A. The goal of specific actions would be to reduce/avoid

1 additional degradation of Barker Slough water quality conditions with respect to the CALFED
2 bromide goal.

3 BDCP proponents shall consider effects of site-specific restoration areas proposed under CM4
4 on bromide concentrations in Barker Slough. Design and siting of restoration areas shall attempt
5 to reduce potential effects to the extent possible without compromising proposed benefits of the
6 restoration areas. It is anticipated that these efforts will be able to reduce the level of projected
7 increase, though it is unknown whether it would be able to completely eliminate any increases.

8 Additionally, following commencement of initial operations of CM1, the BDCP proponents will
9 conduct additional evaluations described herein, and develop additional modeling (as
10 necessary), to define the extent to which modified operations could reduce or eliminate the
11 increased bromide concentrations currently modeled to occur under Alternative 1A. The
12 additional evaluations should also consider specifically the changes in Delta hydrodynamic
13 conditions associated with tidal habitat restoration under CM4 (in particular the potential for
14 increased bromide concentrations that could result from increased tidal exchange) once the
15 specific restoration locations are identified and designed. The evaluations will also consider up-
16 to-date estimates of climate change and sea level rise, if and when such information is available.
17 If sufficient operational flexibility to offset bromide increases is not practicable/feasible under
18 Alternative 1A operations, and/or siting and design of restoration areas cannot feasibly reduce
19 bromide increases to a less than significant level without compromising the benefits of the
20 proposed areas, achieving bromide reduction pursuant to this mitigation measure would not be
21 feasible under this alternative.

22 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 23 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

24 **NEPA Effects:** Under Alternative 1A, sediment-disturbing activities during construction and
25 maintenance could result in the disturbance of existing constituents in sediment, such as pesticides
26 (including legacy pesticides) or methylmercury. In-channel construction activities, such as pile
27 driving during the construction of cofferdams at the intakes and pier construction at the barge
28 unloading facilities, which would occur during a 5-month time window, would result in the localized
29 disturbance of river sediment. In addition, maintenance of the five proposed north Delta intakes and
30 the Byron Tract and intermediate forebays would entail periodic dredging for sediment removal at
31 these locations. During operation of water conveyance facilities, changes in dilution and mixing of
32 sources of water could result in a change in constituents known to bioaccumulate. For example, the
33 reduction of flows in the Sacramento River downstream of the proposed north Delta intakes may
34 result in a decreased dilution of constituents known to bioaccumulate in the study area.

35 **Pesticides**

36 Legacy pesticides, such as organochlorines, have low water solubility; they do not readily volatilize
37 and have a tendency to bond to particulates, settle out into the sediment, and not be transported far
38 from the source. If present in sediment within in-water construction areas, legacy pesticides would
39 be disturbed locally and would not be expected to partition into the water column to any substantial
40 degree. Therefore, no significant adverse effect on public health would result from construction.

41 Further, residues of legacy organochlorine pesticides enter rivers primarily through surface runoff
42 and erosion of terrestrial soils during storm events, and through resuspension of riverine bottom
43 sediments. The combination of these processes may contribute to increases above water quality

1 objectives (Central Valley Regional Water Quality Control Board 2010a). Water supply operations of
 2 the CVP and SWP do not affect terrestrial sources of these pesticides, but may result in geomorphic
 3 changes that ultimately could result in changes to sediment suspension and deposition. However, as
 4 discussed in greater detail in Chapter 8, *Water Quality* (Section 8.3.3), water supply operations
 5 under any BDCP action alternative would not be expected to change total suspended solids or
 6 turbidity levels (highs, lows, typical conditions) to any substantial degree. Changes in the magnitude,
 7 frequency, and geographic distribution of legacy pesticides in water bodies of the affected
 8 environment that would result in new or more severe adverse effects on other beneficial uses,
 9 relative to the No Action Alternative, would not be expected to occur.

10 Numerous pesticides are currently used throughout the affected environment. While some of these
 11 pesticides may be bioaccumulative, those present-use pesticides for which there is sufficient
 12 evidence of their presence in waters affected by SWP and CVP operations (i.e., organophosphate
 13 pesticides, such as diazinon, chlorpyrifos, diuron, and pyrethroids) are not considered
 14 bioaccumulative. Thus, changes in their concentrations would not directly cause bioaccumulative
 15 problems in aquatic life or humans. Furthermore, Alternative 1A would not result in increased
 16 tributary flows that would mobilize organochlorine pesticides in sediments. Thus, the change in
 17 source water in the Delta associated with the change in water supply operations is not expected to
 18 adversely affect public health with respect to bioaccumulation of pesticides.

19 **Methylmercury**

20 If mercury is sequestered in sediments at water facility construction sites, it could become
 21 suspended in the water column during construction activities, opening up a new pathway into the
 22 food chain. Disturbance of sediment associated with construction activities (e.g., pile driving and
 23 cofferdam installation) at intake sites or barge landing locations would result in a localized, short-
 24 term increase in turbidity during the construction activity, which may suspend sediment that
 25 contains methylmercury. Please see Chapter 8, Section 8.1.3.9, *Mercury*, for a discussion of existing
 26 methylmercury concentrations in sediments.

27 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
 28 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
 29 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
 30 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
 31 area of disturbance. These BMPs would include, but not necessarily be limited to the following.

- 32 • Install physical erosion control stabilization features (hydroseeding, mulch, silt fencing, fiber
 33 rolls, sand bags, and erosion control blankets) to capture sediment and control both wind and
 34 water erosion.
- 35 • Retain trees and natural vegetation to the extent feasible to stabilize hillsides, retain moisture,
 36 and reduce erosion.
- 37 • Limit construction, clearing of vegetation, and disturbance of soils to areas of proven stability.
- 38 • Use sediment ponds, silt traps, wattles, straw bale barriers or similar measures to retain
 39 sediment transported by runoff water onsite.
- 40 • Collect and direct surface runoff at non-erosive velocities to the common drainage courses.
- 41 • Deposit or store excavated materials away from drainage courses.

- 1 • Prevent transport of sediment at the construction site perimeter, toe of erodible slopes, soil
2 stockpiles, and into storm drains.
- 3 • Reduce runoff velocity on exposed slopes.
- 4 • Reduce offsite sediment tracking.

5 These measures would help ensure that construction activities would not substantially increase or
6 substantially mobilize methylmercury. Accordingly, there would be no adverse effect.

7 Modeling showed small, insignificant changes in total mercury and methylmercury levels in water
8 and fish tissues resulting from Alternative 1A water operations. Upstream mercury contributions
9 and methylmercury production in Delta waters would not be altered by the operation of Alternative
10 1A, as it would not change existing mercury sources and would not substantially alter
11 methylmercury concentrations in the Sacramento River or San Joaquin River; therefore, the
12 potential for Alternative 1A to create a public health effect is minimal, and effects would not be
13 adverse. Modeling results indicate that percentage change in assimilative capacity of waterborne
14 total mercury relative to the 25 ng/L Ecological Risk Benchmark for this alternative showed the
15 greatest decrease (1.1%) at Franks Tract relative to the No Action Alternative. Fish tissue estimates
16 showed small or no increase in exceedance quotients based on long-term annual average
17 concentrations for mercury at the nine Delta locations modeled (See Chapter 8, *Water Quality*,
18 Section 8.3.3.2, *Alternative 1A–Dual Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs;*
19 *Operational Scenario A)*, for a detailed discussion). The greatest increase was at Mokelumne River
20 (South Fork) at Staten Island (10% relative to the No Action Alternative). Currently, mercury
21 concentrations in fish tissues exceed Delta TMDL guidance targets, which are set for human health
22 rather than effects on fish, and Alternative 1A is not expected to substantially alter this condition
23 through water operations. Large sport fish throughout the Delta are currently uniformly in
24 exceedance of consumption guidelines for mercury, and Alternative 1A is not expected to
25 substantially alter that condition.

26 Although methylmercury currently exceeds the TMDL, little to no change in mercury or
27 methylmercury concentrations in water is expected under Alternative 1A water operations. Thus,
28 the alternative would not result in increased exceedances of water quality criteria. Because water
29 operations would not substantially increase methylmercury in the study area above what currently
30 exists and would not expose people to an additional public health hazard, adverse effects on public
31 health are not expected to result.

32 **CEQA Conclusion:** Intermittent and short-term construction-related activities (as would occur for
33 in-river construction) would not be anticipated to result in contaminant discharges of sufficient
34 magnitude or duration to contribute to long-term bioaccumulation processes, or cause measureable
35 long-term degradation such that existing 303(d) impairments would be made discernibly worse or
36 TMDL actions to reduce loading would be adversely affected. Legacy pesticides typically bond to
37 particulates, and do not mobilize easily. Construction and maintenance of Alternative 1A would not
38 cause legacy organochlorine pesticides to be transported far from the source or to partition into the
39 water column. Other pesticides which are currently present in waters affected by SWP and CVP
40 operations are not considered bioaccumulative. Although methylmercury currently exceeds the
41 TMDL, little to no change in mercury or methylmercury concentrations in water is expected under
42 Alternative 1A water conveyance construction. Further, BMPs implemented as part of Erosion and
43 Sediment Control Plans and SWPPPs would help ensure that construction activities would not
44 substantially increase or substantially mobilize legacy organochlorine pesticides or methylmercury

1 during construction and maintenance. Therefore, construction and maintenance of Alternative 1A
2 would not cause increased exposure of the public to these bioaccumulative sediment constituents.

3 Alternative 1A would not result in increased flows in the tributaries that would mobilize legacy
4 organochlorine pesticides in sediments. Other pesticides that are present in study area water
5 channels are not considered bioaccumulative and any changes in concentrations due to Alternative
6 1A operations would not cause them to become bioaccumulative. Water quality modeling results
7 showed small, insignificant changes in mercury and methylmercury levels in water at certain Delta
8 locations and fish tissues due to Alternative 1A water operations. Specifically, modeling results
9 indicate that percentage change in assimilative capacity of waterborne total mercury relative to the
10 25 ng/L Ecological Risk Benchmark for this alternative showed the greatest decrease (1%) at Franks
11 Tract and Old River relative to Existing Conditions. Fish tissue estimates showed the greatest
12 increase (8%) in exceedance quotients relative to Existing Conditions at Mokelumne River (South
13 Fork) at Staten Island.

14 Since construction, maintenance, or operation of the water conveyance facilities in Alternative 1A
15 would not cause substantial mobilization or substantial increase of constituents known to
16 bioaccumulate, impacts on public health would be less than significant. No mitigation is required.

17 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 18 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 19 **Facilities**

20 *NEPA Effects:* Approximately 621 miles of existing transmission lines are located within the study
21 area. Table 25-9 identifies the miles of the new temporary and permanent 69 kV transmission lines
22 and the miles of permanent 230 kV lines that would be located outside existing rights-of-way of
23 existing transmission lines. As described in Table 25-9, a total of 24.71 miles of new temporary 69
24 kV transmission lines, 8.94 miles of new permanent 69 kV transmission lines, and 42.68 miles of
25 new permanent 230 kV transmission lines would be required for this alternative. While new
26 transmission lines generating new sources of EMFs would be constructed under this alternative, the
27 new temporary and permanent transmission lines would be located in sparsely populated areas
28 (Figure 25-2). Table 25-9 identifies only one potential new sensitive receptor (Stone Lakes National
29 Wildlife Refuge) associated with the pipeline/tunnel alignment that is not currently within 300 feet
30 of an existing transmission line; the majority of sensitive receptors are already located within 300
31 feet of an existing 69 kV or 230 kV transmission line. Accordingly, new temporary or new
32 permanent transmission lines would not expose substantially more potential sensitive receptors or
33 substantially more people to EMFs that they are not already experiencing. Stone Lakes National
34 Wildlife Refuge would be within 300 feet of a proposed temporary 69 kV transmission line. Visitors
35 to this area generally come for walks, water recreation, and hunting, and as such, it is unlikely that
36 large groups of people would be staying in the area within 300 feet of this proposed transmission
37 line, so any EMF exposure would be limited. Further, this line would be removed following
38 completion of construction of the water conveyance facility features near this area so there would
39 be no potential permanent effects. Therefore, this temporary transmission line would not
40 substantially increase people's exposure to EMFs.

41 As discussed in Section 15.1.1.5, the current scientific evidence does not show conclusively that EMF
42 exposure can increase health risks. In 2006, CPUC updated its EMF policy and reaffirmed that health
43 hazards from exposures to EMF have not been established. State and federal public health
44 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC

1 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should be
 2 continued. Based on this, utility companies are required to establish and maintain EMF Design
 3 Guidelines in order to reduce potential health risks associated with power lines. These guidelines
 4 would be implemented for any new temporary or new permanent transmission lines constructed
 5 and operated under Alternative 1A, depending on which electric provider is selected by DWR.
 6 Furthermore, as described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, the
 7 location and design of the proposed new transmission lines would be conducted in accordance with
 8 CPUC's EMF Design Guidelines for Electrical Facilities, and would include one or more of three
 9 measures to reduce EMF exposure.

- 10 • Shielding by placing trees or other physical barriers along the transmission line right-of-way.
- 11 • Cancellation by configuring the conductors and other equipment on the transmission towers.
- 12 • Increasing the distance between the source of the EMF and the receptor either by increasing the
 13 height of the tower or increasing the width of the right-of-way.

14 Therefore, operation of the transmission line corridors would not expose substantially more people
 15 to transmission lines generating EMFs, and there would be no adverse effect on public health.

16 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
 17 transmission lines would be located in sparsely populated areas generally away from existing
 18 potentially sensitive receptors. However, one sensitive receptor, Stone Lakes National Wildlife
 19 Refuge, would be within 300 feet of a proposed temporary 69 kV temporary transmission line.
 20 Because visitors to this area generally come for walks, water recreation, and hunting, it is unlikely
 21 that large groups of people would be staying in the area within 300 feet of this proposed
 22 transmission line, so any EMF exposure would be limited. Further, this line would be removed
 23 following completion of construction of the water conveyance facility features near this area so
 24 there would be no potential permanent effects. Therefore, this temporary transmission line would
 25 not substantially increase people's exposure to EMFs. Design and implementation of new temporary
 26 or permanent transmission lines not within the right-of-way of existing transmission lines would
 27 follow CPUC's EMF Design Guidelines for Electrical Facilities and would implement shielding,
 28 cancellation and/or distance measures to reduce EMF exposure. Since construction and operation of
 29 Alternative 1A would not expose substantially more people to transmission lines that generate new
 30 sources of EMFs, impacts on public health would be less than significant, and no mitigation is
 31 required.

32 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 33 **and CM11**

34 **NEPA Effects:** Implementation of the conservation measures under Alternative 1A would include
 35 fisheries enhancement (CM2); restoration of up to 65,000 acres of tidal and freshwater habitat (CM3
 36 and CM4), 10,000 acres of inundated floodplain (CM5), and 1,200 acres of nontidal marsh and the
 37 creation of 500 acres of managed wetland (CM10); enhancement of channel margin and riparian
 38 habitat (CM6 and CM7); and protection of 150 acres of alkali seasonal wetland complex and 1,500
 39 acres of managed wetlands (CM3 and CM11). These activities could potentially increase suitable
 40 mosquito habitat within the study area.

41 Under CM2, *Yolo Bypass Fisheries Enhancement*, the frequency, duration, and magnitude of
 42 inundation of the Yolo Bypass would increase. The increased floodplain inundation and water
 43 surface may result in an increase in mosquitoes in the Yolo Bypass.

1 Of the approximate 65,000-acre tidal and freshwater habitat restoration target, approximately
 2 55,000 acres of this restoration will consist of tidal perennial aquatic, tidal mudflat, tidal freshwater
 3 emergent wetland, and tidal brackish emergent wetland natural communities, and the remaining up
 4 to 10,000 acres will consist of transitional uplands to accommodate sea level rise. Of the
 5 approximate 55,000 acres of tidally influenced natural community, approximately 20,600 acres
 6 must occur in particular ROAs as listed below.

- 7 • 7,000 acres of brackish tidal habitat, of which at least 4,800 acres would be tidal brackish
 8 emergent wetland and the remainder would be tidal perennial aquatic and tidal mudflat, in
 9 Suisun Marsh ROA.
- 10 • 5,000 acres of freshwater tidal habitat in the Cache Slough ROA.
- 11 • 1,500 acres of freshwater tidal habitat in the Cosumnes/Mokelumne ROA.
- 12 • 2,100 acres of freshwater tidal habitat in the West Delta ROA.
- 13 • 5,000 acres of freshwater tidal habitat in the South Delta ROA.

14 The remaining 34,400 acres would be distributed among the ROAs or may occur outside the ROAs.
 15 The areas within the ROAs currently have potentially suitable habitat for mosquitoes and aquatic
 16 habitat restoration in these areas may increase mosquito populations.

17 Potentially suitable mosquito habitat resulting from the implementation of CM2 – CM7, CM10 and
 18 CM11 would generally not be located near densely populated areas (Figure 25-3). Table 25-6
 19 outlines the distances travelled from breeding grounds for the species listed. These distances range
 20 from less than 1 mile to up to 30 miles. The conservation measures would generally expand existing
 21 habitat or replace existing agricultural areas, both of which are currently sources for mosquitoes. Of
 22 the ROAs, the South Delta ROA and West Delta ROA currently have the fewest acres of habitat
 23 suitable for mosquitoes and are the closest to more densely populated areas (Figure 25-3). Similarly,
 24 although much of Yolo Bypass is not proximate to densely populated areas, there are areas of Yolo
 25 Bypass near populated areas including El Macero, Davis, and West Sacramento. Therefore, habitat
 26 restoration in these ROAs and in the Yolo Bypass may result in an increase in mosquitoes and
 27 exposure to vector-borne diseases when compared with restoration of aquatic habitat within the
 28 other ROAs.

29 The habitat restoration and enhancement under all of these CMs would be performed in accordance
 30 with Natural Communities Enhancement and Management (CM11), which would require
 31 preparation and implementation of management plans for the protected natural communities and
 32 covered species habitats. The preparation and implementation of the management plans would be
 33 performed in consultation with the appropriate MVCDs. This consultation would occur when
 34 specific restoration and enhancement projects and locations are identified within the ROAs and
 35 prior to implementation of CM2. It is standard practice to use IPM to control mosquitoes, and, as
 36 part of the consultation with the MVCDs, MMPs would be prepared (Appendix 3B, *Environmental*
 37 *Commitments, AMMs, and CMs*). In addition, BMPs from the guidelines outlined in Section 25.2.3.4
 38 and Section 25.2.5.7, and detailed in Appendix 3B, would be incorporated into the proposed project
 39 and executed to maintain proper water circulation and flooding during appropriate times of the year
 40 (e.g., fall) to prevent stagnant water and habitat for mosquitoes. These include the following
 41 practices.

- 1 • Delay or phase fall flooding—phased flooding involves flooding habitat throughout the fall and
- 2 winter in proportion to wildlife need and takes into consideration other wetland habitat that
- 3 may be available in surrounding areas.
- 4 • Use rapid fall flooding.
- 5 • Use deep initial flooding.
- 6 • Subsurface irrigate.
- 7 • Utilize water sources with mosquito predators for flooding.
- 8 • Drain irrigation water into ditches or other water bodies with abundant mosquito predators.
- 9 • Employ vegetation management practices to reduce mosquito production in managed wetlands
- 10 (e.g., mowing, burning, disking of vegetation that serves as mosquito breeding substrate).
- 11 • Design wetlands and operations to be inhospitable to mosquitoes.
- 12 • Implement monitoring and sampling programs to detect early signs of mosquito population
- 13 problems.
- 14 • Use biological agents such as mosquito fish to limit larval mosquito populations.
- 15 • Use larvicides and adulticides, as necessary.
- 16 • Test for mosquito larvae during the high mosquito season (June through September).

17 Finally, restoration of different types of habitat would potentially increase mosquito predators, such
 18 as birds and bats, using the habitat. Therefore, implementation of the habitat restoration and
 19 enhancement conservation measures would not significantly increase the public's risk of exposure
 20 to vector-borne diseases. There would be no adverse effect.

21 **CEQA Conclusion:** Although implementing conservation measures under Alternative 1A would
 22 increase restored and enhanced habitat in the study area that could result in a significant increase in
 23 vectors such as mosquitoes, BDCP proponents would consult and coordinate with San Joaquin
 24 County and Sacramento-Yolo County MVCDs and prepare and implement MMPs (Appendix 3B,
 25 *Environmental Commitments, AMMs, and CMs*). BMPs to be implemented as part of the MMPs would
 26 help control mosquitoes. These BMPs would be consistent with practices presented in CDPH's *Best*
 27 *Management Practices for Mosquito Control in California* (California Department of Public Health
 28 2012). This would reduce the potential for an increase in mosquito breeding habitat, and an
 29 associated substantial increase in vector-borne diseases would not result. Furthermore, habitat
 30 would be restored in areas where existing potentially suitable habitat for mosquitoes already exists.
 31 Finally, predators on mosquitoes would likely increase as a result of restoration and enhancement,
 32 which would keep mosquito populations in check. Accordingly, implementation of CM2–CM7, CM10
 33 and CM11 under Alternative 1A would not substantially increase the public's risk of exposure to
 34 vector-borne diseases beyond what currently exists and would be less than significant. No
 35 mitigation is required.

36 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of** 37 **Implementing the Restoration Conservation Measures**

38 **NEPA Effects:** The study area currently supports habitat types, such as tidal habitat, upland
 39 wetlands, and agricultural lands, that produce pathogens as a result of the biological productivity in
 40 these areas (e.g., migrating birds, application of fertilizers, waste products of animals). The study

1 area does not currently have pathogen concentrations that rise to the level of adversely affecting
2 beneficial uses of recreation. Restored habitat and protected agricultural lands under Alternative 1A
3 could result in an increase in pathogen loading in the study area because these land uses are known
4 to generate pathogens. However, as exemplified by the Pathogen Conceptual Model (Tetra Tech
5 2007), any potential increase in pathogens associated with the proposed habitat restoration would
6 be localized and within the vicinity of the actual restoration. The result would be similar for lands
7 protected for agricultural uses. This localized increase is not expected to be of sufficient magnitude
8 and duration to result in adverse effects on recreationists as described in Chapter 8, *Water Quality*,
9 Section 8.3.3.2. Furthermore, depending on the level of recreational access granted by management
10 plans, habitat restoration could increase or decrease opportunities for recreationists within the
11 Delta region. Mechanisms that permit public access could increase opportunities related to upland
12 hunting, hiking, walking, wildlife viewing, botanical viewing, nature photography, picnicking, and
13 sightseeing. Alternatively, acquisition that would exclude public recreational use would decrease
14 opportunities for these activities, thus limiting recreationists' potential exposure to pathogens. Even
15 if recreationists were allowed in the ROAs, the characteristics of pathogens in water as described by
16 the conceptual model would not substantially increase recreationists' exposure. Accordingly,
17 implementation of the restoration conservation measures under Alternative 1A would not result in a
18 substantial increase in recreationists' exposure to pathogens. There would be no adverse effect.

19 **CEQA Conclusion:** Implementation of the restoration conservation measures would support habitat
20 types, such as wetlands and agricultural lands, that could produce pathogens as a result of the
21 biological productivity in these areas (e.g., migrating birds, application of fertilizers, waste products
22 of animals). However, the localized nature of pathogen generation, as well as the quick die-off of
23 some types of pathogens once released into water bodies, would generally prevent substantial
24 pathogen exposure to recreationists. Accordingly, impacts on public health would be less than
25 significant. No mitigation is required.

26 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 27 **as a Result of Implementing CM2, CM4, CM5, and CM10**

28 **NEPA Effects:** The primary concern with habitat restoration regarding constituents known to
29 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
30 inundated floodplains and marshes. The mobilization depends on the presence of the constituent
31 and the biogeochemical behavior of the constituent to determine whether it could re-enter the
32 water column or be reintroduced into the food chain.

33 **Pesticides**

34 Organochlorines and other relatively water insoluble pesticides would likely be sequestered in the
35 former agricultural soils in ROAs. Additionally, because these chemicals tend to bind to particulates,
36 concentrations are typically highest in sediment. Flooding of former agricultural land, as would
37 occur under CM4, CM5, and CM10, is expected to result in some level of accessibility to biota through
38 uptake by benthic organisms. Moreover, CM2 and CM5 may be managed alongside continuing
39 agriculture, where pesticides may be used on a seasonal basis and where water during flood events
40 may come in contact with residues of these pesticides. However, rapid dissipation would be
41 expected, particularly in the large volumes of water involved in flooding; therefore, it is unlikely that
42 a substantial increase in bioaccumulation by fish would result. Further, CM2–CM21 do not include
43 the use of pesticides known to be bioaccumulative in animals or humans. Additionally, significant
44 increases in organochlorine and other legacy pesticides are not expected in the water column

1 because these lipophilic chemicals strongly partition to sediments. Also, concentrations in the water
 2 column should be relatively short-lived because these pesticides settle out of the water column via
 3 sediment adsorption in low-velocity flow. As described in Section D.4.6.1 of BDCP Appendix 5.D⁸, if
 4 sediment with existing pesticide levels erodes and is transported from an ROA, it is likely that the
 5 pesticides would not be transported very far from the source area, and would settle out with
 6 suspended particulates and be deposited close to the ROA. For these reasons a substantial
 7 mobilization of nor a substantial increase in bioaccumulative pesticides in the study area is not
 8 anticipated. Therefore, no adverse effect on public health with respect to bioaccumulation of
 9 pesticides is expected.

10 **Methylmercury**

11 Conversion of inorganic mercury to methylmercury occurs in flooded fine sediments subjected to
 12 periodic drying-out periods and is associated with anaerobic (oxygen-depleted), reducing
 13 environments (Alpers et al. 2008; Ackerman and Eagles-Smith 2010). Methylmercury production is
 14 greatest in high marshes that are subjected to wet and dry periods over the highest monthly tidal
 15 cycles; production appears to be less in low marshes that are always inundated and not subject to
 16 dry periods (Alpers et al. 2008).

17 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 18 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 19 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 20 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 21 be mobilized into the aquatic system. Results of the CALFED Mercury Project Annual Report for
 22 2007 (Stephenson et al. 2007) indicate that river inputs (11.5 grams per day [g/day]
 23 methylmercury) and in-situ production from wetland/marsh sediments (11.3 g/day
 24 methylmercury) are the leading sources of methylmercury to the Delta waters, and have roughly
 25 comparable levels of input. Wood (2010) estimates that in-situ methylmercury production in open
 26 water and wetlands contributes approximately 36% of the overall methylmercury load to the Delta
 27 (approximately 5 g/day) but is less than riverine/tributary inputs (8 g/day). The higher estimate of
 28 methylmercury production from sediments reported by Stephenson is based on periods of higher
 29 water (wet) and may be more representative of what might occur when new ROAs are opened for
 30 inundation. Once in the aquatic system, the methylmercury can be transported with water flow,
 31 taken up by biota, volatilized, demethylated, or returned to sediment (but not necessarily at the
 32 original restoration site).

33 The Sacramento River watershed, and specifically the Yolo Bypass, is the primary source of mercury
 34 in the study area. The highest concentrations of mercury and methylmercury are in the Cache Creek
 35 area and the Yolo Bypass. The amount of methylmercury produced in the Yolo Bypass has been
 36 estimated to represent 40% of the total methylmercury production for the entire Sacramento River
 37 watershed (Foe et al. 2008). Water discharging from the Yolo Bypass at Prospect Slough has a
 38 reported average annual methylmercury concentration of 0.27 ng/L, more than four times greater
 39 than the 0.06 ng/L TMDL.

40 The highest levels of methylmercury generation, mobilization, and bioavailability are expected in
 41 the Yolo Bypass with implementation of CM2 under Alternative 1A. Implementation of CM2 would

⁸ As described in Chapter 1, *Introduction*, Section 1.1, the Final EIR/EIS includes the 2013 Draft EIR/EIS, BDCP, 2015 RDEIR/SDEIS, and all associated appendices with these documents; as well as revisions to these documents as contained in this Final EIR/EIS.

1 subject Yolo Bypass to more frequent and wider areas of inundation. The concentrations of
 2 methylmercury in water exiting the Yolo Bypass would depend on many variables. However,
 3 implementation of CM2 has the potential to significantly increase the loading, concentrations, and
 4 bioavailability of methylmercury in the aquatic system.

5 As part of Alternative 1A, measures are being developed to reduce the production of methylmercury
 6 in ROAs, and these measures will be implemented as part of *CM12 Methylmercury Management*.
 7 These measures may include construction and grading in a way that minimizes the introduction of
 8 mercury-containing soils to the water column; designing areas to support/enhance
 9 photodegradation; and pre-design field studies to identify depositional areas where mercury
 10 accumulation is most likely and characterization and/or design that avoids these areas. *CM12*
 11 *Methylmercury Management* provides for consideration of new information related to
 12 methylmercury degradation that could effectively mitigate methylmercury production and
 13 mobilization.

14 In summary, Alternative 1A restoration actions are likely to result in increased production,
 15 mobilization, and bioavailability of methylmercury in the aquatic system. Methylmercury would be
 16 generated by inundation of restoration areas, with highest concentrations expected in the Yolo
 17 Bypass, Cosumnes River and Mokelumne River, and at ROAs closest to these source areas as a result
 18 of the BDCP actions. An increase in bioavailability in the aquatic system could result in a
 19 corresponding increase in bioaccumulation in fish tissue, biomagnification through the food chain,
 20 and human exposure. Because the increase in bioavailability in the food chain cannot be quantified,
 21 the increase in human exposure also cannot be quantified. OEHHA standards would continue to be
 22 implemented for the consumption of study area fish and thus would serve to protect people against
 23 the overconsumption of fish with increased body burdens of mercury. Furthermore, implementation
 24 of *CM12 Methylmercury Management*, would minimize effects because it provides for project-specific
 25 mercury management plans including a quality assurance/quality control (QA/QC) program, and
 26 specific tidal habitat restoration design elements to reduce the potential for methylation of mercury
 27 and its bioavailability in tidal habitats. Accordingly, adverse effects on public health due to the
 28 substantial mobilization of or increase in methylmercury are not expected to occur.

29 **CEQA Conclusion:** Flooding of former agricultural land under CM4, CM5, and CM10, could result in
 30 some level of accessibility of legacy organochlorine pesticides to biota through uptake by benthic
 31 organisms. Further, CM2 and CM5 may be managed alongside continuing agriculture, where
 32 pesticides may be used on a seasonal basis and where water during flood events may come in
 33 contact with organochlorine and legacy pesticide residues. Additionally, while there would likely be
 34 an increase in mobilization of and potentially an increase in bioaccumulation of methylmercury in
 35 the study area's aquatic systems (e.g., fish and water) in the near term, it is unlikely to be
 36 substantial. Further, *CM12 Methylmercury Management*, as well as existing OEHHA standards, would
 37 serve to reduce the public's exposure to contaminated fish. Implementation of the these
 38 conservation measures under Alternative 1A would not substantially mobilize or substantially
 39 increase the public's exposure to constituents known to bioaccumulate and therefore, this impact
 40 would be less than significant. No mitigation is required.

41 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 42 **Conveyance Facilities**

43 **NEPA Analysis:** Any modified reservoir operations under Alternative 1A are not expected to
 44 promote *Microcystis* production upstream of the Delta since large reservoirs upstream of the Delta

1 are typically low in nutrient concentrations and phytoplankton outcompete cyanobacteria, including
2 *Microcystis*. Further, in the rivers and streams of the Sacramento River watershed, watersheds of the
3 eastern tributaries (Cosumnes, Mokelumne, and Calaveras Rivers), and the San Joaquin River
4 upstream of the Delta, bloom development would be limited by high water velocity and low
5 hydraulic residence times.

6 As described in Chapter 8, *Water Quality*, *Microcystis* blooms in the Export Service Areas could
7 increase due to increased water temperatures resulting from climate change, but not due to water
8 conveyance facility operations. Similarly, hydraulic residence times in the Export Service Area
9 would not be affected by operations of CM1. Accordingly, conditions would not be more conducive
10 to *Microcystis* bloom formation. Water diverted from the Sacramento River in the north Delta is
11 expected to be unaffected by *Microcystis*, but the fraction of water flowing through the Delta that
12 reaches the existing south Delta intakes is expected to be influenced by an increase in *Microcystis*
13 blooms. Therefore, relative to the No Action Alternative, the addition of Sacramento River water
14 from the north Delta under Alternative 1A would dilute *Microcystis* and microcystins in water
15 diverted from the south Delta. Because the degree to which *Microcystis* blooms, and thus
16 microcystins concentrations, will increase in source water from the south Delta is unknown, it
17 cannot be determined whether Alternative 1A will result in increased or decreased levels of
18 microcystins in the mixture of source waters exported from Banks and Jones pumping plants.

19 Ambient meteorological conditions are the primary driver of Delta water temperatures, and
20 therefore climate warming, and not water operations, would determine future water temperatures
21 in the Delta. Increasing water temperatures due to climate change could lead to earlier attainment of
22 the water temperature threshold of 19°C required to initiate *Microcystis* bloom formation, and
23 therefore earlier occurrences of *Microcystis* blooms in the Delta, as well as increases in the duration
24 and magnitude. However, these temperature-related changes under Alternative 1A would not be
25 different from what would occur under the No Action Alternative. Siting and design of restoration
26 areas would have a substantial influence on the magnitude of hydraulic residence time increases
27 under Alternative 1A. The modeled increase in residence time in the Delta could result in an
28 increase in the frequency, magnitude, and geographic extent of *Microcystis* blooms, and thus
29 microcystin levels, throughout the Delta. Therefore, impacts on beneficial uses, including drinking
30 water and recreational waters, could occur and, as such, public health could be affected. Accordingly,
31 this would be considered an adverse effect. Mitigation Measure WQ-32a and WQ-32b are available
32 to reduce the effects of degraded water quality, and therefore potential public health effects, in the
33 Delta due to *Microcystis*. Mitigation Measure WQ-32a has been included here because the DSM2
34 modeling that was done for this alternative and utilized for the CM1 assessment included both
35 operations and restoration. Because the effectiveness of these mitigation measures to result in
36 feasible measures for reducing water quality effects, and therefore potential public health effects, is
37 uncertain, the effect would still be considered adverse.

38 **CEQA Conclusion:** Under Alternative 1A, operation of the water conveyance facilities is not expected
39 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta
40 because large reservoirs upstream are typically low in nutrient concentrations and phytoplankton
41 outcompete cyanobacteria, including *Microcystis*, and high water velocity and low hydraulic
42 residence times in the upstream area limit the development of *Microcystis* blooms. *Microcystis*
43 blooms in the Export Service Areas could increase due to increased water temperatures resulting
44 from climate change, but not water conveyance facility operations. Hydraulic residence times in the
45 Export Service Area would not be affected by operations of CM1, and therefore conditions would not
46 be more conducive to *Microcystis* bloom formation. Water exported from the Delta to the Export

1 Service Area is expected to be a mixture of *Microcystis*-affected source water from the south Delta
 2 intakes and unaffected source water from the Sacramento River. Because of this, it cannot be
 3 determined whether operations and maintenance under Alternative 1A would result in increased or
 4 decreased levels of *Microcystis* and microcystins in the mixture of source waters exported from
 5 Banks and Jones pumping plants.

6 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
 7 would result in an increase in the frequency, magnitude and geographic extent of *Microcystis*, and
 8 therefore microcystin levels. However, the potential water quality effects due to temperature
 9 increases would be due to climate change, not effects resulting from operation of the water
 10 conveyance facilities. Increases in Delta residence times would be due in small part to climate
 11 change and sea level rise, but due to a greater degree to operation of the water conveyance facilities
 12 and hydrodynamic impacts of restoration included in CM2 and CM4. Consequently, it is possible that
 13 increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms in the Delta
 14 would occur due to the operations and maintenance of the water conveyance facilities and the
 15 hydrodynamic impacts of restoration under CM2 and CM4. Accordingly, beneficial uses including
 16 drinking water and recreational waters would potentially be impacted and therefore, so would
 17 public health. Therefore this impact would be significant.

18 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 19 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 20 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 21 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 22 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 23 to determine whether increases in abundance are significant. This mitigation measure also requires
 24 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 25 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
 26 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 27 measures for reducing water quality effects, and therefore potential public health effects, is
 28 uncertain, this impact would be significant and unavoidable.

29 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 30 ***Microcystis* Blooms**

31 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 32 in Chapter 8, *Water Quality*.

33 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 34 **Water Residence Time**

35 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 36 in Chapter 8, *Water Quality*.

37 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 38 **CM4**

39 **NEPA Effects:** As described in Chapter 8, *Water Quality*, implementation of CM3 and CM6–CM21 is
 40 unlikely to affect *Microcystis* abundance in the rivers and reservoirs upstream of the Delta, in the
 41 Delta region, or the waters exported to the CVP and SWP service areas. Implementation of *CM5*
 42 *Seasonally Inundated Floodplain Restoration* could result in increased local water temperatures in

1 areas near restored seasonally inundated floodplains. However, floodplain inundation typically
 2 occurs during spring and winter months when *Microcystis* growth is limited in general by low water
 3 temperatures and by insufficient surface water irradiance. Water temperatures would not increase
 4 sufficiently due to floodplain inundation such that effects on *Microcystis* growth would occur.
 5 Therefore, implementation of CM5 is unlikely to affect *Microcystis* blooms in the study area.
 6 Implementation of *CM13 Invasive Aquatic Vegetation Control* may increase turbidity and flow
 7 velocity, particularly in restored aquatic habitats, which could discourage *Microcystis* growth in
 8 these areas. To the extent that invasive aquatic vegetation (IAV) removal would affect turbidity and
 9 water velocity, it is possible that IAV removal could, to some degree, help offset the increase in
 10 *Microcystis* production expected under Alternative 1A, relative to the No Action Alternative.

11 As discussed under Impact PH-8, development of restoration areas under CM2 and CM4 could
 12 potentially increase the frequency, magnitude, and geographic extent of *Microcystis* blooms due to
 13 the hydrodynamic impacts that are expected to increase hydraulic residence times throughout the
 14 Delta. Additionally, restoration activities implemented under CM2 and CM4 that create shallow
 15 backwater areas could result in local increases in water temperature that may encourage *Microcystis*
 16 growth during the summer bloom season, which could result in further degradation of water quality
 17 to the extent that beneficial uses are affected. Were *Microcystis* blooms to increase with
 18 implementation of CM2 and CM4, there would be an increase in the potential for impacts on public
 19 health as a result of potential effects on drinking water quality and recreational waters. Mitigation
 20 Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local
 21 water temperatures and water residence time. However this would be an adverse effect.

22 **CEQA Conclusion:** Restoration activities implemented under CM2 and CM4 that create shallow
 23 backwater areas could result in local increases in water temperature conducive to *Microcystis*
 24 growth during summer bloom season. This could compound the water quality degradation that may
 25 result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact PH-8 and result in
 26 additional water quality degradation such that beneficial uses are affected. An increase in
 27 *Microcystis* blooms could potentially result in impacts on public health through exposure via
 28 drinking water quality and recreational waters. Therefore, this impact would be significant.
 29 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 30 increased local water temperatures and hydraulic residence time. The effectiveness of these
 31 mitigation measures to result in feasible measures for reducing water quality effects, and therefore
 32 potential public health effects, is uncertain. Therefore, this impact would be significant and
 33 unavoidable.

34 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 35 **Microcystis Blooms**

36 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 37 in Chapter 8, *Water Quality*.

38 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 39 **Water Residence Time**

40 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 41 in Chapter 8, *Water Quality*.

25.3.3.3 Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)

Alternative 1B would be similar to Alternative 1A except that the water routed from the north Delta to the south Delta would be conveyed primarily through a canal along the east side of the Delta instead of through pipelines/tunnels, and there would be no intermediate forebay. From an intermediate pumping plant, water would be raised to an elevation allowing gravity to carry it through a continuing canal to the new Byron Tract Forebay, adjacent to and south of Clifton Court Forebay. Along the way, diverted water would travel under existing watercourses through culvert siphons or tunnel siphons. CM2–CM21 would also be implemented under this alternative, and their effects would be the same as under Alternative 1A. A detailed description of the alternative is provided in Chapter 3, *Description of the Alternatives*, Section 3.5.3; a detailed depiction is provided in Mapbook Figure M3-2 in Chapter 3.

Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of the Water Conveyance Facilities

NEPA Effects: As with Alternative 1A, implementation of CM1 under Alternative 1B would involve construction and operation of five north Delta intakes, up to 15 solids lagoons, five sedimentation basins, and Byron Tract Forebay. These facilities have the potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of the large volumes of water that would be held within these areas. Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons would be 165 feet long by 86 feet wide by 10 feet deep. The depth, design, and operation of the sedimentation basins and solids lagoons would prevent the development of suitable mosquito habitat (Figure 25-1). Specifically, the basins would be too deep and the constant movement of water would prevent mosquitoes from breeding and multiplying.

Although the proposed Byron Tract Forebay would increase surface water within the study area, it is unlikely that the forebay would provide suitable breeding habitat for mosquitoes given that the water in this forebay would not be stagnant and would be too deep. However, the shallow edges of the forebay could potentially provide suitable mosquito breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed) were allowed to grow. However, as part of the regular maintenance of the forebay, floating vegetation such as pond weed would be harvested to maintain flow and forebay capacity.

Although construction and operation of the water conveyance facilities would increase surface water area in the Plan Area and therefore potentially provide habitat for vectors that transmit diseases (e.g., mosquitoes), DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVEDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes during construction and operation of the water conveyance facilities. These BMPs would be consistent with practices presented in CDPH's *Best Management Practices for Mosquito Control in California* (California Department of Public Health 2012). See Impact PH-1 under Alternative 1A. Therefore, construction and operation of the water conveyance facilities under Alternative 1B would not result in a substantial increase in vector-borne diseases and the impact would not be adverse.

CEQA Conclusion: As with Alternative 1A, implementation of CM1 under Alternative 1B would involve construction and operation of solids lagoons, sedimentation basins, and the Byron Tract Forebay. Public exposure to vector-borne diseases would not substantially increase because water

1 depth and circulation in sedimentation basins and the Byron Tract Forebay would prevent
 2 development of suitable mosquito habitat. However, the shallow edges on the periphery of Byron
 3 Tract Forebay could potentially provide suitable mosquito breeding habitat if emergent vegetation
 4 or other aquatic plants (e.g., pond weed) were allowed to grow. To minimize the potential for
 5 impacts related to increasing suitable vector habitat within the study area, DWR would consult and
 6 coordinate with San Joaquin County and Sacramento-Yolo County MVEDs and prepare and
 7 implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes. See
 8 Impact PH-1 for Alternative 1A. These BMPs would be consistent with practices presented in CDPH's
 9 *Best Management Practices for Mosquito Control in California* (California Department of Public
 10 Health 2012). During operations, water depth and circulation would prevent the areas from
 11 substantially increasing suitable vector habitat. Therefore, construction and operation of the water
 12 conveyance facilities under Alternative 1B would not result in a substantial increase in vector-borne
 13 diseases and the impact would be less than significant. No mitigation is required.

14 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 15 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 16 **Facilities**

17 **NEPA Effects:** The water supply facilities under Alternative 1B would be the same as those
 18 described for 1A with the exception that the water would be primarily conveyed via an east canal
 19 rather than pipelines and tunnels, and there would be no intermediate forebay. Alternative 1B
 20 would have the same number of intakes as Alternative 1A and they would be constructed and
 21 operated in the same manner. Water supply operations under Alternative 1B (Operational Scenario
 22 A) would be identical to Alternative 1A. Therefore, the water quality and public health effects
 23 described for Alternative 1A also appropriately characterize effects under Alternative 1B. There
 24 would be no substantial changes in trace metals, pesticides, or DBPs under Operational Scenario A
 25 with the exception of bromide concentrations at Barker Slough. Under Alternative 1B, long-term
 26 average bromide concentrations are expected to increase at the North Bay Aqueduct at Barker
 27 Slough, Staten Island, and Emmaton on the Sacramento River relative to the No Action Alternative.
 28 This increase would be greatest at Barker Slough (43%). Increases at Barker Slough would be more
 29 substantial during the drought period (93%).

30 This increase in long-term average bromide concentration at Barker Slough may require upgrades
 31 and/or changes at certain water treatment plants. While treatment technologies sufficient to
 32 achieve the necessary bromide removal exist, implementation of such technologies would likely
 33 require substantial investment in new or modified infrastructure. Should treatment plant upgrades
 34 not be undertaken, a change of such magnitude in long-term average bromide concentrations in
 35 drinking water sources would represent an increased risk for adverse effects on public health from
 36 DBP in drinking water sources. Mitigation Measure WQ-5 is available to reduce these effects.
 37 Implementation of this measure along with a separate other commitment as set forth in EIR/EIS
 38 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, relating to the potential increased
 39 treatment costs associated with bromide-related changes would reduce these effects. Further, as
 40 described for Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay
 41 Aqueduct at Barker Slough may be further minimized by implementation of the AIP.

42 **CEQA Conclusion:** The operation of water supply facilities under Alternative 1B would be the same
 43 as described for Alternative 1A. Water supply operations would increase contributions from the San
 44 Joaquin River relative to the Sacramento River, and decrease the dilution capacity of the Sacramento
 45 River for contaminants. Water quality modeling results indicate that changes in flows under

1 Alternative 1B would, for the most part, not result in increased exceedances of water quality criteria
2 for trace metals, pesticides, or DBP in the study area (Chapter 8, *Water Quality*, Section 8.3.3.3).
3 However, relative to Existing Conditions, under Alternative 1B bromide concentrations would
4 increase at the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton on the
5 Sacramento River, with the greatest increase occurring at Barker Slough (38%). Increases would be
6 more substantial during the drought period (94%).

7 The increase in long-term average bromide concentrations predicted for Barker Slough would result
8 in a substantial change in source water quality to existing drinking water treatment plants drawing
9 water from the North Bay Aqueduct. These modeled increases in bromide at Barker Slough could
10 lead to adverse changes in the formation of DBPs at drinking water treatment plants such that
11 considerable water treatment plant upgrades would be necessary in order to achieve equivalent
12 levels of drinking water health protection. This would be a significant impact.

13 While treatment technologies sufficient to achieve the necessary bromide removal exist,
14 implementation of such technologies would likely require substantial investment in new or modified
15 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
16 long-term average bromide concentrations in drinking water sources would represent an increased
17 risk for adverse effects on public health from DBP in drinking water sources. Assuming the adverse
18 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
19 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
20 uses potentially provided in Barker Slough would remain significant.

21 While Mitigation Measure WQ-5 may reduce this impact, the feasibility and effectiveness of this
22 mitigation measure are uncertain based on currently available information.

23 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
24 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
25 separate other commitment to address the potential increased water treatment costs that could
26 result from bromide-related concentration effects on municipal water purveyor operations.
27 Potential options for making use of this financial commitment include funding or providing other
28 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
29 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
30 water supply diversion facilities. Please refer to Appendix 3B, *Environmental Commitments, AMMs,*
31 *and CMs*, for the full list of potential actions that could be taken pursuant to this commitment in
32 order to reduce the water quality treatment costs associated with water quality effects relating to
33 chloride, electrical conductivity, and bromide. Because the BDCP proponents cannot ensure that the
34 results of coordinated actions with water treatment entities will be fully funded or implemented
35 successfully prior to the project's contribution to the impact, the ability to fully mitigate this impact
36 is uncertain. If a solution that is identified by the BDCP proponents and an affected water purveyor
37 is not fully funded, constructed, or implemented before the project's contribution to the impact is
38 made, a significant impact in the form of increased DBP in drinking water sources could occur.
39 Accordingly, this impact would be significant and unavoidable. If, however, all financial
40 contributions, technical contributions, or partnerships required to avoid significant impacts prove to
41 be feasible and any necessary agreements are completed before the project's contribution to the
42 effect is made, impacts would be less than significant.

1 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
2 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
3 **Slough**

4 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

5 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
6 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

7 **NEPA Effects:** Similar to effects described for Alternative 1A, sediment-disturbing activities during
8 construction and maintenance of the water conveyance facilities under Alternative 1B could result
9 in the disturbance of existing constituents, such as legacy pesticides or methylmercury, in sediment.
10 During water conveyance facilities operation, changes in dilution and mixing of sources of water
11 could result in a change in constituents known to bioaccumulate. For example, the reduction of flows
12 in the Sacramento River downstream of the proposed north Delta intakes may result in a decreased
13 dilution of constituents known to bioaccumulate in the study area.

14 As described for Alternative 1A, construction and operation of the water conveyance facilities under
15 Alternative 1B would not result in a change in water dilution, and mixing of existing constituents
16 would not affect the status of legacy organochlorine pesticides, or methylmercury in the study area.
17 Intermittent and/or short-term construction-related activities (as would occur for in-river
18 construction) would not be anticipated to result in contaminant discharges of sufficient magnitude
19 or duration to contribute to long-term bioaccumulation processes, or cause measureable long-term
20 water quality degradation, as described under Alternative 1A. Legacy pesticides typically bond to
21 particulates and do not mobilize easily. Construction and maintenance of Alternative 1B would not
22 cause legacy organochlorine pesticides to be transported far from the source or to partition into the
23 water column, as described under Alternative 1A. Water supply operations under any BDCP action
24 alternative would not be expected to change total suspended solids or turbidity levels (highs, lows,
25 typical conditions) to any substantial degree. Changes in the magnitude, frequency, and geographic
26 distribution of legacy organochlorine pesticides in water bodies of the affected environment that
27 would result in new or more severe adverse effects on other beneficial uses, relative to the No
28 Action Alternative, would not be expected to occur.

29 Furthermore, based on modeling results presented in Chapter 8, *Water Quality*. Section 8.3.3.3,
30 operation of water conveyance facilities under Alternative 1B, as under Alternative 1A, would not
31 substantially alter mercury or methylmercury concentrations in the Sacramento River or San
32 Joaquin River, nor would it substantially result in an increase in mercury concentrations in fish
33 tissues.

34 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
35 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
36 under Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
37 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of
38 disturbance. Examples of these BMPs are described under Alternative 1A, Impact PH-3. Accordingly,
39 the potential for Alternative 1B to create a public health effect from bioaccumulation of legacy
40 organochlorine pesticides and methylmercury in fish is minimal, and public health effects are not
41 expected to be adverse.

42 **CEQA Conclusion:** As described under Alternative 1A, construction and maintenance of Alternative
43 1B would not cause legacy organochlorine pesticides to be transported far from the source or to

1 partition into the water column based on the chemical properties of the pesticides. Although
 2 methylmercury currently exceeds the TMDL, little to no change in mercury or methylmercury
 3 concentrations in water is expected under Alternative 1B water construction. BMPs implemented as
 4 part of Erosion and Sediment Control Plans and SWPPPs would help ensure that construction
 5 activities would not substantially increase or substantially mobilize legacy organochlorine
 6 pesticides or methylmercury during construction and maintenance. Therefore, construction and
 7 maintenance of Alternative 1B would not cause increased exposure of the public to these
 8 bioaccumulative sediment constituents.

9 Operation of Alternative 1B would not result in increased flows in the tributaries that would
 10 mobilize legacy organochlorine pesticides in sediments. Water quality modeling results showed
 11 small changes in mercury and methylmercury levels in water at certain Delta locations and in
 12 mercury in fish tissues due to Alternative 1B water operations (Chapter 8, *Water Quality*, Section
 13 8.3.3.3). Because construction, maintenance or operation of Alternative 1B would not cause
 14 substantial mobilization or a substantial increase of constituents known to bioaccumulate (i.e.,
 15 organochlorine pesticides or mercury), impacts on public health would be less than significant. No
 16 mitigation is required.

17 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
 18 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
 19 **Facilities**

20 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
 21 area. As described in Table 25-9, a total of 13.49 miles of new temporary 69 kV transmission lines;
 22 36.79 miles of new permanent 69 kV transmission lines; and 16.35 miles of new permanent 230 kV
 23 transmission lines would be required for this alternative. While new transmission lines generating
 24 new sources of EMFs would be constructed under Alternative 1B, the new temporary and
 25 permanent transmission lines would generally be located in sparsely populated areas (Figure 25-2).
 26 Table 25-9 identifies only one potential new sensitive receptor (Stone Lakes National Wildlife
 27 Refuge) that is not currently within 300 feet of an existing transmission line; the majority of
 28 sensitive receptors are already located within 300 feet of an existing 69 kV or 230 kV transmission
 29 line. Stone Lakes National Wildlife Refuge would be within 300 feet of a proposed permanent 69 kV
 30 transmission line. Visitors to this area generally come for walks, water recreation, and hunting, and
 31 as such, it is unlikely that large groups of people would be staying in the area within 300 feet of this
 32 proposed transmission line, so any EMF exposure would be limited. The majority of sensitive
 33 receptors are already located within 300 feet of an existing transmission line. Accordingly, the
 34 majority of new temporary or new permanent transmission lines would not expose sensitive
 35 receptors or substantially more people to EMFs that they are not already experiencing. Because the
 36 proposed transmission lines would be located in sparsely populated areas and would be within 300
 37 feet of only one potential new sensitive receptor, the proposed temporary and permanent
 38 transmission lines would not substantially increase people's exposure to EMFs.

39 As discussed in Section 25.2.6.1, the current scientific evidence does not show conclusively that EMF
 40 exposure increases health risks. In 2006, CPUC updated its EMF Policy and reaffirmed that health
 41 hazards from exposures to EMF have not been established. State and federal public health
 42 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
 43 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should be
 44 continued. Based on this, utility companies are required to establish and maintain EMF Design
 45 Guidelines in order to minimize health risks associated with power lines. These guidelines would be

1 implemented for any new temporary or new permanent transmission lines constructed and
 2 operated under Alternative 1B, depending on which electric provider is selected by DWR.
 3 Furthermore, as described under Impact PH-4 for Alternative 1A (and in Appendix 3B,
 4 *Environmental Commitments, AMMs, and CMs*), location and design of the new transmission lines
 5 would be conducted in accordance with CPUC's EMF Design Guidelines for Electrical Facilities.
 6 Measures implemented under these guidelines would reduce EMF exposure from the proposed
 7 transmission lines. Therefore, operation of the transmission line corridors would not expose
 8 substantially more people to transmission lines generating EMFs, and there would be no adverse
 9 effect on public health.

10 **CEQA Conclusion:** Under Alternative 1B, new transmission lines would be located in sparsely
 11 populated areas generally away from existing sensitive receptors. However, one sensitive receptor,
 12 Stone Lakes National Wildlife Refuge, would be within 300 feet of a proposed permanent 69 kV
 13 transmission line. Because visitors to this area generally come for walks, water recreation, and
 14 hunting, it is unlikely that large groups of people would be staying in the area within 300 feet of this
 15 proposed transmission line, so any EMF exposure would be limited. Design and implementation of
 16 new temporary or permanent transmission lines not within the right-of-way of existing
 17 transmission lines would follow CPUC's EMF Design Guidelines for Electrical Facilities and would
 18 implement shielding, cancellation, or distance measures to reduce EMF exposure. Since construction
 19 and operation of Alternative 1B would not expose substantially more people to transmission lines
 20 that generate new sources of EMFs, impacts on public health would be less than significant, and no
 21 mitigation is required.

22 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
 23 **and CM11**

24 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 25 under Alternative 1B would be the same as that described under Alternative 1A. Although there
 26 would be an increase in restored and enhanced aquatic habitat in the study area as a result of
 27 implementing Alternative 1B, implementation of environmental commitments, such as coordination
 28 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
 29 Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*), would reduce the
 30 potential for an increase in mosquito breeding habitat, and a substantial increase in vector-borne
 31 diseases is unlikely to result. Furthermore, habitat would be restored in areas where potentially
 32 suitable habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would
 33 likely increase as a result of restoration and enhancement, which would keep mosquito populations
 34 in check. Therefore, effects would be the same under Alternative 1B as under Alternative 1A and
 35 there would not be a substantial increase in the public's risk of exposure to vector-borne diseases
 36 with implementation of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

37 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 38 land potentially suitable for vector habitat (e.g., mosquitoes). However, Alternative 1B would
 39 require environmental commitments, such as coordination with MVCDs and implementation of
 40 BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in Appendix 3B,
 41 *Environmental Commitments, AMMs, and CMs*) that would help control mosquitoes and reduce the
 42 potential for an increase in mosquito breeding habitat. These BMPs would be consistent with
 43 practices presented in CDPH's *Best Management Practices for Mosquito Control in California*
 44 (California Department of Public Health 2012). Furthermore, habitat would be restored where
 45 potentially suitable vector habitat already exists, and habitat restoration and enhancement would

1 likely increase the number of mosquito predators. Therefore, as described under Alternative 1A,
 2 implementation of CM2–CM7, CM10 and CM11 under Alternative 1B would not substantially
 3 increase the public’s risk of exposure to vector-borne diseases beyond what currently exists.
 4 Accordingly, this impact would be less than significant and no mitigation is required.

5 **Impact PH-6: Substantial Increase in Recreationists’ Exposure to Pathogens as a Result of**
 6 **Implementing the Restoration Conservation Measures**

7 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 8 under Alternative 1B would be the same as that described under Alternative 1A. Implementation of
 9 the restoration conservation measures would support habitat types, such as wetlands and
 10 agricultural areas, that produce pathogens as a result of the biological productivity in these areas
 11 (e.g., migrating birds, application of fertilizers, waste products of animals). As exemplified by the
 12 Pathogen Conceptual Model, any potential increase in pathogens associated with habitat restoration
 13 would be localized and within the vicinity of the actual restoration. This would be similar for lands
 14 protected for agricultural uses. Depending on the level of recreational access granted by
 15 management plans, habitat restoration could increase or decrease opportunities for recreationists in
 16 the Delta region. However, effects associated with pathogens would be the same under Alternative
 17 1B as under Alternative 1A. Any increase in pathogens would be localized and likely of insufficient
 18 magnitude or duration to result in adverse effects on recreationists. Even if recreationists were
 19 allowed in the ROAs, the characteristics of pathogens in water as described by the conceptual model
 20 would not substantially increase recreationists’ exposure. Therefore, recreationists would not
 21 experience a substantial increase in exposure to pathogens as a result of the restoration and no
 22 adverse effect would result.

23 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 1B
 24 would support habitat types, such as wetlands and agricultural areas, that could produce pathogens
 25 as a result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 26 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 27 off of some types of pathogens once released into water bodies would generally prevent a
 28 substantial increase in pathogen exposure by recreationists. Therefore, impacts on public health
 29 would be less than significant. No mitigation is required.

30 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 31 **as a Result of Implementing CM2, CM4, CM5, and CM10**

32 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 1B as
 33 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
 34 known to bioaccumulate (i.e., legacy organochlorine pesticides and methylmercury) is the potential
 35 for mobilizing contaminants sequestered in sediments of the newly inundated floodplains and
 36 marshes, as described under Alternative 1A. It is likely that the pesticide-bearing sediments would
 37 not be transported very far from the source area and would settle out with suspended particulates
 38 and be deposited close to the ROA. Further, CM2–CM21 do not include the use of pesticides known
 39 to be bioaccumulative in animals or humans.

40 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 41 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 42 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 43 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 44 be mobilized into the aquatic system. While there would likely be an increase in mobilization and

1 bioaccumulation of methylmercury in the study area's aquatic systems (i.e., fish and water) during
 2 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
 3 reduce the public's exposure to contaminated fish. Implementation of methylmercury management
 4 measures under CM12 would minimize conditions conducive to generation of methylmercury in
 5 restored areas.

6 Therefore, implementation of CM2, CM4, CM5, and CM10 under Alternative 1B would not result in
 7 the substantial mobilization or increase of constituents known to bioaccumulate and, as such, would
 8 not result in an adverse effect on public health with respect to bioaccumulative pesticides or
 9 methylmercury.

10 **CEQA Conclusion:** Implementation of CM2, CM4, CM5 and CM10 would have the potential to
 11 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 12 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 13 sediments would be transported very far from the source area and they would likely settle out with
 14 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 15 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 16 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
 17 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
 18 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5 and CM10
 19 under Alternative 1B would not substantially mobilize or substantially increase the public's
 20 exposure to constituents known to bioaccumulate and this impact would be less than significant. No
 21 mitigation is required.

22 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 23 **Conveyance Facilities**

24 **NEPA Effects:** Water operations under Alternative 1B would be the same as under Alternative 1A.
 25 Therefore, potential effects on public health due to changes in water quality and beneficial uses as a
 26 result of *Microcystis* blooms and microcystin levels would be the same. Any modified reservoir
 27 operations under Alternative 1B are not expected to promote *Microcystis* production upstream of
 28 the Delta or in the rivers and streams of the Sacramento River watershed, watersheds of the eastern
 29 tributaries (Cosumnes, Mokelumne, and Calaveras Rivers), and the San Joaquin River upstream of
 30 the Delta.

31 As described in Chapter 8, *Water Quality*, *Microcystis* blooms in the Export Service Areas could
 32 increase due to increased water temperatures resulting from climate change, but not due to water
 33 conveyance facility operations. Similarly, hydraulic residence times in the Export Service Area
 34 would not be affected by operations of CM1. Accordingly, conditions would not be more conducive
 35 to *Microcystis* bloom formation. Water diverted from the Sacramento River in the north Delta is
 36 expected to be unaffected by *Microcystis*. However, the fraction of water flowing through the Delta
 37 that reaches the existing south Delta intakes is expected to be influenced by an increase in
 38 *Microcystis* blooms, as discussed below. Therefore, relative to the No Action Alternative, the addition
 39 of Sacramento River water from the north Delta under Alternative 1B would dilute *Microcystis* and
 40 microcystins in water diverted from the south Delta. Because the degree to which *Microcystis*
 41 blooms, and thus microcystins concentrations, would increase in source water from the south Delta
 42 is unknown, it cannot be determined whether Alternative 1B would result in increased or decreased
 43 levels of microcystins in the mixture of source waters exported from Banks and Jones pumping
 44 plants.

1 Ambient meteorological conditions would be the primary driver of Delta water temperatures, and
2 climate warming, not water operations, would determine future water temperatures in the Delta.
3 Increasing water temperatures due to climate change could lead to earlier attainment of the water
4 temperature threshold required to initiate *Microcystis* bloom formation, and therefore earlier
5 occurrences of *Microcystis* blooms in the Delta, as well as increases in the duration and magnitude.
6 However, these temperature-related changes would not be different from what would occur under
7 the No Action Alternative. Modeled hydraulic residence times in the Delta are projected to increase
8 in the summer and fall periods in the north and west Delta and in the summer in Cache Slough, the
9 east Delta, and south Delta relative to the No Action Alternative. Siting and design of restoration
10 areas would have a substantial influence on the magnitude of residence time increases under
11 Alternative 1B. The modeled increase in hydraulic residence time in the Delta could result in an
12 increase in the frequency, magnitude, and geographic extent of *Microcystis* blooms, and thus
13 microcystin levels. Therefore, impacts on beneficial uses, including drinking water and recreational
14 waters, could occur and public health could be affected. Accordingly, this would be considered an
15 adverse effect.

16 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
17 quality, and therefore potential public health effects, in the Delta due to *Microcystis*. However,
18 because the effectiveness of these mitigation measures to result in feasible measures for reducing
19 water quality effects, and therefore potential public health effects, is uncertain, the effect would still
20 be considered adverse.

21 **CEQA Conclusion:** Under Alternative 1B, operation of the water conveyance facilities is not expected
22 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
23 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
24 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
25 residence times in the Export Service Area would not be affected by operations of CM1, and
26 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.
27 Water exported from the Delta to the Export Service Area is expected to be a mixture of *Microcystis*-
28 affected source water from the south Delta intakes and unaffected source water from the
29 Sacramento River. Because of this, it cannot be determined whether operations and maintenance
30 under Alternative 1B would result in increased or decreased levels of *Microcystis* and microcystins
31 in the mixture of source waters exported from Banks and Jones pumping plants.

32 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
33 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
34 water temperature increases in the Delta would be due to climate change primarily and not due to
35 operation of the water conveyance facilities. Increases in Delta residence times would be due in
36 small part to climate change and sea level rise, but due to a greater degree to operation of the water
37 conveyance facilities and hydrodynamic impacts of restoration included in CM2 and CM4.
38 Consequently, it is possible that increases in the frequency, magnitude, and geographic extent of
39 *Microcystis* blooms in the Delta would occur due to the operations and maintenance of the water
40 conveyance facilities and the hydrodynamic impacts of restoration under CM2 and CM4.
41 Accordingly, beneficial uses including drinking water and recreational waters would be impacted
42 and, as a result, public health. Therefore, this impact would be significant.

43 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
44 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
45 considerations be incorporated into restoration area site design for CM2 and CM4 using the best

1 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 2 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 3 to determine whether increases in abundance are significant. This mitigation measure also requires
 4 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 5 investigate and evaluate measures that could be taken to reduce hydraulic residence time in the
 6 affected areas of the Delta. However, because the effectiveness of these mitigation measures to
 7 result in feasible measures for reducing water quality effects, and therefore potential public health
 8 effects, is uncertain, this impact would be significant and unavoidable.

9 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 10 ***Microcystis* Blooms**

11 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 12 in Chapter 8, *Water Quality*.

13 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 14 **Water Residence Time**

15 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 16 in Chapter 8, *Water Quality*.

17 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 18 **CM4**

19 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 20 under Alternative 1B would be the same as that described under Alternative 1A. Restoration
 21 activities implemented under CM2 and CM4 that would create shallow backwater areas could result
 22 in local increases in water temperature that may encourage *Microcystis* growth during the summer
 23 bloom season. This would result in further degradation of water quality beyond the hydrodynamic
 24 effects of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis*
 25 blooms with implementation of CM2 and CM4 could potentially result in adverse effects on public
 26 health through exposure via drinking water quality and recreational waters. Mitigation Measures
 27 WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 28 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 29 feasible measures for reducing water quality effects, and therefore potential public health effects, is
 30 uncertain. This would be an adverse effect.

31 **CEQA Conclusion:** Restoration activities implemented under CM2 and CM4 that create shallow
 32 backwater areas could result in local increases in water temperature conducive to *Microcystis*
 33 growth during summer bloom season. This could compound the water quality degradation that may
 34 result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact PH-8 and result in
 35 additional water quality degradation such that beneficial uses are affected. An increase in
 36 *Microcystis* blooms could potentially result in impacts on public health through exposure via
 37 drinking water quality and recreational waters. Therefore, this impact would be significant.
 38 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 39 increased local water temperatures and water residence time. The effectiveness of these mitigation
 40 measures to result in feasible measures for reducing water quality effects, and therefore potential
 41 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

1 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 2 ***Microcystis* Blooms**

3 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 4 in Chapter 8, *Water Quality*.

5 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 6 **Water Residence Time**

7 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 8 in Chapter 8, *Water Quality*.

9 **25.3.3.4 Alternative 1C—Dual Conveyance with West Alignment and**
 10 **Intakes W1–W5 (15,000 cfs; Operational Scenario A)**

11 The water supply facilities under Alternative 1C would be similar to those described for 1A with the
 12 exception that the five intakes would be located on the west bank of the Sacramento River between
 13 Clarksburg and Walnut Grove, rather than the east bank; the water would be conveyed from intakes
 14 to the intermediate pumping plant via a canal on the western side of the Delta rather than a
 15 pipeline/tunnel. There would be no intermediate forebay under this alternative. Water would be
 16 carried south along the western side of the Delta to an intermediate pumping plant, then pumped
 17 through a dual-bore tunnel to a continuing canal to the proposed Byron Tract Forebay immediately
 18 northwest of Clifton Court Forebay. Along the conveyance route, diverted water would travel under
 19 existing watercourses and one rail crossing through culvert siphons. A detailed description of the
 20 alternative is provided in Chapter 3, *Description of the Alternatives*, Section 3.5.4; a depiction of the
 21 physical components is provided in Mapbook Figure M3-3 in Chapter 3.

22 Generally, the water conveyance facilities construction techniques and operation for Alternative 1C
 23 would be the same as under Alternative 1A; therefore, Alternative 1C would have similar effects on
 24 public health to those described under Alternative 1A. CM2–CM21 would also be implemented
 25 under this alternative, and their effects would be the same as under Alternative 1A.

26 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 27 **the Water Conveyance Facilities**

28 **NEPA Effects:** As with Alternative 1A, implementation of CM1 under Alternative 1C would involve
 29 construction and operation of five north Delta intakes, up to 15 solids lagoons, five sedimentation
 30 basins, and Byron Tract Forebay. Sedimentation basins and solids lagoons near the intakes have the
 31 potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of the large
 32 volumes of water that would be held within these areas. The depth, design, and operation of the
 33 sedimentation basins and solids lagoons would prevent the development of suitable mosquito
 34 habitat (Figure 25-1). Specifically, the basins would be too deep and the constant movement of
 35 water would prevent mosquitoes from breeding and multiplying. Sedimentation basins would be
 36 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons would be 165 feet long by 86 feet
 37 wide by 10 feet deep.

38 Although the proposed Byron Tract Forebay would increase surface water within the study area, it
 39 is unlikely that the forebay would provide suitable breeding habitat for mosquitoes given that the
 40 water in these forebay would not be stagnant and would be too deep. However, the shallow edges of
 41 the forebay could provide suitable mosquito breeding habitat if emergent vegetation or other

1 aquatic plants (e.g., pond weed) were allowed to grow. However, as part of the regular maintenance
 2 of the forebay, floating vegetation such pond weed would be harvested to maintain flow and forebay
 3 capacity.

4 Although construction and operation of the water conveyance facilities would increase surface
 5 water area in the Plan Area and therefore potentially provide habitat for vectors that transmit
 6 diseases (e.g., mosquitoes), DWR would consult and coordinate with San Joaquin County and
 7 Sacramento-Yolo County MVCs and prepare and implement MMPs. BMPs to be implemented as
 8 part of the MMPs would help control mosquitoes. These BMPs would be consistent with practices
 9 presented in CDPH's *Best Management Practices for Mosquito Control in California* (California
 10 Department of Public Health 2012). Activities will include, but not be limited to: testing for mosquito
 11 larvae during the high mosquito season (June through September), introducing biological controls
 12 such as mosquitofish if mosquitoes are present, and introducing physical controls (e.g., discharging
 13 water more frequently or increasing circulation) if mosquitoes are present. Accordingly, as
 14 described under Alternative 1A, construction and operation of the intakes, solids lagoons, and/or
 15 sedimentation basins under Alternative 1C would not substantially increase suitable vector habitat,
 16 and would not substantially increase vector-borne diseases. Therefore, no adverse effects would
 17 result.

18 **CEQA Conclusion:** As with Alternative 1A, implementation of CM1 under Alternative 1C would
 19 involve construction and operation of solids lagoons, sedimentation basins and Byron Tract
 20 Forebay. These areas could provide suitable habitat for vectors (i.e., mosquitoes). During operations,
 21 water depth and circulation would prevent the solids lagoons and sedimentation basins from
 22 substantially increasing suitable vector habitat. However, the shallow edges on the periphery of
 23 Byron Tract Forebay could potentially provide suitable mosquito breeding habitat if emergent
 24 vegetation or other aquatic plants (e.g., pond weed) were allowed to grow. To minimize the
 25 potential for impacts related to increasing suitable vector habitat within the study area, DWR would
 26 consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCs and prepare
 27 and implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes
 28 (see Impact PH-1 under Alternative 1A). These BMPs would be consistent with practices presented
 29 in CDPH's *Best Management Practices for Mosquito Control in California* (California Department of
 30 Public Health 2012). Accordingly, construction and operation of the water conveyance facilities
 31 under Alternative 1C would not result in a substantial increase in vector-borne diseases and the
 32 impact would be less than significant. No mitigation is required.

33 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 34 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 35 **Facilities**

36 **NEPA Effects:** Water supply operations under Alternative 1C (Operational Scenario A) would be
 37 identical to Alternative 1A. Further, Alternative 1C would have the same number of intakes as
 38 Alternative 1A and they would be constructed and operated in the same manner. Therefore, the
 39 water quality and public health effects described for Alternative 1A also appropriately characterize
 40 effects under Alternative 1C. There would be no substantial changes in trace metals, pesticides, or
 41 DBPs under Operational Scenario A relative to the No Action Alternative, with the exception of
 42 bromide concentrations at Barker Slough. Under Alternative 1C, long-term average bromide
 43 concentrations are expected to increase at the North Bay Aqueduct at Barker Slough, Staten Island,
 44 and Emmaton on the Sacramento River relative to the No Action Alternative. This increase would be
 45 greatest at Barker Slough (43%). Increases at Barker Slough would be more substantial during the

1 drought period (93%). This increase in the long-term average bromide concentration at Barker
2 Slough may require upgrades and/or changes to the existing water treatment plant. While treatment
3 technologies sufficient to achieve the necessary bromide removal exist, implementation of such
4 technologies would likely require substantial investment in new or modified infrastructure. Should
5 treatment plant upgrades not be undertaken, a change of such magnitude in long-term average
6 bromide concentrations in drinking water sources would represent an increased risk for adverse
7 effects on public health from DBPs in drinking water sources. Mitigation Measure WQ-5 is available
8 to reduce these effects. Implementation of this measure along with a separate other commitment as
9 set forth in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, relating to the potential
10 increased treatment costs associated with bromide-related changes would reduce these effects.
11 Further, as described for Impact PH-2 under Alternative 1A, the adverse water quality effects on the
12 North Bay Aqueduct at Barker Slough may be further minimized by implementation of the AIP.

13 **CEQA Conclusion:** The operation of water supply facilities under Alternative 1C would be the same
14 as those described above for Alternative 1A. Water supply operations would increase contributions
15 from the San Joaquin River relative to the Sacramento River, and decrease the dilution capacity of
16 the Sacramento River for contaminants. Water quality modeling results indicate that changes in
17 flows under Alternative 1C would, for the most part, not result in increased exceedances of water
18 quality criteria for trace metals, pesticides, or DBPs in the study area (Chapter 8, *Water Quality*,
19 Section 8.3.3.4). However, relative to Existing Conditions, bromide concentrations would increase at
20 the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton on the Sacramento River,
21 with the greatest increase occurring at Barker Slough (38%). During drought periods the increase
22 would be more substantial (94%). The increase in long-term average bromide concentrations
23 predicted for Barker Slough would result in a substantial change in source water quality to existing
24 drinking water treatment plants drawing water from the North Bay Aqueduct. These modeled
25 increases in bromide at Barker Slough could lead to adverse changes in the formation of DBPs at
26 drinking water treatment plants such that considerable water treatment plant upgrades would be
27 necessary to achieve equivalent levels of drinking water health protection. This would be a
28 significant impact.

29 While treatment technologies sufficient to achieve the necessary bromide removal exist,
30 implementation of such technologies would likely require substantial investment in new or modified
31 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
32 long-term average bromide concentrations in drinking water sources would represent an increased
33 risk for adverse effects on public health from DBPs in drinking water sources. Assuming the adverse
34 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
35 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
36 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
37 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
38 based on currently available information.

39 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
40 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
41 separate other commitment to address the potential increased water treatment costs that could
42 result from bromide-related concentration effects on municipal water purveyor operations.
43 Potential options for making use of this financial commitment include funding or providing other
44 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
45 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
46 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that

1 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
 2 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
 3 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
 4 treatment entities will be fully funded or implemented successfully prior to the project's
 5 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
 6 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
 7 or implemented before the project's contribution to the impact is made, a significant impact in the
 8 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
 9 significant and unavoidable. If, however, all financial contributions, technical contributions, or
 10 partnerships required to avoid significant impacts prove to be feasible and any necessary
 11 agreements are completed before the project's contribution to the effect is made, impacts would be
 12 less than significant.

13 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 14 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 15 **Slough**

16 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

17 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 18 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

19 **NEPA Effects:** Similar to effects described for Alternative 1A, sediment-disturbing activities during
 20 construction and maintenance of the water conveyance facilities under Alternative 1C could result in
 21 the disturbance of existing constituents in sediment, such as organochlorine or other legacy
 22 pesticides or methylmercury. During water conveyance facilities operation, changes in dilution and
 23 mixing of sources of water could result in a change in constituents known to bioaccumulate. For
 24 example, the reduction of flows in the Sacramento River downstream of the proposed north Delta
 25 intakes may result in a decreased dilution of constituents known to bioaccumulate in the study area.

26 As described for Alternative 1A, construction and operation of the water conveyance facilities under
 27 Alternative 1C would not result in a change in water dilution, and mixing of existing constituents
 28 would not affect the current status of legacy organochlorine pesticides or methylmercury in the
 29 study area. Intermittent and/or short-term construction-related activities (as would occur for in-
 30 river construction) would not be anticipated to result in contaminant discharges of substantial
 31 magnitude or duration sufficient to contribute to long-term bioaccumulation processes, or cause
 32 measureable long-term degradation, as described under Alternative 1A. Legacy pesticides typically
 33 bond to particulates and do not mobilize easily. Construction and maintenance of Alternative 1C
 34 would not cause legacy organochlorine pesticides to be transported far from the source or to
 35 partition into the water column, as described in Alternative 1A. Additionally, water supply
 36 operations under any BDCP action alternative would not be expected to change total suspended
 37 solids or turbidity levels (highs, lows, typical conditions) to any substantial degree. Changes in the
 38 magnitude, frequency, and geographic distribution of legacy organochlorine pesticides in water
 39 bodies of the study area that would result in new or more severe adverse effects on beneficial uses,
 40 relative to the No Action Alternative, would not be expected to occur.

41 Based on water quality modeling results presented in Chapter 8, *Water Quality*, Section 8.3.3.4, and
 42 described under Impact PH-3 for Alternative 1A, operation of water conveyance facilities under
 43 Alternative 1C would not substantially alter mercury or methylmercury concentrations in the

1 Sacramento River or San Joaquin River, nor would it substantially alter mercury concentrations in
2 fish tissues.

3 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
4 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
5 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
6 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
7 area of disturbance. Examples of these BMPs are described under Alternative 1A, Impact PH-3.

8 Accordingly, the potential for Alternative 1C to create a public health effect from bioaccumulation of
9 legacy organochlorine pesticides and mercury or methylmercury in fish is minimal, and public
10 health effects are not expected to be adverse.

11 **CEQA Conclusion:** As described for Alternative 1A, construction and maintenance of Alternative 1C
12 would not cause legacy organochlorine pesticides to be transported far from the source or to
13 partition into the water column based on the chemical properties of the pesticides. Although
14 methylmercury currently exceeds the TMDL, little to no change in mercury or methylmercury
15 concentrations in water is expected under Alternative 1C water conveyance construction. BMPs
16 implemented as part of Erosion and Sediment Control Plans and SWPPPs would help ensure that
17 construction activities would not substantially increase or substantially mobilize legacy
18 organochlorine pesticides or methylmercury during construction and maintenance. Therefore,
19 construction and maintenance of Alternative 1C would not cause increased exposure of the public to
20 these bioaccumulative sediment constituents.

21 Alternative 1C would not result in increased tributary flows that would mobilize legacy
22 organochlorine pesticides in sediments. Water quality modeling results showed small but
23 insignificant changes in mercury and methylmercury levels in water at certain Delta locations and
24 fish tissues due to Alternative 1C water operations. Because construction, maintenance, or operation
25 of Alternative 1C would not cause substantial mobilization or substantial increase of constituents
26 known to bioaccumulate, impacts on public health would be less than significant. No mitigation is
27 required.

28 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
29 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
30 **Facilities**

31 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
32 area. As described in Table 25-9, a total of 13.73 miles of new temporary 69 kV transmission lines;
33 17.61 miles of new permanent 69 kV transmission lines; and 18.45 miles of new permanent 230 kV
34 transmission lines would be required for this alternative. New transmission lines generating new
35 sources of EMFs would be constructed under this alternative, the new temporary and permanent
36 transmission lines would be located in rights-of-way of existing transmission lines or in sparsely
37 populated areas (Figure 25-2). Table 25-9 identifies only two potential new sensitive receptor
38 associated with this alternative, Under Alternative 1C, Fire Station 63, in Walnut Grove, would be
39 within 300 feet of a proposed temporary 69 kV transmission line This line would be removed
40 following completion of construction of the water conveyance facility features near this area so
41 there would be no potential permanent effects. The majority of sensitive receptors in the study area
42 are already located within 300 feet of an existing transmission line. Therefore, new temporary or
43 new permanent transmission lines would not expose new sensitive receptors or substantially more
44 people to EMFs that they are not already exposed. Because this proposed temporary 69 kV

1 transmission line would be located in a sparsely populated area, would be within 300 feet of only
2 one potential new sensitive receptor, and would be removed following construction of the water
3 conveyance facilities for this alternative, the proposed temporary transmission line would not
4 substantially increase people's exposure to EMFs.

5 As discussed in Section 25.1.1.5, the current scientific evidence does not show conclusively that EMF
6 exposure increases health risks. In 2006, CPUC updated its EMF Policy and reaffirmed that health
7 hazards from exposures to EMF have not been established. State and federal public health
8 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
9 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should be
10 continued. Based on this, utility companies are required to establish and maintain EMF Design
11 Guidelines in order to minimize health risks associated with power lines. These guidelines would be
12 implemented for any new temporary or new permanent transmission lines constructed and
13 operated under Alternative 1C, depending on which electrical provider is selected by DWR.
14 Furthermore, location and design of the proposed new transmission lines would be conducted in
15 accordance with CPUC's EMF Design Guidelines for Electrical Facilities. Therefore, operation of the
16 transmission line corridors would not expose substantially more people to transmission lines
17 generating EMFs and there would be no adverse effects.

18 **CEQA Conclusion:** The majority of proposed temporary and permanent transmission lines would be
19 located within the right-of-way of existing transmission lines. In general, any new temporary or
20 permanent transmission lines not within the right-of-way of existing transmission lines would be
21 located in sparsely populated areas generally away from existing sensitive receptors. However,
22 under this alternative a proposed temporary 69 kV transmission line would be located within 300
23 feet of Fire Station 63, in Walnut Grove. Design and implementation of new temporary or permanent
24 transmission lines not within the right-of-way of existing transmission lines would follow CPUC's
25 EMF Design Guidelines for Electrical Facilities and would implement shielding, cancelation, or
26 distance measures to reduce EMF exposure. Further, this temporary transmission line would be
27 removed once construction of the water conveyance facilities is completed. Since construction and
28 operation of Alternative 1C would not expose substantially more people to transmission lines that
29 generate new sources of EMFs, impacts would be less than significant, and no mitigation is required.

30 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 31 **and CM11**

32 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
33 under Alternative 1C would be the same as that described for Alternative 1A. Although there would
34 be an increase in restored and enhanced aquatic habitat in the study area as a result of
35 implementing Alternative 1C, implementation of environmental commitments, such as coordination
36 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
37 Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*), would reduce the
38 potential for an increase in mosquito breeding habitat and a substantial increase in vector-borne
39 diseases is unlikely to result. Furthermore, habitat would be restored in areas where potentially
40 suitable habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would
41 likely increase as a result of restoration and enhancement, which would keep mosquito populations
42 in check. Accordingly, effects would be the same under Alternative 1C as 1A and there would not be
43 a substantial increase in the public's risk of exposure to vector-borne diseases with implementation
44 of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

1 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 2 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described above in
 3 Alternative 1A, Alternative 1C would require environmental commitments, such as coordination
 4 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
 5 Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help
 6 control mosquitoes and reduce the potential for an increase in mosquito breeding habitat.
 7 Furthermore, habitat would be restored where potentially suitable vector habitat already exists, and
 8 habitat restoration and enhancement would likely increase the number of mosquito predators.
 9 Therefore, as described under Alternative 1A, implementation of CM2–CM7, CM10 and CM11 under
 10 Alternative 1C would not substantially increase the public’s risk of exposure to vector-borne
 11 diseases beyond what currently exists. Accordingly, this impact would be less than significant and
 12 no mitigation is required.

13 **Impact PH-6: Substantial Increase in Recreationists’ Exposure to Pathogens as a Result of**
 14 **Implementing the Restoration Conservation Measures**

15 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 16 under Alternative 1C would be the same as that described under Alternative 1A. Implementation of
 17 the restoration conservation measures would support habitat types, such as wetlands and
 18 agricultural areas, that produce pathogens as a result of the biological productivity in these areas
 19 (e.g., migrating birds, application of fertilizers, waste products of animals). As exemplified by the
 20 Pathogen Conceptual Model, any potential increase in pathogens associated with the habitat
 21 restoration would be localized and within the vicinity of the actual restoration. This would be
 22 similar for lands protected for agricultural uses. Depending on the level of recreational access
 23 granted by management plans, habitat restoration could increase or decrease opportunities for
 24 recreationists within the Delta region. However, effects associated with pathogens would be the
 25 same under Alternative 1C as under Alternative 1A. Recreationists would not experience a
 26 substantial increase in exposure to pathogens as a result of the restoration and no adverse effect
 27 would result.

28 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 1C
 29 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 30 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 31 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 32 off of some types of pathogens once released into water bodies would generally prevent substantial
 33 pathogen exposure to recreationists. Accordingly, impacts on public health would be less than
 34 significant and no mitigation is required.

35 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 36 **as a Result of Implementing CM2, CM4, CM5, and CM10**

37 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 1C as
 38 described under Alternative 1A. The primary concern with habitat restoration regarding
 39 constituents known to bioaccumulate is the potential for mobilizing contaminants sequestered in
 40 sediments of the newly inundated floodplains and marshes, as described under Alternative 1A. It is
 41 likely that the pesticide-bearing sediments would not be transported very far from the source area
 42 and would settle out with suspended particulates and be deposited close to the ROA during habitat
 43 restoration construction. Further, CM2–CM21 do not include the use of pesticides known to be
 44 bioaccumulative in animals or humans.

1 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 2 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 3 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 4 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 5 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 6 bioaccumulation of mercury and/or methylmercury in the study area's aquatic systems (i.e., fish and
 7 water) during the near-term, *CM12 Methylmercury Management* and existing OEHHA standards
 8 would serve to reduce the public's exposure to contaminated fish. Therefore, implementation of the
 9 CM2, CM4, CM5, and CM10 under Alternative 1C is not expected to result in an adverse effect on
 10 public health with respect to pesticides or methylmercury.

11 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 12 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 13 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 14 sediments would be transported very far from the source area and they would likely settle out with
 15 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 16 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 17 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
 18 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
 19 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10
 20 under Alternative 1C would not substantially mobilize or substantially increase the public's
 21 exposure to constituents known to bioaccumulate and this impact would be less than significant. No
 22 mitigation is required.

23 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 24 **Conveyance Facilities**

25 **NEPA Effects:** Water operations under Alternative 1C would be the same as under Alternative 1A.
 26 Therefore, potential effects on public health due to changes in water quality and beneficial uses as a
 27 result of *Microcystis* blooms and microcystin levels would be the same. Any modified reservoir
 28 operations under Alternative 1C are not expected to promote *Microcystis* production upstream of
 29 the Delta or in the rivers and streams of the Sacramento River watershed, watersheds of the eastern
 30 tributaries (Cosumnes, Mokelumne, and Calaveras Rivers), and the San Joaquin River upstream of
 31 the Delta.

32 As described in Chapter 8, *Water Quality*, *Microcystis* blooms in the Export Service Areas could
 33 increase due to increased water temperatures resulting from climate change, but not due to water
 34 conveyance facility operations. Similarly, hydraulic residence times in the Export Service Area
 35 would not be affected by operations of CM1. Accordingly, conditions would not be more conducive
 36 to *Microcystis* bloom formation. Water diverted from the Sacramento River in the north Delta is
 37 expected to be unaffected by *Microcystis*. However, the fraction of water flowing through the Delta
 38 that reaches the existing south Delta intakes is expected to be influenced by an increase in
 39 *Microcystis* blooms, as discussed below. Therefore, relative to the No Action Alternative, the addition
 40 of Sacramento River water from the north Delta under Alternative 1C would dilute *Microcystis* and
 41 microcystins in water diverted from the south Delta. Because the degree to which *Microcystis*
 42 blooms, and thus microcystins concentrations, would increase in source water from the south Delta
 43 is unknown, it cannot be determined whether Alternative 1C would result in increased or decreased
 44 levels of microcystins in the mixture of source waters exported from Banks and Jones pumping
 45 plants.

1 Ambient meteorological conditions would be the primary driver of Delta water temperatures, and
2 climate warming, not water operations, would determine future water temperatures in the Delta.
3 Increasing water temperatures due to climate change could lead to earlier attainment of the water
4 temperature threshold required to initiate *Microcystis* bloom formation, and therefore earlier
5 occurrences of *Microcystis* blooms in the Delta, as well as increases in the duration and magnitude.
6 However, these temperature-related changes would not be different from what would occur under
7 the No Action Alternative. Modeled hydraulic residence times in the Delta are projected to increase
8 in the summer and fall periods in the north and west Delta and in the summer in Cache Slough, the
9 east Delta, and south Delta relative to the No Action Alternative. Siting and design of restoration
10 areas would have a substantial influence on the magnitude of residence time increases under
11 Alternative 1C. The modeled increase in residence time in the Delta could result in an increase in the
12 frequency, magnitude, and geographic extent of *Microcystis* blooms, and thus microcystin levels.
13 Therefore, impacts on beneficial uses, including drinking water and recreational waters, could occur
14 and public health could be affected. Accordingly, this would be considered an adverse effect.

15 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
16 quality, and therefore potential public health effects, in the Delta due to *Microcystis*. However,
17 because the effectiveness of these mitigation measures to result in feasible measures for reducing
18 water quality effects, and therefore potential public health effects, is uncertain, the effect would still
19 be considered adverse.

20 **CEQA Conclusion:** Under Alternative 1C, operation of the water conveyance facilities is not expected
21 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
22 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
23 resulting from climate change, but not due to water conveyance facility operations. Residence times
24 in the Export Service Area would not be affected by operations of CM1, and therefore conditions in
25 those areas would not be more conducive to *Microcystis* bloom formation. Water exported from the
26 Delta to the Export Service Area is expected to be a mixture of *Microcystis*-affected source water
27 from the south Delta intakes and unaffected source water from the Sacramento River. Because of
28 this, it cannot be determined whether operations and maintenance under Alternative 1C would
29 result in increased or decreased levels of *Microcystis* and microcystins in the mixture of source
30 waters exported from Banks and Jones pumping plants.

31 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
32 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
33 water temperature increases in the Delta would be due to climate change primarily and not due to
34 operation of the water conveyance facilities. Increases in Delta residence times would be due in
35 small part to climate change and sea level rise, but due to a greater degree to operation of the water
36 conveyance facilities and hydrodynamic impacts of restoration included in CM2 and CM4.
37 Consequently, it is possible that increases in the frequency, magnitude, and geographic extent of
38 *Microcystis* blooms in the Delta would occur due to the operations and maintenance of the water
39 conveyance facilities and the hydrodynamic impacts of restoration under CM2 and CM4.
40 Accordingly, beneficial uses including drinking water and recreational waters would be impacted
41 and, as a result, public health. Therefore, this impact would be significant.

42 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
43 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
44 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
45 available science at the time of design. Mitigation Measure WQ-32b requires that the project

1 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 2 to determine whether increases in abundance are significant. This mitigation measure also requires
 3 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 4 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
 5 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 6 measures for reducing water quality effects, and therefore potential public health effects, is
 7 uncertain, this impact would be significant and unavoidable.

8 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 9 ***Microcystis* Blooms**

10 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 11 in Chapter 8, *Water Quality*.

12 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 13 **Water Residence Time**

14 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 15 in Chapter 8, *Water Quality*.

16 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 17 **CM4**

18 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 19 under Alternative 1C would be the same as that described under Alternative 1A. Restoration
 20 activities implemented under CM2 and CM4 that would create shallow backwater areas could result
 21 in local increases in water temperature that may encourage *Microcystis* growth during the summer
 22 bloom season. This would result in further degradation of water quality beyond the hydrodynamic
 23 effects of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis*
 24 blooms with implementation of CM2 and CM4 could potentially result in adverse effects on public
 25 health through exposure via drinking water quality and recreational waters. Mitigation Measures
 26 WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 27 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 28 feasible measures for reducing water quality effects, and therefore potential public health effects, is
 29 uncertain. This would be an adverse effect.

30 **CEQA Conclusion:** Restoration activities implemented under CM2 and CM4 that create shallow
 31 backwater areas could result in local increases in water temperature conducive to *Microcystis*
 32 growth during summer bloom season. This could compound the water quality degradation that may
 33 result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact PH-8 and result in
 34 additional water quality degradation such that beneficial uses are affected. An increase in
 35 *Microcystis* blooms could potentially result in impacts on public health through exposure via
 36 drinking water quality and recreational waters. Therefore, this impact would be significant.
 37 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 38 increased local water temperatures and hydraulic residence time. The effectiveness of these
 39 mitigation measures to result in feasible measures for reducing water quality effects, and therefore
 40 potential public health effects, is uncertain. Therefore, this impact would be significant and
 41 unavoidable.

1 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 2 ***Microcystis* Blooms**

3 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 4 in Chapter 8, *Water Quality*.

5 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 6 **Water Residence Time**

7 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 8 in Chapter 8, *Water Quality*.

9 **25.3.3.5 Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five**
 10 **Intakes (15,000 cfs; Operational Scenario B)**

11 Alternative 2A would include the same physical/structural components as Alternative 1A, but could
 12 potentially utilize two different intake and intake pumping plant locations. Water supply and
 13 conveyance operations would follow the guidelines described as Operational Scenario B, which
 14 includes Fall X2. In addition, an operable barrier at the Head of Old River to control fish passage
 15 would be constructed towards the end of the construction period, between 2022 and 2025. It would
 16 include a fish passage approximately 40 feet long and 10 feet wide, constructed of reinforced
 17 concrete. The fish passage would likely be open during summer and fall and closed with stoplogs
 18 during spring. CM2–CM21 would be implemented under this alternative, and would be the same as
 19 under Alternative 1A. See Chapter 3, *Description of Alternatives*, Section 3.5.5, for additional details
 20 on Alternative 2A.

21 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 22 **the Water Conveyance Facilities**

23 ***NEPA Effects:*** As with Alternative 1A, implementation of CM1 under Alternative 2A would involve
 24 construction and operation of up to 15 solids lagoons, five sedimentation basins, Byron Tract
 25 Forebay, an intermediate forebay, and a 350-acre inundation area adjacent to the intermediate
 26 forebay. Sedimentation basins, solids lagoons, the intermediate forebay inundation area, and the
 27 periphery of the intermediate forebay and Byron Tract Forebay have the potential to provide habitat
 28 for vectors that transmit diseases (e.g., mosquitoes) because of the large volumes of water that
 29 would be held within these areas. The depth, design, and operation of the sedimentation basins and
 30 solids lagoons would prevent the development of suitable mosquito habitat (Figure 25-1).
 31 Specifically, the basins would be too deep and the constant movement of water would prevent
 32 mosquitoes from breeding and multiplying. Sedimentation basins would be approximately 120 feet
 33 long by 40 feet wide by 55 feet deep, and solids lagoons would be approximately 165 feet long by 86
 34 feet wide by 10 feet deep. Furthermore, use of the 350-acre inundation area would be limited to
 35 forebay emergency overflow situations and water would be pumped, creating circulation such that
 36 the area would have a low potential for creating suitable vector habitat. Similarly, water in the
 37 intermediate forebay and the Byron Tract Forebay would be circulated regularly and, with the
 38 exception of shallower areas around the periphery, would be too deep to provide suitable mosquito
 39 habitat. The shallower edges of the forebays could provide suitable mosquito breeding habitat if
 40 emergent vegetation or other aquatic plants (e.g., pond weed) were allowed to grow.

41 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 42 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County

1 MVCDDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 2 control mosquitoes (see Impact PH-1 under Alternative 1A). These BMPs would be consistent with
 3 practices presented in CDPH's Best Management Practices for Mosquito Control in California
 4 (California Department of Public Health 2012). Implementation of these BMPs would reduce the
 5 likelihood that BDCP operations would require an increase in abatement activities by the local
 6 MVCDDs. Therefore, as described under Alternative 1A, construction and operation of the intakes,
 7 solids lagoons, sedimentation basins, the forebays, and the intermediate forebay inundation area
 8 under Alternative 2A would not substantially increase suitable vector habitat and would not
 9 substantially increase vector-borne diseases. Accordingly, no adverse effects on public health would
 10 result.

11 **CEQA Conclusion:** As with Alternative 1A, implementation of CM1 under Alternative 2A would
 12 involve construction and operation of solids lagoons, sedimentation basins, an intermediate forebay
 13 and associated 350-acre inundation area, and Byron Tract Forebay. While these facilities could
 14 provide suitable habitat for vectors (e.g., mosquitoes), water depth and circulation would prevent
 15 the areas from substantially increasing suitable vector habitat. The inundation area would only be
 16 used during emergency overflow situations and water would be pumped back into the intermediate
 17 forebay, creating circulation that would discourage mosquito breeding. The shallower periphery of
 18 the intermediate forebay and Bryon Tract Forebay could provide suitable mosquito breeding
 19 habitat.

20 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 21 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 22 MVCDDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 23 control mosquitoes. These BMPs would be consistent with practices presented in CDPH's Best
 24 Management Practices for Mosquito Control in California (California Department of Public Health
 25 2012). See Impact PH-1 under Alternative 1A. Accordingly, construction and operation of the water
 26 conveyance facilities under Alternative 2A would not result in a substantial increase in vector-borne
 27 diseases and the impact on public health would be less than significant. No mitigation is required.

28 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 29 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 30 **Facilities**

31 **NEPA Effects:**

32 **Disinfection Byproducts**

33 Under Alternative 2A, the geographic extent of effects pertaining to long-term average DOC
 34 concentrations and, by extension, the DBPs in the study area would be similar to that described for
 35 Alternative 1A and the magnitude of predicted long-term change and relative frequency of
 36 concentration threshold exceedances would be slightly greater (see Chapter 8, *Water Quality*,
 37 Section 8.3.3.5, for a detailed discussion). DOC water quality exceedance would conflict with the
 38 Basin Plan, as it exceeds the Basin Plan's requirements. The long-term change and exceedances in
 39 DOC would not be of a sufficient magnitude that they would require existing drinking water
 40 treatment plants to substantially upgrade treatment for DOC removal above levels currently
 41 employed. Under Alternative 2A, the geographic extent of effects pertaining to long-term average
 42 bromide concentrations in the study area would be similar to those described for Alternative 1A,
 43 although the magnitude of predicted long-term change and relative frequency of concentration

1 threshold exceedances would be different. Relative to the No Action Alternative, modeled long-term
 2 average bromide concentrations would increase at Buckley Cove, Staten Island, Emmaton (during
 3 the drought period only) and the North Bay Aqueduct at Barker Slough. This increase would be
 4 greatest at Barker Slough, where average concentrations could increase by approximately 26%. This
 5 increase would be substantially greater in drought years (75%). (Chapter 8, *Water Quality*, Section
 6 8.3.3.5).

7 This increase in long-term average bromide concentrations at Barker Slough could necessitate
 8 upgrades or changes in operations at certain water treatment plants. While treatment technologies
 9 sufficient to achieve the necessary bromide removal exist, implementation of such technologies
 10 would likely require substantial investment in new or modified infrastructure. Should treatment
 11 plant upgrades not be undertaken, a change of such magnitude in long-term average bromide
 12 concentrations in drinking water sources would represent an increased risk for adverse effects on
 13 public health from DBP in drinking water sources. Mitigation Measure WQ-5 is available to reduce
 14 these effects. Implementation of this measure along with a separate other commitment as set forth
 15 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, relating to the potential increased
 16 treatment costs associated with bromide-related changes would reduce these effects. Further, as
 17 described for Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay
 18 Aqueduct at Barker Slough may be further minimized by implementation of the AIP.

19 **Trace Metals**

20 Water quality modeling results indicate that for metals of primarily human health and drinking
 21 water concern (arsenic, iron, manganese), concentrations in Delta waters relative to the No Action
 22 Alternative are not expected to change substantially. Average concentrations for arsenic, iron, and
 23 manganese in the primary source water (Sacramento River, San Joaquin River, and the Bay at
 24 Martinez) would not exceed drinking water quality criteria. No mixing of these three source waters
 25 would result in a metal concentration greater than the highest source water concentration, and,
 26 given that the average water concentrations for arsenic, iron, and manganese do not exceed water
 27 quality criteria, more frequent exceedances of drinking water criteria in the Delta would not be
 28 expected to occur under this alternative. Consequently, no adverse effect on public health related to
 29 the trace metals arsenic, iron, or manganese from drinking water sources is anticipated.

30 **Pesticides**

31 Sources of pesticides to the study area include direct input of surface runoff from in-Delta
 32 agriculture and Delta urbanized areas as well inputs from rivers upstream of the Delta. These
 33 sources would not be affected by implementing Alternative 2A. However, under Alternative 2A
 34 operations, the distribution and mixing of Delta source waters would change relative to the No
 35 Action Alternative. As discussed in Chapter 8, *Water Quality*, modeling results indicate that in the
 36 long-term, relative to the No Action Alternative, modeled changes in the source water fractions of
 37 Sacramento, San Joaquin and Delta agriculture water are not of sufficient magnitude to adversely
 38 affect beneficial uses of the Delta. Therefore, it is not anticipated that there would be adverse effects
 39 on public health related to pesticides from drinking water sources.

40 **CEQA Conclusion:** The operation of water supply facilities under Alternative 2A would adhere to the
 41 criteria set forth under Operational Scenario B. As described in Chapter 8, *Water Quality*, Section
 42 8.3.3.5, water quality modeling results indicate that, for the most part, there would be no substantial
 43 changes in trace metals, DBPs, or pesticides relative to Existing Conditions under this operational
 44 scenario. However, relative to Existing Conditions, bromide concentrations would increase at the

1 North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton (during the drought period only),
2 with the greatest increase occurring at Barker Slough (22%). During the drought period the increase
3 in bromide would be more substantial (75%). The increase in long-term average bromide
4 concentrations predicted for Barker Slough would result in a substantial change in source water
5 quality to existing drinking water treatment plants drawing water from the North Bay Aqueduct.
6 These modeled increases in bromide at Barker Slough could lead to adverse changes in the
7 formation of DBPs at drinking water treatment plants such that considerable water treatment plant
8 upgrades would be necessary in order to achieve equivalent levels of drinking water health
9 protection. This would be a significant impact.

10 While treatment technologies sufficient to achieve the necessary bromide removal exist,
11 implementation of such technologies would likely require substantial investment in new or modified
12 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
13 long-term average bromide concentrations in drinking water sources would represent an increased
14 risk for adverse effects on public health from DBPs in drinking water sources. Assuming the adverse
15 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
16 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
17 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
18 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
19 based on currently available information.

20 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
21 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
22 separate other commitment to address the potential increased water treatment costs that could
23 result from bromide-related concentration effects on municipal water purveyor operations.
24 Potential options for making use of this financial commitment include funding or providing other
25 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
26 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
27 water supply diversion facilities. Please refer to Appendix 3B, *Environmental Commitments, AMMs,*
28 *and CMs*, for the full list of potential actions that could be taken pursuant to this commitment in
29 order to reduce the water quality treatment costs associated with water quality effects relating to
30 chloride, electrical conductivity, and bromide. Because the BDCP proponents cannot ensure that the
31 results of coordinated actions with water treatment entities will be fully funded or implemented
32 successfully prior to the project's contribution to the impact, the ability to fully mitigate this impact
33 is uncertain. If a solution that is identified by the BDCP proponents and an affected water purveyor
34 is not fully funded, constructed, or implemented before the project's contribution to the impact is
35 made, a significant impact in the form of increased DBP in drinking water sources could occur.
36 Accordingly, this impact would be significant and unavoidable. If, however, all financial
37 contributions, technical contributions, or partnerships required to avoid significant impacts prove to
38 be feasible and any necessary agreements are completed before the project's contribution to the
39 effect is made, impacts would be less than significant.

40 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
41 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
42 **Slough**

43 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

1 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
2 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

3 **NEPA Effects:** Similar to effects described for Alternative 1A, sediment-disturbing activities during
4 construction and maintenance of the water conveyance facilities under Alternative 2A could result
5 in the disturbance of existing constituents, such as legacy organochlorine pesticides, or
6 methylmercury in sediment. During water conveyance facilities operation, changes in dilution and
7 mixing of sources of water could result in a change in constituents known to bioaccumulate. For
8 example, the reduction of flows in the Sacramento River downstream of the proposed north Delta
9 intakes may result in a decreased dilution of constituents known to bioaccumulate in the study area.

10 As described under Alternative 1A, construction and operation of the water conveyance facilities
11 under Alternative 2A would not result in a change in water dilution and mixing of existing
12 constituents and would not affect the current status of organochlorine or other legacy pesticides.
13 Intermittent and/ short-term construction-related activities (as would occur for in-river
14 construction) would not be anticipated to result in contaminant discharges of sufficient magnitude
15 or duration to contribute to long-term bioaccumulation processes, or cause measureable long-term
16 degradation as described under Alternative 1A. Legacy organochlorine pesticides typically bond to
17 particulates, and do not mobilize easily. Construction and maintenance of Alternative 2A would not
18 cause these pesticides to be transported far from the source or to partition into the water column, as
19 described under Alternative 1A. Additionally, water supply operations under any BDCP action
20 alternative would not be expected to change total suspended solids or turbidity levels (highs, lows,
21 typical conditions) to any substantial degree. Changes in the magnitude, frequency, and geographic
22 distribution of legacy organochlorine pesticides in water bodies of the affected environment that
23 would result in new or more severe adverse effects on beneficial uses, relative to the No Action
24 Alternative, would not be expected to occur.

25 Modeling results indicate small, insignificant changes in total mercury and methylmercury levels in
26 water and fish tissues resulting from Alternative 2A water operations (Chapter 8, *Water Quality*,
27 Section 8.3.3.5). Upstream mercury contributions and methylmercury production in Delta waters
28 would not be altered by the operation of Alternative 2A, as it would not change existing mercury
29 sources and would not substantially alter methylmercury concentrations in the Sacramento River or
30 San Joaquin River. Modeling results indicate that the percentage change in assimilative capacity of
31 waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark for this alternative
32 showed the greatest decrease (2.1%), relative to the No Action Alternative, at Old River at Rock
33 Slough. Similarly, changes in methylmercury concentration are expected to be very small. Fish tissue
34 estimates showed small or no increase in exceedance quotients based on long-term annual average
35 concentrations at the nine Delta locations modeled. The greatest increase in exceedance quotients
36 was 11-12% at Mokelumne River (South Fork) at Staten Island, Franks Tract and Old River at Rock
37 Slough relative to the No Action Alternative.

38 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
39 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
40 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
41 keep sediment that may contain methylmercury within the area of disturbance during construction
42 and maintenance. Further, operations under Alternative 2A are not expected to increase mercury
43 concentrations substantially and therefore there would be no long-term water quality degradation
44 such that beneficial uses are adversely affected. Increases in mercury or methylmercury
45 concentrations are not likely to be measurable, and changes in mercury concentrations or fish tissue

1 mercury concentrations would not make any existing mercury-related impairment measurably
2 worse. Therefore, it is not expected that aquatic organisms would have measurably higher body
3 burdens of mercury as a result of Alternative 2A water operations. Accordingly, the potential for
4 Alternative 2A to create a public health effect from bioaccumulation of legacy organochlorine
5 pesticides and mercury or methylmercury in fish is minimal, and public health effects are not
6 expected to be adverse.

7 **CEQA Conclusion:** Construction and maintenance of the water conveyance facilities under
8 Alternative 2A would not cause legacy organochlorine pesticides to be transported far from the
9 source or to partition into the water column based on the chemical properties of the pesticides.
10 Although methylmercury currently exceeds the TMDL, little to no change in methylmercury
11 concentrations in water is expected under Alternative 2A water conveyance facilities construction.
12 BMPs implemented as part of Erosion and Sediment Control Plans and SWPPPs would help ensure
13 that construction activities would not substantially increase or substantially mobilize legacy
14 organochlorine pesticides or methylmercury during construction and maintenance. Therefore,
15 construction and maintenance of Alternative 2A would not cause increased exposure of the public to
16 these bioaccumulative sediment constituents.

17 Alternative 2A would not result in increased tributary flows that would mobilize legacy
18 organochlorine pesticides in sediments. Water quality modeling results showed small changes in
19 mercury and methylmercury levels in water at certain Delta locations. Specifically the analysis of
20 percentage change in assimilative capacity of waterborne total mercury relative to the 25 ng/L
21 ecological risk benchmark showed a 2.2% decrease for Old River at Rock Slough relative to Existing
22 Conditions. The greatest increase in exceedance quotients for mercury in fish tissues due to
23 Alternative 2A water operations relative to Existing Conditions was 13% at Old River at Rock
24 Slough. Because mercury concentrations are not expected to increase substantially, no long-term
25 water quality degradation is expected to occur and, thus, no adverse effects to beneficial uses would
26 occur. Because any increases in mercury or methylmercury concentrations are not likely to be
27 measurable, changes in mercury concentrations or fish tissue mercury concentrations would not
28 make any existing mercury-related impairment measurably worse. In comparison to Existing
29 Conditions, Alternative 2A would not increase levels of mercury by frequency, magnitude, and
30 geographic extent such that the affected environment would be expected to have measurably higher
31 body burdens of mercury in aquatic organisms or humans consuming those organisms.

32 Because construction, maintenance, or operation of Alternative 2A would not cause substantial
33 mobilization or substantial increase of constituents known to bioaccumulate (i.e., organochlorine
34 pesticides or mercury), and therefore impacts on public health would be less than significant. No
35 mitigation is required.

36 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 37 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 38 **Facilities**

39 **NEPA Effects:** Alternative 2A has different intakes than 1A, as the intakes could be 1, 2, 3, 4, and 5; or
40 1, 2, 3, 6, and 7. Thus, a different configuration of transmission lines may be required; however, the
41 total number of intakes would remain the same (five). Approximately 621 miles of existing
42 transmission lines are located within the study area. As described in Table 25-9, a total of 24.71
43 miles of new temporary 69 kV transmission lines; 14.46 mile of new permanent 69 kV transmission

1 lines; and 42.68 miles of new permanent 230 kV transmission lines would be required for this
2 alternative.

3 New transmission lines generating new sources of EMFs would be constructed under this
4 alternative; the new temporary and permanent transmission lines would generally be located in
5 sparsely populated areas (Figure 25-2). However, as indicated in Table 25-9, Stone Lakes National
6 Wildlife Refuge would be within 300 feet of a proposed temporary 69 kV transmission line. Visitors
7 to this area generally come for walks, water recreation, and hunting, and as such, it is unlikely that
8 large groups of people would be staying in the area within 300 feet of this proposed transmission
9 line, so any EMF exposure would be limited. Further, this line would be removed when construction
10 of the water conveyance facility features near this area is completed, so there would be no potential
11 permanent effects. Therefore, this temporary transmission line would not substantially increase
12 people's exposure to EMFs. As described for Alternative 1A, the majority of sensitive receptors are
13 already located within 300 feet of an existing 69 kV or 230 kV transmission line. Accordingly, the
14 majority of new temporary or new permanent transmission lines would not expose sensitive
15 receptors or substantially more people to EMFs that they are not already experiencing. Because the
16 lines would be located in sparsely populated areas and would be within 300 feet of only one
17 potential new sensitive receptor, the proposed transmission line would not substantially increase
18 people's exposure to EMFs.

19 As discussed in Section 25.1.1.5, the current scientific evidence does not show conclusively that EMF
20 exposure can increase health risks. In 2006, CPUC updated its EMF Policy and reaffirmed that health
21 hazards from exposures to EMF have not been established. State and federal public health
22 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
23 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should be
24 continued. Based on this, utility companies are required to establish and maintain EMF Design
25 Guidelines in order to minimize health risks associated with power lines. These guidelines would be
26 implemented for any new temporary or new permanent transmission lines constructed and
27 operated under Alternative 2A, depending on which electric provider is selected by DWR.
28 Furthermore, location and design of the new transmission lines would be conducted in accordance
29 with CPUC's EMF Design Guidelines for Electrical Facilities. Therefore, operation of the transmission
30 line corridors would not expose substantially more people to transmission lines generating EMFs,
31 and there would be no adverse effect on public health.

32 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
33 transmission lines would be located in rights-of-way of existing transmission lines or in sparsely
34 populated areas generally away from existing potentially sensitive receptors. However, one
35 sensitive receptor, Stone Lakes National Wildlife Refuge, would be within 300 feet of a proposed 69
36 kV temporary transmission line for Alternative 2A. Because visitors to this area generally come for
37 walks, water recreation, and hunting, it is unlikely that large groups of people would be staying in
38 the area within 300 feet of this proposed transmission line, so any EMF exposure would be limited.
39 Further, this line would be removed when construction of the water conveyance facility features
40 near this area is completed, so there would be no potential permanent effects. Therefore, this
41 temporary transmission line would not substantially increase people's exposure to EMFs. Design
42 and implementation of new temporary or permanent transmission lines not within the right-of-way
43 of existing transmission lines would follow CPUC's EMF Design Guidelines for Electrical Facilities
44 and would implement shielding, cancellation, or distance measures to reduce EMF exposure. Because
45 construction and operation of Alternative 2A would not expose substantially more people to

1 transmission lines that generate new sources of EMFs, impacts on public health would be less than
2 significant, and no mitigation is required.

3 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 4 **and CM11**

5 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
6 under Alternative 2A would be the same as that described for Alternative 1A. Although there would
7 be an increase in restored and enhanced aquatic habitat in the study area as a result of
8 implementing Alternative 2A, implementation of environmental commitments, such as coordination
9 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
10 Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*), would reduce the
11 potential for an increase in mosquito breeding habitat, and a substantial increase in vector-borne
12 diseases is unlikely to result. Furthermore, habitat would be restored in areas where potentially
13 suitable habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would
14 likely increase as a result as restoration and enhancement, which would keep mosquito populations
15 in check. Therefore, effects would be the same under Alternative 2A as under Alternative 1A and
16 there would not be a substantial increase in the public's risk of exposure to vector-borne diseases
17 with implementation of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

18 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
19 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described above under
20 Alternative 1A, Alternative 2A would require environmental commitments, such as coordination
21 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
22 Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help
23 control mosquitoes and reduce the potential for an increase in mosquito breeding habitat.
24 Furthermore, habitat would be restored where potentially suitable vector habitat already exists, and
25 habitat restoration and enhancement would likely increase the number of mosquito predators.
26 Therefore, as described under Alternative 1A, implementation of CM2-CM7, CM10 and CM11 under
27 Alternative 2A would not substantially increase the public's risk of exposure to vector-borne
28 diseases beyond what currently exists. Accordingly, this impact would be less than significant and
29 no mitigation is required.

30 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of** 31 **Implementing the Restoration Conservation Measures**

32 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
33 under Alternative 2A would be the same as that described for Alternative 1A. Implementation of the
34 conservation measures would support habitat types, such as wetlands and agricultural areas, that
35 produce pathogens as a result of the biological productivity in these areas (e.g., migrating birds,
36 application of fertilizers, waste products of animals). As exemplified by the Pathogen Conceptual
37 Model, any potential increase in pathogens associated with the habitat restoration would be
38 localized and within the vicinity of the actual restoration. This would be similar for lands protected
39 for agricultural uses. Depending on the level of recreational access granted by management plans,
40 habitat restoration could increase or decrease opportunities for recreationists within the Delta
41 region. However, effects associated with pathogens and would be the same under Alternative 2A as
42 under Alternative 1A. Recreationists would not experience a substantial increase in exposure to
43 pathogens as a result of the restoration and no adverse effect would result.

1 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 2A
 2 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 3 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 4 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 5 off of some types of pathogens once released into water bodies would generally prevent substantial
 6 pathogen exposure to recreationists. Accordingly, impacts on public health would be less than
 7 significant. No mitigation is required.

8 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 9 **as a Result of Implementing CM2, CM4, CM5, and CM10**

10 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 2A as
 11 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
 12 known to bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of
 13 the newly inundated floodplains and marshes, as described under Alternative 1A. It is likely that the
 14 pesticide-bearing sediments would not be transported very far from the source area, and would
 15 settle out with suspended particulates and be deposited close to the ROA. Further, CM2–CM21 do
 16 not include the use of pesticides known to be bioaccumulative in animals or humans.

17 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 18 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 19 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 20 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 21 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 22 bioaccumulation for methylmercury in the study area's aquatic systems (e.g., fish and water) during
 23 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
 24 reduce the public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,
 25 and CM10 under Alternative 2A is not expected to result in an adverse effect on public health with
 26 respect to pesticides or methylmercury.

27 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 28 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 29 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 30 sediments would be transported very far from the source area and they would likely settle out with
 31 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 32 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 33 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
 34 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
 35 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10
 36 under Alternative 1C would not substantially mobilize or substantially increase the public's
 37 exposure to constituents known to bioaccumulate and this impact would be less than significant. No
 38 mitigation is required.

39 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water**
 40 **Conveyance Facilities**

41 **NEPA Effects:** Because factors that affect *Microcystis* abundance in waters upstream of the Delta, in
 42 the Delta, and in the SWP/CVP Export Services Areas under Alternative 1A would similarly change
 43 under Alternative 2A, *Microcystis* abundance, and thus microcystins concentrations, in water bodies

1 of the affected environment under Alternative 2A would be very similar (i.e., nearly the same) to
2 those discussed for Alternative 1A.

3 As described in Chapter 8, *Water Quality*, although *Microcystis* blooms have not occurred in the
4 Export Service Areas, conditions in the Export Service Areas under Alternative 2A may become more
5 conducive to *Microcystis* bloom formation because water temperatures will increase in the Export
6 Service Areas due to the expected increase in ambient air temperatures resulting from climate
7 change, but not from operation of the water conveyance facilities. Under Alternative 2A, relative to
8 No Action Alternative, water exported to the SWP/CVP Export Service Area will be a mixture of
9 *Microcystis*-affected source water from the south Delta intakes and unaffected source water from the
10 Sacramento River, diverted at the north Delta intakes. It cannot be determined whether operations
11 and maintenance under Alternative 2A will result in increased or decreased levels of *Microcystis* and
12 microcystins in the mixture of source waters exported from Banks and Jones pumping plants.

13 Like Alternative 1A, elevated ambient water temperatures would occur in the Delta under
14 Alternative 2A, which could lead to earlier occurrences of *Microcystis* blooms in the Delta, and
15 increase the overall duration and magnitude of blooms. However, as described in Chapter 8, *Water*
16 *Quality*, the increase in Delta water temperatures, and consequent potential increase in *Microcystis*
17 blooms, would be driven entirely by climate change, not by operation of water conveyance facilities.
18 There would be differences in the direction and magnitude of hydraulic residence time changes
19 during the *Microcystis* bloom period due to operation of the water conveyance facilities under
20 Alternative 2A compared to Alternative 1A, relative to the No Action Alternative. As a result,
21 *Microcystis* blooms, and therefore microcystin, could increase in surface waters throughout the
22 Delta. Therefore, impacts on beneficial uses, including drinking water and recreational waters, could
23 occur and public health could be affected. Accordingly, this would be considered an adverse effect.

24 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
25 quality in the Delta. Although there is uncertainty regarding this impact, the effects on *Microcystis*
26 from implementing CM1 is determined to be adverse.

27 **CEQA Conclusion:** Under Alternative 2A, operation of the water conveyance facilities is not expected
28 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
29 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
30 resulting from climate change, but not due to water conveyance facility operations. Residence times
31 in the Export Service Area would not be affected by operations of CM1, and therefore conditions in
32 those areas would not be more conducive to *Microcystis* bloom formation. Water exported from the
33 Delta to the Export Service Area is expected to be a mixture of *Microcystis*-affected source water
34 from the south Delta intakes and unaffected source water from the Sacramento River. Because of
35 this, it cannot be determined whether operations and maintenance under Alternative 2A would
36 result in increased or decreased levels of *Microcystis* and microcystins in the mixture of source
37 waters exported from Banks and Jones pumping plants.

38 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
39 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
40 water temperature increases in the Delta would be due to climate change and not due to operation
41 of the water conveyance facilities. Increases in Delta residence times would be due in small part to
42 climate change and sea level rise, but due to a greater degree to operation of the water conveyance
43 facilities and hydrodynamic impacts of restoration included in CM2 and CM4. Consequently, it is
44 possible that increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms in

1 the Delta would occur due to the operations and maintenance of the water conveyance facilities and
 2 the hydrodynamic impacts of restoration under CM2 and CM4. Accordingly, beneficial uses including
 3 drinking water and recreational waters would be impacted and, as a result, public health. Therefore,
 4 this impact would be significant.

5 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 6 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 7 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 8 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 9 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 10 to determine whether increases in abundance are significant. This mitigation measure also requires
 11 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 12 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
 13 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 14 measures for reducing water quality effects, and therefore potential public health effects, is
 15 uncertain, this impact would be significant and unavoidable.

16 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 17 ***Microcystis* Blooms**

18 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 19 in Chapter 8, *Water Quality*.

20 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 21 **Water Residence Time**

22 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 23 in Chapter 8, *Water Quality*.

24 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 25 **CM4**

26 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 27 under Alternative 2A would be the same as that described under Alternative 1A. Restoration
 28 activities implemented under CM2 and CM4 that would create shallow backwater areas could result
 29 in local increases in water temperature that may encourage *Microcystis* growth during the summer
 30 bloom season. This would result in further degradation of water quality beyond the hydrodynamic
 31 effects of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis*
 32 blooms with implementation of CM2 and CM4 could potentially result in adverse effects on public
 33 health through exposure via drinking water quality and recreational waters. Mitigation Measures
 34 WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 35 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 36 feasible measures for reducing water quality effects, and therefore potential public health effects, is
 37 uncertain. This would be an adverse effect.

38 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 2A are the same as
 39 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
 40 create shallow backwater areas could result in local increases in water temperature conducive to
 41 *Microcystis* growth during summer bloom season. This could compound the water quality
 42 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact

1 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 2 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 3 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 4 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 5 increased local water temperatures and water residence time. The effectiveness of these mitigation
 6 measures to result in feasible measures for reducing water quality effects, and therefore potential
 7 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

8 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 9 ***Microcystis* Blooms**

10 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 11 in Chapter 8, *Water Quality*.

12 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 13 **Water Residence Time**

14 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 15 in Chapter 8, *Water Quality*.

16 **25.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five**
 17 **Intakes (15,000 cfs; Operational Scenario B)**

18 Alternative 2B would involve construction activities similar to those under Alternative 1A, with the
 19 addition of an operable barrier at the Head of Old River to facilitate fish passage during summer and
 20 fall. However, the water conveyance facilities would be the same as under Alternative 1B with the
 21 exception that two alternative intake locations (Intakes 6 and 7—located downstream of Sutter and
 22 Steamboat Sloughs) might be utilized. In addition, Alternative 2B has the same diversion and
 23 conveyance operations as Alternative 2A. The primary difference between the two alternatives is
 24 that conveyance under Alternative 2B would be in a lined or unlined canal, instead of a
 25 pipeline/tunnel conveyance. Because there would be no difference in conveyance capacity or
 26 operations, there would be no differences between these two alternatives in Delta inflow, source
 27 fractions to various Delta locations, and hydrodynamics in the Delta. CM2–CM21 under Alternative
 28 2B would be the same as described under Alternative 1A.

29 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 30 **the Water Conveyance Facilities**

31 **NEPA Effects:** As with Alternative 1A, implementation of CM1 under Alternative 2B would involve
 32 construction and operation of up to 15 solids lagoons, 5 sedimentation basins and Bryon Tract
 33 Forebay. These facilities have the potential to provide habitat for vectors that transmit diseases (e.g.,
 34 mosquitoes) because of the large volumes of water that would be held within these areas.
 35 Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons
 36 would be 165 feet long by 86 feet wide by 10 feet deep. The depth, design, and operation of the
 37 sedimentation basins and solids lagoons would prevent the development of suitable mosquito
 38 habitat (Figure 25-1). Specifically, the basins would be too deep and the constant movement of
 39 water would prevent mosquitoes from breeding and multiplying.

40 Although the proposed Byron Tract Forebay would increase surface water within the study area, it
 41 is unlikely that the forebay would provide suitable breeding habitat for mosquitoes given that the

1 water in this forebay would not be stagnant and would be too deep. However, the shallow edges of
 2 the forebay could potentially provide suitable mosquito breeding habitat if emergent vegetation or
 3 other aquatic plants (e.g., pond weed) were allowed to grow. However, as part of the regular
 4 maintenance of the forebay, floating vegetation such as pond weed would be harvested to maintain
 5 flow and forebay capacity.

6 To minimize the potential for causing impacts related to increasing suitable mosquito habitat in the
 7 Plan Area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo
 8 County MVCDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs
 9 would help control mosquitoes. These BMPs would be consistent with practices presented in CDPH's
 10 *Best Management Practices for Mosquito Control in California* (California Department of Public
 11 Health 2012). See Impact PH-1 under Alternative 1A. Therefore, as described for Alternative 1A,
 12 construction and operation of the water conveyance facilities under Alternative 2B would not
 13 substantially increase suitable vector habitat and would not substantially increase vector-borne
 14 diseases. No adverse effects would result.

15 **CEQA Conclusion:** As with Alternative 1A, implementation of CM1 under Alternative 2B would
 16 involve construction and operation of solids lagoons, sedimentation basins, and the Byron Tract
 17 Forebay. These areas could provide suitable habitat for vectors (e.g., mosquitoes). During
 18 operations, water depth and circulation would prevent these areas from substantially increasing
 19 suitable vector habitat. However, the shallow edges on the periphery of Byron Tract Forebay could
 20 potentially provide suitable mosquito breeding habitat if emergent vegetation or other aquatic
 21 plants (e.g., pond weed) were allowed to grow. To minimize the potential for impacts related to
 22 increasing suitable vector habitat within the study area, DWR would consult and coordinate with
 23 San Joaquin County and Sacramento-Yolo County MVCDs and prepare and implement MMPs. BMPs
 24 to be implemented as part of the MMPs would help control mosquitoes. See Impact PH-1 under
 25 Alternative 1A. These BMPs would be consistent with practices presented in *Best Management*
 26 *Practices for Mosquito Control in California* (California Department of Public Health 2012).
 27 Therefore, construction and operation of the water conveyance facilities under Alternative 2B would
 28 not result in a substantial increase in vector-borne diseases and the impact would be less than
 29 significant. No mitigation is required.

30 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 31 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 32 **Facilities**

33 **NEPA Effects:** The water quality and public health effects related to DBPs, pesticides and trace
 34 metals described for Alternative 2A also appropriately characterize effects under this alternative.
 35 There would be no substantial changes in trace metals or DBPs under Operational Scenario B. DOC
 36 water quality exceedances described above in Alternative 2A would conflict with the Basin Plan, as it
 37 exceeds the Basin Plan's requirements. However, the long-term change and exceedances in DOC
 38 would not be of a sufficient magnitude that they would require existing drinking water treatment
 39 plants to substantially upgrade treatment for DOC removal above levels currently employed.
 40 Relative to the No Action Alternative, bromide concentrations would increase at Buckley Cove, the
 41 North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton (during the dry period only),
 42 with the greatest increase (26%) occurring at Barker Slough (Chapter 8, *Water Quality*, Section
 43 8.3.3.6). This increase would be more substantial during the drought period (75%).

1 This increase in the long-term average bromide concentration at Barker Slough may require
2 upgrades and/or changes in operations at certain water treatment plants. While treatment
3 technologies sufficient to achieve the necessary bromide removal exist, implementation of such
4 technologies would likely require substantial investment in new or modified infrastructure. Should
5 treatment plant upgrades not be undertaken, a change of such magnitude in long-term average
6 bromide concentrations in drinking water sources would represent an increased risk for adverse
7 effects on public health from DBP in drinking water sources. Mitigation Measure WQ-5 is available
8 to reduce these effects. Implementation of this measure along with a separate other commitment as
9 set forth in Appendix 3B, *Environmental Commitments, AMMs, and CMs* relating to the potential
10 increased treatment costs associated with bromide-related changes would reduce these effects.
11 Further, as described for Impact PH-2 under Alternative 1A, the adverse water quality effects on the
12 North Bay Aqueduct at Barker Slough may be further minimized by implementation of the AIP.

13 Water quality modeling results for pesticides indicate that in the long-term, relative to the No Action
14 Alternative, there would be a potential increase in pesticide toxicity to aquatic life in the summer
15 source water fraction at Buckley Cove. This increase would result from the apparent greater
16 incidence of pesticides in the San Joaquin River and its relative contribution to the total source
17 water volume at this location during July and August. A conclusion regarding the risk to human
18 health at this location, based on the predicted adverse effects from pesticides on aquatic life, cannot
19 be made. However, because the modeled increase would only occur at one location, and over a very
20 short period during the year, it is expected that the potential for affecting public health would be
21 relatively low. Additionally, the prediction of adverse effects of pesticides on water quality relative
22 to the No Action Alternative fundamentally assumes that the present pattern of pesticide incidence
23 in surface water would occur at similar levels into the future. In reality, the makeup and character of
24 the pesticide use market during the late long-term would not be exactly as it is today. Use of
25 chlorpyrifos and diazinon is on the decline with their replacement by pyrethroids on the rise. Yet in
26 this assessment it is the apparent greater incidence of diazinon and chlorpyrifos in the San Joaquin
27 River that serves as the basis for concluding that substantially increased San Joaquin River source
28 water fraction would correspond to an increased risk of pesticide-related toxicity to aquatic life.
29 Water treatment plants are required to meet certain drinking water standards, as previously
30 described. Therefore, it is not anticipated that there would be adverse effects on public health from
31 exceedances of water quality criteria for pesticides in drinking water sources.

32 **CEQA Conclusion:** The operation of water supply facilities under Alternative 2B would adhere to the
33 criteria set forth under Operational Scenario B. Water quality modeling results indicate that, for the
34 most part, there would be no substantial changes in trace metals, DBPs, or pesticides relative to
35 Existing Conditions under this operational scenario. However, relative to Existing Conditions
36 bromide concentrations would increase at the North Bay Aqueduct at Barker Slough, Staten Island,
37 and Emmaton (during the dry period only), with the greatest increase occurring at Barker Slough
38 (22%). The increase in bromide concentration would be more substantial during the drought period
39 (75%). This modeled increase in in the long-term average bromide concentration at Barker Slough
40 could lead to adverse changes in the formation of DBPs at drinking water treatment plants such that
41 considerable water treatment plant upgrades would be necessary to achieve equivalent levels of
42 drinking water health protection. This would be a significant impact.

43 While treatment technologies sufficient to achieve the necessary bromide removal exist,
44 implementation of such technologies would likely require substantial investment in new or modified
45 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
46 long-term average bromide concentrations in drinking water sources would represent an increased

1 risk for adverse effects on public health from DBPs in drinking water sources. Assuming the adverse
 2 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
 3 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
 4 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
 5 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
 6 based on currently available information.

7 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
 8 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
 9 separate other commitment to address the potential increased water treatment costs that could
 10 result from bromide-related concentration effects on municipal water purveyor operations.
 11 Potential options for making use of this financial commitment include funding or providing other
 12 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
 13 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
 14 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
 15 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
 16 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
 17 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
 18 treatment entities will be fully funded or implemented successfully prior to the project's
 19 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
 20 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
 21 or implemented before the project's contribution to the impact is made, a significant impact in the
 22 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
 23 significant and unavoidable. If, however, all financial contributions, technical contributions, or
 24 partnerships required to avoid significant impacts prove to be feasible and any necessary
 25 agreements are completed before the project's contribution to the effect is made, impacts would be
 26 less than significant.

27 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 28 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 29 **Slough**

30 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

31 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 32 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

33 **NEPA Effects:** Similar to Alternative 1A, sediment-disturbing activities during construction and
 34 maintenance of the water conveyance facilities under Alternative 2B could result in the disturbance
 35 of existing bioaccumulative constituents, such as legacy organochlorine pesticides, or
 36 methylmercury in sediment. During water conveyance facilities operation, changes in dilution and
 37 mixing of sources of water could result in a change in constituents known to bioaccumulate. For
 38 example, the reduction of flows in the Sacramento River downstream of the proposed north Delta
 39 intakes may result in a decreased dilution of constituents known to bioaccumulate in the study area.

40 As described for Alternative 1A, construction and operation of the water conveyance facilities under
 41 Alternative 2B would not result in a change in water dilution and mixing of existing constituents and
 42 would not affect the existing conditions of legacy organochlorine pesticides. Intermittent and/or
 43 short-term construction-related activities (as would occur for in-river construction) would not be

1 anticipated to result in contaminant discharges of sufficient magnitude or duration to contribute to
2 long-term bioaccumulation processes, or cause measureable long-term degradation as described
3 under Alternative 1A. Legacy organochlorine pesticides typically bond to particulates and do not
4 mobilize easily. Construction and maintenance of Alternative 2B would not cause legacy
5 organochlorine pesticides to be transported far from the source or to partition into the water
6 column, as described under Alternative 1A. Additionally, water supply operations under any BDCP
7 action alternative would not be expected to change total suspended solids or turbidity levels (high,
8 lows, typical conditions) to any substantial degree. Changes in the magnitude, frequency, and
9 geographic distribution of legacy pesticides in water bodies of the affected environment that would
10 result in new or more severe adverse effects on beneficial uses, relative to the No Action Alternative,
11 would not be expected to occur.

12 Further, as described under Impact PH-3 for Alternative 2A, modeling results indicate small,
13 insignificant changes in total mercury and methylmercury levels in water and in mercury in fish
14 tissues resulting from Alternative 2B water operations (Chapter 8, *Water Quality*, Section 8.3.3.6).
15 Upstream mercury contributions and methylmercury production in Delta waters would not be
16 altered by the operation of Alternative 2B, as it would not change existing mercury sources and
17 would not substantially alter methylmercury concentrations in the Sacramento River or San Joaquin
18 River, as discussed for Alternative 2A.

19 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
20 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
21 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
22 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
23 area of disturbance. Examples of these BMPs are described under Alternative 1A, Impact PH-3.
24 Accordingly, the potential for Alternative 2B to create a public health effect from bioaccumulation of
25 legacy organochlorine pesticides and methylmercury in fish is minimal, and public health effects
26 from construction, operation, or maintenance of the water conveyance facilities are not expected to
27 be adverse.

28 **CEQA Conclusion:** Construction and maintenance of Alternative 2B would not cause legacy
29 organochlorine pesticides to be transported far from the source or to partition into the water
30 column based on the chemical properties of the pesticides. Although methylmercury currently
31 exceeds the TMDL, little to no change in methylmercury concentrations in water are expected under
32 Alternative 2B water conveyance facilities construction. BMPs implemented as part of Erosion and
33 Sediment Control Plans and SWPPPs would help ensure that construction activities would not
34 substantially increase or substantially mobilize legacy organochlorine pesticides or methylmercury
35 during construction and maintenance. Therefore, construction and maintenance of Alternative 2B
36 would not cause increased exposure of the public to these bioaccumulative sediment constituents.

37 Alternative 2B would not result in increased flows in the tributaries that would mobilize legacy
38 organochlorine pesticides in sediments. Modeling showed small changes in mercury and
39 methylmercury levels in water at certain Delta locations and in mercury in fish tissues due to
40 Alternative 2B water operations. However, these changes would not substantially affect the current
41 level of existing methylmercury degradation in the study area or substantially affect the existing fish
42 tissue concentrations. Environmental commitments and BMPs would help ensure that construction
43 activities would not substantially increase or substantially mobilize methylmercury. Because
44 construction, maintenance, or operation of Alternative 2B would not cause substantial mobilization

1 or substantial increase of constituents known to bioaccumulate, impacts on public health would be
2 less than significant. No mitigation is required.

3 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
4 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
5 **Facilities**

6 **NEPA Effects:** Alternative 2B could have different intakes than Alternative 1B (Intakes 1, 2, 3, 4, and
7 5 or 1, 2, 3, 6, and 7), thus a different configuration of transmission lines may be required; however,
8 the total number of intakes would remain the same (five) between the two alternatives.

9 Approximately 621 miles of existing transmission lines are located within the study area. As
10 described in Table 25-9, a total of 13.49 miles of new temporary 69 kV transmission lines; 40.5 miles
11 of new permanent 69 kV transmission lines; and 16.35 miles of new permanent 230 kV transmission
12 lines would be required for this alternative.

13 While new transmission lines generating new sources of EMFs would be constructed under this
14 alternative, the new temporary and permanent transmission lines would be located in rights-of-way
15 of existing transmission lines or in sparsely populated areas (Figure 25-2). Table 25-9 identifies only
16 one potential new sensitive receptor (Stone Lakes National Wildlife Refuge) that is not currently
17 within 300 feet of an existing transmission line; the majority of sensitive receptors are already
18 located within 300 feet of an existing 69 kV or 230 kV transmission line. Stone Lakes National
19 Wildlife Refuge would be within 300 feet of a proposed permanent 69 kV transmission line. Visitors
20 to this area generally come for walks, water recreation, and hunting, and as such, it is unlikely that
21 large groups of people would be staying in the area within 300 feet of this proposed transmission
22 line, so any EMF exposure would be limited. However, also as described for Alternative 1A, the
23 majority of sensitive receptors are already located within 300 feet of an existing transmission line;
24 therefore, the majority of new temporary or new permanent transmission lines would not expose
25 new sensitive receptors or substantially more people to EMFs that they are not already
26 experiencing. Because the proposed transmission line would be located in a sparsely populated area
27 and would be within 300 feet of only one potential new sensitive receptor, there would not be a
28 substantial increase in people's exposure to EMFs.

29 As discussed in Section 25.1.1.5, the current scientific evidence does not show conclusively that EMF
30 exposure can increase health risks. In 2006, CPUC updated its EMF Policy and reaffirmed that health
31 hazards from exposures to EMF have not been established. State and federal public health
32 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
33 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should be
34 continued. Based on this, utility companies are required to establish and maintain EMF Design
35 Guidelines in order to minimize health risks associated with power lines and these guidelines would
36 be implemented for any new temporary or new permanent transmission lines constructed and
37 operated under Alternative 2B, depending on which electric provider is selected by DWR.
38 Furthermore, as described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, location
39 and design of the proposed new transmission lines would be conducted in accordance with CPUC's
40 EMF Design Guidelines for Electrical Facilities. Therefore, operation of the transmission line
41 corridors would not expose substantially more people to transmission lines generating EMFs.
42 Therefore, operation of the transmission line corridors would not expose substantially more people
43 to transmission lines generating EMFs, and there would be no adverse effect on public health.

1 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
 2 transmission lines would be located within the rights-of-way of existing transmission lines, or in
 3 sparsely populated areas generally away from existing sensitive receptors. However, one sensitive
 4 receptor, Stone Lakes National Wildlife Refuge, would be within 300 feet of a proposed permanent
 5 69 kV transmission line. Because visitors to this area generally come for walks, water recreation,
 6 and hunting, it is unlikely that large groups of people would be staying in the area within 300 feet of
 7 this proposed transmission line, so any EMF exposure would be limited. Design and implementation
 8 of new temporary or permanent transmission lines not within the right-of-way of existing
 9 transmission lines would follow CPUC's EMF Design Guidelines for Electrical Facilities and would
 10 implement shielding, cancellation, or distance measures to reduce EMF exposure. Since construction
 11 and operation of Alternative 2B would not expose substantially more people to transmission lines
 12 that provide new sources of EMFs, impacts on public health would be less than significant, and no
 13 mitigation is required.

14 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
 15 **and CM11**

16 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 17 under Alternative 2B would be the same as that described for Alternative 1A. Although there would
 18 be an increase in restored and enhanced aquatic habitat in the study area as a result of
 19 implementing CM2-CM7, CM10 and CM11 under Alternative 2B, implementation of environmental
 20 commitments, such as coordination with MVCDs and implementation of BMPs under MMPs (as
 21 described under Impact PH-1 for Alternative 1A and in Appendix 3B, *Environmental Commitments,*
 22 *AMMs, and CMs*) would reduce the potential for an increase in mosquito breeding habitat, and a
 23 substantial increase in vector-borne diseases is unlikely to result. Furthermore, habitat would be
 24 restored in areas where potentially suitable habitat for mosquitoes already exists. Finally, mosquito
 25 predators (e.g., bats, spiders) would likely increase as a result of restoration and enhancement,
 26 which would keep mosquito populations in check. Therefore, effects would be the same under
 27 Alternative 2B as under Alternative 1A and there would not be a substantial increase in the public's
 28 risk of exposure to vector-borne diseases with implementation of CM2-CM7, CM10 and CM11.
 29 Accordingly, there would be no adverse effect.

30 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 31 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described in Alternative
 32 1A, Alternative 2B would require environmental commitments such as coordination with MVCDs
 33 and implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and
 34 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help control mosquitoes
 35 and reduce the potential for an increase in mosquito breeding habitat. Furthermore, habitat would
 36 be restored where potentially suitable vector habitat already exists and habitat restoration and
 37 enhancement would likely increase the number of mosquito predators. Therefore, as described for
 38 Alternative 1A, implementation of CM2-CM7, CM10 and CM11 under Alternative 2B would not
 39 substantially increase the public's risk of exposure to vector-borne diseases beyond what currently
 40 exists. Accordingly, this impact would be less than significant and no mitigation is required.

41 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 42 **Implementing the Restoration Conservation Measures**

43 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 44 under Alternative 2B would be the same as that described for Alternative 1A. Implementation of the

1 restoration conservation measures would support habitat types, such as wetlands and agricultural
 2 areas, that produce pathogens as a result of the biological productivity in these areas (e.g., migrating
 3 birds, application of fertilizers, waste products of animals). As exemplified by the Pathogen
 4 Conceptual Model, any potential increase in pathogens associated with the habitat restoration would
 5 be localized and within the vicinity of the actual restoration. This would be similar for lands
 6 protected for agricultural uses. Depending on the level of recreational access granted by
 7 management plans, habitat restoration could increase or decrease opportunities for recreationists
 8 within the Delta region. However, effects associated with pathogens would be the
 9 same under Alternative 2B as under Alternative 1A. Recreationists would not experience a
 10 substantial increase in exposure to pathogens as a result of the restoration and no adverse effect
 11 would result.

12 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 2B
 13 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 14 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 15 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 16 off of some types of pathogens once released into water bodies would generally prevent substantial
 17 pathogen exposure to recreationists. Therefore, impacts would be less than significant, and no
 18 mitigation is required.

19 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 20 **as a Result of Implementing CM2, CM4, CM5, and CM10**

21 **NEPA Effects:** The amount of habitat restoration under Alternative 2B would be the same as
 22 Alternative 1A. The primary concern with habitat restoration regarding constituents known to
 23 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 24 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the pesticide-
 25 bearing sediments would not be transported very far from the source area and would settle out with
 26 suspended particulates and be deposited close to the ROA. Further, CM2–CM21 do not include the
 27 use of pesticides known to be bioaccumulative in animals or humans.

28 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 29 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 30 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 31 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 32 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 33 bioaccumulation for methylmercury in the aquatic systems (e.g., fish and water quality) of the study
 34 area in the near-term, measures implemented under *CM12 Methylmercury Management* as well as
 35 existing OEHHA standards would serve to reduce the public's exposure to contaminated fish.
 36 Therefore, implementation of CM2, CM4, CM5, and CM10 under Alternative 2B is not expected to
 37 result in an adverse effect on public health with respect to pesticides or methylmercury.

38 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 39 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 40 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 41 sediments would be transported very far from the source area and they would likely settle out with
 42 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 43 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 44 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented

1 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
2 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10
3 under Alternative 2B would not substantially mobilize or substantially increase the public's
4 exposure to constituents known to bioaccumulate and this impact would be less than significant. No
5 mitigation is required.

6 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 7 **Conveyance Facilities**

8 **NEPA Effects:** Water operations under Alternative 2B would be the same as under Alternative 2A.
9 Therefore, potential effects on public health due to changes in water quality and beneficial uses as a
10 result of *Microcystis* blooms and microcystin levels would be the same.

11 Any modified reservoir operations under Alternative 2B are not expected to promote *Microcystis*
12 production in waters upstream of the Delta. As described in Chapter 8, *Water Quality*, *Microcystis*
13 blooms in the Export Service Areas could increase due to increased water temperatures resulting
14 from climate change, but not due to water conveyance facility operations. Similarly, hydraulic
15 residence times in the Export Service Area would not be affected by operations of CM1. Accordingly,
16 conditions would not be more conducive to *Microcystis* bloom formation. Water diverted from the
17 Sacramento River in the north Delta is expected to be unaffected by *Microcystis*. However, the
18 fraction of water flowing through the Delta that reaches the existing south Delta intakes is expected
19 to be influenced by an increase in *Microcystis* blooms, as discussed below. Therefore, relative to the
20 No Action Alternative, the addition of Sacramento River water from the north Delta under
21 Alternative 2B would dilute *Microcystis* and microcystins in water diverted from the south Delta.
22 Because the degree to which *Microcystis* blooms, and thus microcystins concentrations, would
23 increase in source water from the south Delta is unknown, it cannot be determined whether
24 Alternative 2B would result in increased or decreased levels of microcystins in the mixture of source
25 waters exported from Banks and Jones pumping plants.

26 Ambient meteorological conditions would be the primary driver of Delta water temperatures, and
27 climate warming, not water operations, would determine future water temperatures in the Delta.
28 Increasing water temperatures could lead to earlier attainment of the water temperature threshold
29 required to initiate *Microcystis* bloom formation, and therefore earlier occurrences of *Microcystis*
30 blooms in the Delta, as well as increases in the duration and magnitude. However, these
31 temperature-related changes would not be different from what would occur under the No Action
32 Alternative. Siting and design of restoration areas would have a substantial influence on the
33 magnitude of hydraulic residence time increases under Alternative 2B. The modeled increase in
34 residence time in the Delta could result in an increase in the frequency, magnitude, and geographic
35 extent of *Microcystis* blooms, and thus microcystin levels. Therefore, impacts on beneficial uses,
36 including drinking water and recreational waters, could occur and public health could be affected.
37 Accordingly, this would be considered an adverse effect.

38 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
39 quality, and therefore potential public health effects, in the Delta due to *Microcystis*. However,
40 because the effectiveness of these mitigation measures to result in feasible measures for reducing
41 water quality effects, and therefore potential public health effects, is uncertain, the effect would still
42 be considered adverse.

1 **CEQA Conclusion:** Under Alternative 2B, operation of the water conveyance facilities is not expected
 2 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
 3 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
 4 resulting from climate change, but not due to water conveyance facility operations. Residence times
 5 in the Export Service Area would not be affected by operations of CM1, and therefore conditions in
 6 those areas would not be more conducive to *Microcystis* bloom formation. Water exported from the
 7 Delta to the Export Service Area is expected to be a mixture of *Microcystis*-affected source water
 8 from the south Delta intakes and unaffected source water from the Sacramento River. Because of
 9 this, it cannot be determined whether operations and maintenance under Alternative 2B would
 10 result in increased or decreased levels of *Microcystis* and microcystins in the mixture of source
 11 waters exported from Banks and Jones pumping plants.

12 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
 13 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
 14 water temperature increases in the Delta would be due to climate change primarily and not due to
 15 operation of the water conveyance facilities. Increases in Delta residence times would be due in
 16 small part to climate change and sea level rise, but due to a greater degree to operation of the water
 17 conveyance facilities and hydrodynamic impacts of restoration included in CM2 and CM4.
 18 Consequently, it is possible that increases in the frequency, magnitude, and geographic extent of
 19 *Microcystis* blooms in the Delta would occur due to the operations and maintenance of the water
 20 conveyance facilities and the hydrodynamic impacts of restoration under CM2 and CM4.
 21 Accordingly, beneficial uses including drinking water and recreational waters would be impacted
 22 and, as a result, there could be potential impacts on public health. Therefore, this impact would be
 23 significant.

24 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 25 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 26 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 27 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 28 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 29 to determine whether increases in abundance are significant. This mitigation measure also requires
 30 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 31 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
 32 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 33 measures for reducing water quality effects, and therefore potential public health effects, is
 34 uncertain, this impact would be significant and unavoidable.

35 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 36 ***Microcystis* Blooms**

37 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 38 in Chapter 8, *Water Quality*.

39 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 40 **Water Residence Time**

41 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 42 in Chapter 8, *Water Quality*.

1 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 2 **CM4**

3 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 4 under Alternative 2B would be the same as that described under Alternative 1A. Restoration
 5 activities implemented under CM2 and CM4 that would create shallow backwater areas could result
 6 in local increases in water temperature that may encourage *Microcystis* growth during the summer
 7 bloom season. This would result in further degradation of water quality beyond the hydrodynamic
 8 effects of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis*
 9 blooms with implementation of CM2 and CM4 could potentially result in adverse effects on public
 10 health through exposure via drinking water quality and recreational waters. Mitigation Measures
 11 WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 12 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 13 feasible measures for reducing water quality effects, and therefore potential public health effects, is
 14 uncertain. This would be an adverse effect.

15 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 2B are the same as
 16 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
 17 create shallow backwater areas could result in local increases in water temperature conducive to
 18 *Microcystis* growth during summer bloom season. This could compound the water quality
 19 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 20 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 21 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 22 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 23 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 24 increased local water temperatures and water residence time. The effectiveness of these mitigation
 25 measures to result in feasible measures for reducing water quality effects, and therefore potential
 26 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

27 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 28 ***Microcystis* Blooms**

29 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 30 in Chapter 8, *Water Quality*.

31 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 32 **Water Residence Time**

33 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 34 in Chapter 8, *Water Quality*.

35 **25.3.3.7 Alternative 2C—Dual Conveyance with West Alignment and**
 36 **Intakes W1–W5 (15,000 cfs; Operational Scenario B)**

37 Alternative 2C would involve construction activities similar to those described under Alternative 1A;
 38 therefore, construction impacts in terms of public health would be the same and are summarized
 39 below for vector-borne diseases and water quality concerns. Alternative 2C has the same diversion
 40 and conveyance operations as Alternative 2A. Alternative 2C would also have the same transmission
 41 line needs as Alternative 2A. The primary differences between the two alternatives are that under
 42 Alternative 2C, the intakes would be on the west bank of the Sacramento River between Clarksburg

1 and Walnut Grove, and may utilize intake locations 1, 2, 3, 4, and 5, or 1, 2, 3, 6, and 7; the primary
 2 water conveyance between intakes and the intermediate pumping plant would be a lined or unlined
 3 canal along the western side of the Delta, instead of a pipeline/tunnel; there would be no
 4 intermediate forebay; and water would be pumped from the intermediate pumping plant through a
 5 dual-bore tunnel to a continuing canal to the proposed Byron Tract Forebay immediately northwest
 6 of Clifton Court Forebay. Alternative 2C also includes the construction of an operable barrier at the
 7 Head of Old River, to facilitate fish passage during summer and fall and be closed with stoplogs in
 8 spring. However, because there would be no difference in conveyance capacity or operations, there
 9 would be no differences between these two alternatives in Delta inflow, source fractions to various
 10 Delta locations, and hydrodynamics in the Delta. CM2-CM21 under Alternative 2C would be the
 11 same as described under Alternative 1A. Therefore, Alternative 2C would have effects on public
 12 health similar to those under Alternative 1A.

13 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 14 **the Water Conveyance Facilities**

15 **NEPA Effects:** As with Alternative 1A, implementation of CM1 under Alternative 2C would involve
 16 construction and operation of five north Delta intakes; up to 15 solids lagoons; five sedimentation
 17 basins; and Byron Tract Forebay. These facilities have the potential to provide habitat for vectors
 18 that transmit diseases (e.g., mosquitoes) because of the large volumes of water that would be held
 19 within these areas. The depth, design, and operation of the sedimentation basins and solids lagoons
 20 would prevent the development of suitable mosquito habitat (Figure 25-1). Specifically, the basins
 21 would be too deep and the constant movement of water would prevent mosquitoes from breeding
 22 and multiplying. Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and
 23 solids lagoons would be 165 feet long by 86 feet wide by 10 feet deep.

24 Although the proposed Byron Tract Forebay would increase surface water within the study area, it
 25 is unlikely that the forebay would provide suitable breeding habitat for mosquitoes given that the
 26 water in this forebay would not be stagnant and would be too deep. However, the shallow edges of
 27 the forebay could potentially provide suitable mosquito breeding habitat if emergent vegetation or
 28 other aquatic plants (e.g., pond weed) were allowed to grow. However, as part of the regular
 29 maintenance of the forebay, floating vegetation such as pond weed would be harvested to maintain
 30 flow and forebay capacity.

31 To minimize the potential for impacts related to increasing suitable mosquito habitat in the Plan
 32 Area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 33 MVCDDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 34 control mosquitoes. These BMPs would be consistent practices presented in *Best Management*
 35 *Practices for Mosquito Control in California* (California Department of Public Health 2012). See
 36 Impact PH-1 under Alternative 1A. Therefore, as described for Alternative 1A, construction and
 37 operation of the intakes, solids lagoons, and/or sedimentation basins under Alternative 2C would
 38 not substantially increase suitable vector habitat and would not substantially increase vector-borne
 39 diseases. Accordingly, there would be no adverse effects on public health.

40 **CEQA Conclusion:** As with Alternative 1A, implementation of CM1 under Alternative 2C would
 41 involve construction and operation of solids lagoons, sedimentation basins, and Byron Tract
 42 Forebay. These areas could provide suitable habitat for vectors (e.g., mosquitoes). During
 43 operations, water depth and circulation would prevent these areas from substantially increasing
 44 suitable vector habitat. However, the shallow edges on the periphery of Byron Tract Forebay could

1 potentially provide suitable mosquito breeding habitat if emergent vegetation or other aquatic
 2 plants (e.g., pond weed) were allowed to grow. To minimize the potential for impacts related to
 3 increasing suitable vector habitat within the study area, DWR would consult and coordinate with
 4 San Joaquin County and Sacramento-Yolo County MVCDs and prepare and implement MMPs. BMPs
 5 to be implemented as part of the MMPs would help control mosquitoes. See Impact PH-1 under
 6 Alternative 1A. These BMPs would be consistent practices presented in *Best Management Practices*
 7 *for Mosquito Control in California* (California Department of Public Health 2012). Therefore,
 8 construction and operation of the water conveyance facilities under Alternative 2C would not result
 9 in a substantial increase in vector-borne diseases and the impact on public health would be less than
 10 significant. No mitigation is required.

11 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 12 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 13 **Facilities**

14 **NEPA Effects:** The description of water quality and public health effects related to DBPs, pesticides
 15 and trace metals for Alternative 2A also appropriately characterizes effects under this alternative.
 16 For the most part, there would be no substantial changes in trace metals or DBPs under Operational
 17 Scenario B. As described under Alternative 2A, increases in long-term average DOC concentrations
 18 estimated to occur at various Delta locations are of sufficiently small magnitude that they would not
 19 require existing drinking water treatment plants to substantially upgrade treatment for DOC
 20 removal above levels currently employed (Chapter 8, *Water Quality*, Section 8.3.3.7).

21 Relative to the No Action Alternative, long-term average bromide concentrations would increase at
 22 Buckley Cove, the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton (during the dry
 23 period only), with the greatest increase (26%) occurring at Barker Slough (Chapter 8, *Water Quality*,
 24 Section 8.3.3.7). This increase would be more substantial during the drought period (75%). This
 25 increase in bromide may require upgrades and/or changes in operations at certain water treatment
 26 plant. While treatment technologies sufficient to achieve the necessary bromide removal exist,
 27 implementation of such technologies would likely require substantial investment in new or modified
 28 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
 29 long-term average bromide concentrations in drinking water sources would represent an increased
 30 risk for adverse effects on public health from DBP in drinking water sources. Mitigation Measure
 31 WQ-5 is available to reduce these effects. Implementation of this measure along with a separate
 32 other commitment as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and*
 33 *CMs*, relating to the potential increased treatment costs associated with bromide-related changes
 34 would reduce these effects. Further, as described for Impact PH-2 under Alternative 1A, the adverse
 35 water quality effects on the North Bay Aqueduct at Barker Slough may be further minimized by
 36 implementation of the AIP.

37 Water quality modeling results for pesticides indicate that in the long-term, relative to the No Action
 38 Alternative, there would be a potential increase in pesticide toxicity to aquatic life in the summer
 39 source water fraction at Buckley Cove. This increase would result from the apparent greater
 40 incidence of pesticides in the San Joaquin River and its relative contribution to the total source
 41 water volume at this location during July and August. A conclusion regarding the risk to human
 42 health at this location, based on the predicted adverse effects from pesticides on aquatic life, cannot
 43 be made. However, because the modeled increase would only occur in one location, and over a very
 44 short period during the year, it is expected that the potential for affecting public health would be
 45 relatively low. Additionally, the prediction of adverse effects of pesticides relative to the No Action

1 Alternative fundamentally assumes that the present pattern of pesticide incidence in surface water
2 would occur at similar levels into the future. In reality, the makeup and character of the pesticide
3 use market during the late long-term would not be exactly as it is today. Use of chlorpyrifos and
4 diazinon is on the decline with their replacement by pyrethroids on the rise. Yet in this assessment it
5 is the apparent greater incidence of diazinon and chlorpyrifos in the San Joaquin River that serves as
6 the basis for concluding that substantially increased San Joaquin River source water fraction would
7 correspond to an increased risk of pesticide-related toxicity to aquatic life. Water treatment plants
8 are required to meet certain drinking water standard, as described in Section 25.2.4. Therefore, it is
9 not anticipated that levels of pesticides in drinking water sources would have adverse effects on
10 public health.

11 **CEQA Conclusion:** The operation of water supply facilities under Alternative 2C would adhere to the
12 criteria set forth under Operational Scenario B. Water quality modeling results indicate that, for the
13 most part, there would be no substantial changes in trace metals, DBPs, or pesticides relative to
14 Existing Conditions under this operational scenario. An exception to this is that concentrations of
15 bromide would increase at the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton
16 on the Sacramento River (during drought conditions) under Alternative 2C, with the greatest
17 increase at Barker Slough (22%). This increase would be more substantial during the drought
18 period (75%). The increase in long-term average bromide concentrations predicted for Barker
19 Slough would result in a substantial change in source water quality to existing drinking water
20 treatment plants drawing water from the North Bay Aqueduct. These modeled increases in bromide
21 at Barker Slough could lead to adverse changes in the formation of DBPs at drinking water
22 treatment plants such that considerable water treatment plant upgrades would be necessary r to
23 achieve equivalent levels of drinking water health protection. This would be a significant impact.

24 While treatment technologies sufficient to achieve the necessary bromide removal exist,
25 implementation of such technologies would likely require substantial investment in new or modified
26 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
27 long-term average bromide concentrations in drinking water sources would represent an increased
28 risk for adverse effects on public health from DBPs in drinking water sources. Assuming the adverse
29 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
30 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
31 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
32 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
33 based on currently available information.

34 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
35 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
36 separate other commitment to address the potential increased water treatment costs that could
37 result from bromide-related concentration effects on municipal water purveyor operations.
38 Potential options for making use of this financial commitment include funding or providing other
39 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
40 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
41 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
42 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
43 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
44 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
45 treatment entities will be fully funded or implemented successfully prior to the project's
46 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is

1 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
 2 or implemented before the project's contribution to the impact is made, a significant impact in the
 3 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
 4 significant and unavoidable. If, however, all financial contributions, technical contributions, or
 5 partnerships required to avoid significant impacts prove to be feasible and any necessary
 6 agreements are completed before the project's contribution to the effect is made, impacts would be
 7 less than significant.

8 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 9 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 10 **Slough**

11 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

12 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 13 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

14 *NEPA Effects:* Similar to effects described for Alternative 1A, sediment-disturbing activities during
 15 construction and maintenance of the water conveyance facilities under Alternative 2C could result in
 16 the disturbance of existing constituents, such as legacy pesticides, or methylmercury in sediment.
 17 During water conveyance facilities operation, changes in dilution and mixing of sources of water
 18 could result in a change in constituents known to bioaccumulate. For example, the reduction of flows
 19 in the Sacramento River downstream of the proposed north Delta intakes may result in a decreased
 20 dilution of constituents known to bioaccumulate in the study area.

21 As described for Alternative 1A, construction and operation of water conveyance facilities under
 22 Alternative 2C would not result in a change in water dilution and mixing of existing constituents and
 23 would not affect the existing conditions of legacy organochlorine pesticides in the study area.
 24 Intermittent and/ short-term construction-related activities (as would occur for in-river
 25 construction) would not be anticipated to result in contaminant discharges of sufficient magnitude
 26 or duration to contribute to long-term bioaccumulation processes, or cause measureable long-term
 27 degradation, as described under Alternative 1A. Legacy organochlorine pesticides typically bond to
 28 particulates, and do not mobilize easily. Construction and maintenance of Alternative 2C would not
 29 cause legacy organochlorine pesticides to be transported far from the source or to partition into the
 30 water column, as described for Alternative 1A. Water supply operations under any BDCP action
 31 alternative would not be expected to change total suspended solids or turbidity levels (highs, lows,
 32 typical conditions) to any substantial degree. Changes in the magnitude, frequency, and geographic
 33 distribution of legacy pesticides in water bodies of the affected environment that would result in
 34 new or more severe adverse effects on beneficial uses, relative to the No Action Alternative, would
 35 not be expected to occur.

36 Further, as described under Impact PH-3 for Alternative 2A, modeling results indicate small,
 37 insignificant changes in total mercury and methylmercury levels in water and in mercury in fish
 38 tissues resulting from Alternative 2C water operations (Chapter 8, *Water Quality*, Section 8.3.3.7).
 39 Upstream mercury contributions and methylmercury production in Delta waters would not be
 40 altered by the operation of Alternative 2C, as it would not change existing mercury sources and
 41 would not substantially alter methylmercury concentrations in the Sacramento River or San Joaquin
 42 River.

1 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
2 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
3 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
4 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
5 area of disturbance. Examples of these BMPs are described under Alternative 1A, Impact PH-3.
6 Accordingly, the potential for Alternative 2C to create a public health effect from bioaccumulation of
7 legacy organochlorine pesticides and methylmercury in fish is minimal, and public health effects are
8 not expected to be adverse.

9 **CEQA Conclusion:** As described for Alternative 1A, construction and maintenance of Alternative 2C
10 would not cause legacy organochlorine pesticides to be transported far from the source or to
11 partition into the water column based on the chemical properties of the pesticides. Although
12 methylmercury currently exceeds the TMDL, little to no change in methylmercury concentrations in
13 water are expected under Alternative 2C water conveyance construction. BMPs implemented as part
14 of Erosion and Sediment Control Plans and SWPPPs would help ensure that construction activities
15 would not substantially increase or substantially mobilize legacy organochlorine pesticides or
16 methylmercury during construction and maintenance. Therefore, construction and maintenance of
17 Alternative 2C would not cause increased exposure of the public to these bioaccumulative sediment
18 constituents.

19 Alternative 2C would not result in increased tributary flows that would mobilize legacy
20 organochlorine pesticides in sediments. Water quality modeling results show small changes in
21 mercury and methylmercury levels in water at certain Delta locations and in mercury in fish tissues
22 due to Alternative 2C water operations. However, these changes would not substantially affect the
23 current level of existing methylmercury degradation in the study area or substantially affect the
24 existing fish tissue concentrations. Because construction, maintenance, or operation of Alternative
25 2C would not cause substantial mobilization or substantial increase of constituents known to
26 bioaccumulate, impacts on public health would be less than significant. No mitigation is required.

27 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 28 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 29 **Facilities**

30 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
31 area. As described in Table 25-9, a total of 13.73 miles of new temporary 69 kV transmission lines;
32 17.61 miles of new permanent 69 kV transmission lines; and 18.45 miles of new permanent 230 kV
33 transmission lines would be required for this alternative.

34 While new transmission lines generating new sources of EMFs would be constructed under this
35 alternative, the new temporary and permanent transmission lines would be located in existing
36 rights-of-way or in sparsely populated areas (Figure 25-2). Under Alternative 2C, only one potential
37 new sensitive receptor, Fire Station 63, in Walnut Grove, would be located within 300 feet of a
38 proposed 69 kV temporary transmission line (Table 25-9). However, also as described for
39 Alternative 1A, the majority of sensitive receptors are already located within 300 feet of an existing
40 transmission line; therefore, the majority of new temporary or new permanent transmission lines
41 would not expose new sensitive receptors or substantially more people to EMFs that they are not
42 already experiencing. Because the lines would be located in sparsely populated areas and would be
43 within 300 feet of only one potential new sensitive receptor, the proposed temporary and
44 permanent transmission lines would not substantially increase people's exposure to EMFs.

1 As discussed in Section 25.1.1.5, the current scientific evidence does not show conclusively that EMF
 2 exposure can increase health risks. In 2006, CPUC updated its EMF Policy and reaffirmed that health
 3 hazards from exposures to EMF have not been established. State and federal public health
 4 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
 5 also reaffirmed that the existing no-cost and low-cost precautionary- based EMF policy should be
 6 continued. Based on this, utility companies are required to establish and maintain EMF Design
 7 Guidelines in order to minimize health risks associated with power lines. These guidelines would be
 8 implemented for any new temporary or new permanent transmission lines constructed and
 9 operated under Alternative 2C, depending on which electrical provider is selected by DWR.
 10 Furthermore, location and design of the new transmission lines would be conducted in accordance
 11 with CPUC's EMF Design Guidelines for Electrical Facilities. Therefore, operation of the transmission
 12 line corridors would not expose substantially more people to transmission lines generating EMFs.

13 **CEQA Conclusion:** The majority of proposed temporary and permanent transmission lines would be
 14 located within the rights-of-way of existing transmission lines. In general, any new temporary or
 15 permanent transmission lines not within the right-of-way of existing transmission lines would be
 16 located in sparsely populated areas generally away from existing sensitive receptors. However,
 17 under this alternative a temporary 69 kV transmission line would be located within 300 feet of Fire
 18 Station 63, in Walnut Grove. Design and implementation of new temporary or permanent
 19 transmission lines not within the right-of-way of existing transmission lines would follow CPUC's
 20 EMF Design Guidelines for Electrical Facilities and would implement shielding, cancellation, or
 21 distance measures to reduce EMF exposure. Further, this temporary transmission line would be
 22 removed once construction of the water conveyance facilities under this alternative is completed.
 23 Because construction and operation of Alternative 2C would not expose substantially more people
 24 to transmission lines that generate new sources of EMFs, impacts would be less than significant, and
 25 no mitigation is required.

26 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
 27 **and CM11**

28 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 29 under Alternative 2C would be the same as that described for Alternative 1A. Although there would
 30 be an increase in restored and enhanced aquatic habitat in the study area as a result of
 31 implementing Alternative 2C, implementation of environmental commitments such as coordination
 32 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
 33 Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) would reduce the
 34 potential for an increase in mosquito breeding habitat, and a substantial increase in vector-borne
 35 diseases is unlikely to result. Furthermore, habitat would be restored in areas where potentially
 36 suitable habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would
 37 likely increase as a result of restoration and enhancement, which would keep mosquito populations
 38 in check. Therefore, effects would be the same under Alternative 2C as under Alternative 1A and
 39 there would not be a substantial increase in the public's risk of exposure to vector-borne diseases
 40 with implementation of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

41 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 42 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described in Alternative
 43 1A, Alternative 2C would require environmental commitments, such as coordination with MVCDs
 44 and implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and
 45 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help control mosquitoes

1 and reduce the potential for an increase in mosquito breeding habitat. Furthermore, habitat would
 2 be restored where potentially suitable vector habitat already exists, and habitat restoration and
 3 enhancement would likely increase the number of mosquito predators. Therefore, as described for
 4 Alternative 1A, implementation of CM2-CM7, CM10 and CM11 under Alternative 2C would not
 5 substantially increase the public's risk of exposure to vector-borne diseases beyond what currently
 6 exists. Accordingly, this impact would be less than significant and no mitigation is required.

7 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 8 **Implementing the Restoration Conservation Measures**

9 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 10 under Alternative 2C would be the same as that described for Alternative 1A. Implementation of the
 11 restoration conservation measures would support habitat types, such as wetlands and agricultural
 12 areas, that produce pathogens as a result of the biological productivity in these areas (e.g., migrating
 13 birds, application of fertilizers, waste products of animals). As exemplified by the Pathogen
 14 Conceptual Model, any potential increase in pathogens associated with the habitat restoration would
 15 be localized and within the vicinity of the actual restoration. This would be similar for lands
 16 protected for agricultural uses. Depending on the level of recreational access granted by
 17 management plans, habitat restoration could increase or decrease opportunities for recreationists
 18 within the Delta region. However, effects associated with pathogens would be the same under
 19 Alternative 2C as under Alternative 1A. Recreationists would not experience a substantial increase
 20 in exposure to pathogens as a result of the restoration and no adverse effect would result.

21 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 2C
 22 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 23 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 24 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 25 off of some types of pathogens once released into water bodies would generally prevent substantial
 26 pathogen exposure to recreationists. Accordingly, impacts would be less than significant and no
 27 mitigation is required.

28 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 29 **as a Result of Implementing CM2, CM4, CM5, and CM10**

30 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 2C as
 31 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
 32 known to bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of
 33 the newly inundated floodplains and marshes, as described under Alternative 1A. It is likely that the
 34 pesticide-bearing sediments would not be transported very far from the source area and would
 35 settle out with suspended particulates and be deposited close to the ROA. Further, CM2-CM21 do
 36 not include the use of pesticides known to be bioaccumulative in animals or humans.

37 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 38 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 39 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 40 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 41 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 42 bioaccumulation for methylmercury in the study area's aquatic systems (i.e., fish and water) during
 43 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
 44 reduce the public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,

1 and CM10 under Alternative 2C is not expected to result in an adverse effect on public health with
2 respect to pesticides or methylmercury.

3 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
4 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
5 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
6 sediments would be transported very far from the source area and they would likely settle out with
7 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
8 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
9 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
10 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
11 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10
12 under Alternative 2C would not substantially mobilize or substantially increase the public's
13 exposure to constituents known to bioaccumulate and this impact would be less than significant. No
14 mitigation is required.

15 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 16 **Conveyance Facilities**

17 **NEPA Effects:** Water operations under Alternative 2C would be the same as under Alternative 2A.
18 Therefore, potential effects on public health due to changes in water quality and beneficial uses as a
19 result of *Microcystis* blooms and microcystin levels would be the same.

20 Any modified reservoir operations under Alternative 2C are not expected to promote *Microcystis*
21 production in waters upstream of the Delta. As described in Chapter 8, *Water Quality*, *Microcystis*
22 blooms in the Export Service Areas could increase due to increased water temperatures resulting
23 from climate change, but not due to water conveyance facility operations. Similarly, hydraulic
24 residence times in the Export Service Area would not be affected by operations of CM1. Accordingly,
25 conditions would not be more conducive to *Microcystis* bloom formation. Water diverted from the
26 Sacramento River in the north Delta is expected to be unaffected by *Microcystis*. However, the
27 fraction of water flowing through the Delta that reaches the existing south Delta intakes is expected
28 to be influenced by an increase in *Microcystis* blooms, as discussed below. Therefore, relative to the
29 No Action Alternative, the addition of Sacramento River water from the north Delta under
30 Alternative 2C would dilute *Microcystis* and microcystins in water diverted from the south Delta.
31 Because the degree to which *Microcystis* blooms, and thus microcystins concentrations, would
32 increase in source water from the south Delta is unknown, it cannot be determined whether
33 Alternative 2C would result in increased or decreased levels of microcystins in the mixture of source
34 waters exported from Banks and Jones pumping plants.

35 Ambient meteorological conditions would be the primary driver of Delta water temperatures, and
36 climate warming, not water operations, would determine future water temperatures in the Delta.
37 Increasing water temperatures could lead to earlier attainment of the water temperature threshold
38 required to initiate *Microcystis* bloom formation, and therefore earlier occurrences of *Microcystis*
39 blooms in the Delta, as well as increases in the duration and magnitude. However, these
40 temperature-related changes would not be different from what would occur under the No Action
41 Alternative. Siting and design of restoration areas would have a substantial influence on the
42 magnitude of hydraulic residence time increases under Alternative 2C. The modeled increase in
43 residence time in the Delta could result in an increase in the frequency, magnitude, and geographic
44 extent of *Microcystis* blooms, and thus microcystin levels. Therefore, impacts on beneficial uses,

1 including drinking water and recreational waters, could occur and public health could be affected.
2 Accordingly, this would be considered an adverse effect.

3 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
4 quality, and therefore potential public health effects, in the Delta due to *Microcystis*. However,
5 because the effectiveness of these mitigation measures to result in feasible measures for reducing
6 water quality effects, and therefore potential public health effects, is uncertain, the effect would still
7 be considered adverse.

8 **CEQA Conclusion:** Under Alternative 2C, operation of the water conveyance facilities is not expected
9 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
10 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
11 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
12 residence times in the Export Service Area would not be affected by operations of CM1, and
13 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.
14 Water exported from the Delta to the Export Service Area is expected to be a mixture of *Microcystis*-
15 affected source water from the south Delta intakes and unaffected source water from the
16 Sacramento River. Because of this, it cannot be determined whether operations and maintenance
17 under Alternative 2C would result in increased or decreased levels of *Microcystis* and microcystins
18 in the mixture of source waters exported from Banks and Jones pumping plants.

19 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
20 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
21 water temperature increases in the Delta would be due to climate change primarily and not due to
22 operation of the water conveyance facilities. Increases in Delta residence times would be due in
23 small part to climate change and sea level rise, but due to a greater degree to operation of the water
24 conveyance facilities and hydrodynamic impacts of restoration included in CM2 and CM4.
25 Consequently, it is possible that increases in the frequency, magnitude, and geographic extent of
26 *Microcystis* blooms in the Delta would occur due to the operations and maintenance of the water
27 conveyance facilities and the hydrodynamic impacts of restoration under CM2 and CM4.
28 Accordingly, beneficial uses including drinking water and recreational waters would be impacted
29 and, as a result, there could be potential impacts on public health. Therefore, this impact would be
30 significant.

31 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
32 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
33 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
34 available science at the time of design. Mitigation Measure WQ-32b requires that the project
35 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
36 to determine whether increases in abundance are significant. This mitigation measure also requires
37 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
38 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
39 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
40 measures for reducing water quality effects, and therefore potential public health effects, is
41 uncertain, this impact would be significant and unavoidable.

1 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 2 ***Microcystis* Blooms**

3 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 4 in Chapter 8, *Water Quality*.

5 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 6 **Water Residence Time**

7 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 8 in Chapter 8, *Water Quality*.

9 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 10 **CM4**

11 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 12 under Alternative 2C would be the same as that described under Alternative 1A. Restoration
 13 activities implemented under CM2 and CM4 that would create shallow backwater areas could result
 14 in local increases in water temperature that may encourage *Microcystis* growth during the summer
 15 bloom season. This would result in further degradation of water quality beyond the hydrodynamic
 16 effects of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis*
 17 blooms with implementation of CM2 and CM4 could potentially result in adverse effects on public
 18 health through exposure via drinking water quality and recreational waters. Mitigation Measures
 19 WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 20 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 21 feasible measures for reducing water quality effects, and therefore potential public health effects, is
 22 uncertain. This would be an adverse effect.

23 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 2C are the same as
 24 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
 25 create shallow backwater areas could result in local increases in water temperature conducive to
 26 *Microcystis* growth during summer bloom season. This could compound the water quality
 27 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 28 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 29 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 30 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 31 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 32 increased local water temperatures and water residence time. The effectiveness of these mitigation
 33 measures to result in feasible measures for reducing water quality effects, and therefore potential
 34 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

35 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 36 ***Microcystis* Blooms**

37 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 38 in Chapter 8, *Water Quality*.

1 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 2 **Water Residence Time**

3 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 4 in Chapter 8, *Water Quality*.

5 **25.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and**
 6 **Intakes 1 and 2 (6,000 cfs; Operational Scenario A)**

7 Alternative 3 would have fewer new intakes than Alternative 1A (only Intakes 1 and 2, as compared
 8 with five) and would convey less water (6,000 cfs as compared with 15,000 cfs). Because of these
 9 differences, Alternative 3 would involve fewer solids lagoons and sedimentation basins and fewer
 10 transmission lines. Therefore, the public health effects of Alternative 3 would generally be less than
 11 those identified under Alternative 1A. However, Alternative 3 would have the same conservation
 12 measures with the same amount of habitat restoration and therefore public health effects associated
 13 with habitat restoration would be the same as those described for Alternative 1A.

14 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 15 **the Water Conveyance Facilities**

16 **NEPA Effects:** Alternative 3 would be similar to Alternative 1A, but the water conveyance facilities
 17 would involve construction and operation of up to six solids lagoons, two sedimentation basins,
 18 Byron Tract Forebay, an intermediate forebay, and a 350-acre inundation area adjacent to the
 19 intermediate forebay. The mechanisms for potential public health effects from construction and
 20 operation of the water conveyance facilities are similar to those described for Alternative 1A.
 21 Specifically, sedimentation basins, solids lagoons, the intermediate forebay and associated
 22 inundation area, and Byron Tract Forebay have the potential to provide habitat for vectors that
 23 transmit diseases (e.g., mosquitoes) because of the large volumes of water that would be held within
 24 these areas.

25 The depth, design, and operation of the sedimentation basins and solids lagoons would prevent the
 26 development of suitable mosquito habitat (Figure 25-1). Specifically, the basins would be too deep
 27 and the constant movement of water would prevent mosquitoes from breeding and multiplying.
 28 Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons
 29 would be 165 feet long by 86 feet wide by 10 feet deep. Furthermore, use of the 350-acre inundation
 30 area would be limited to forebay emergency overflow situations and water would be pumped back
 31 to the intermediate forebay, creating circulation such that the area would have a low potential for
 32 creating suitable vector habitat. Similarly, water in the Byron Tract Forebay and intermediate
 33 forebay would be circulated regularly and, with the exception of shallower areas around the
 34 periphery, would be too deep to provide suitable mosquito habitat. The shallower edges of the
 35 forebays could provide suitable mosquito breeding habitat if emergent vegetation or other aquatic
 36 plants (e.g., pond weed) were allowed to grow.

37 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 38 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 39 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 40 control mosquitoes (see Impact PH-1 under Alternative 1A). These BMPs would be consistent with
 41 practices presented in *Best Management Practices for Mosquito Control in California* (California
 42 Department of Public Health 2012). Implementation of these BMPs would reduce the likelihood that

1 BDCP operations would require an increase in abatement activities by the local MVCs. Therefore,
 2 Alternative 3 would not substantially increase suitable vector habitat, and would not substantially
 3 increase vector-borne diseases. Accordingly, no adverse effects on public health would result.

4 **CEQA Conclusion:** Implementation of CM1 under Alternative 3 would involve construction and
 5 operation of an intermediate forebay and associated 350-acre inundation area, and Bryon Tract
 6 Forebay, but fewer solids lagoons and sedimentation basins would be constructed under this
 7 alternative relative to Alternative 1A. These areas could provide suitable habitat for vectors (e.g.,
 8 mosquitoes). During operations, water depth and circulation would prevent the areas from
 9 substantially increasing suitable vector habitat. However, the shallower periphery of the
 10 intermediate forebay and Bryon Tract Forebay could provide suitable mosquito breeding habitat.

11 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 12 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 13 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 14 control mosquitoes. These BMPs would be consistent with practices presented in *Best Management*
 15 *Practices for Mosquito Control in California* (California Department of Public Health 2012). See
 16 Impact PH-1 under Alternative 1A. Therefore, construction and operation of the water conveyance
 17 facilities under Alternative 3 would not result in a substantial increase in vector-borne diseases and
 18 the impact on public health would be less than significant. No mitigation is required.

19 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 20 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 21 **Facilities**

22 **NEPA Effects:** The operation of water supply facilities under Alternative 3 would be the same as
 23 those described for Alternative 1A. Although Alternative 3 would have three fewer intakes, they
 24 would be constructed and operated in the same manner as described under Alternative 1A.
 25 Therefore, the description of water quality and public health effects for Alternative 1A also
 26 appropriately characterizes effects under Alternative 3. For the most part, there would be no
 27 substantial changes in trace metals, pesticides, or DBPs under Operational Scenario A. However,
 28 relative to the No Action Alternative, there would be an increase in the long-term average bromide
 29 concentrations at all modeled Delta locations (except at Banks and Jones pumping plants), with
 30 Barker Slough showing the greatest increase (38%). This increase would be more substantial during
 31 the drought period (85%).

32 This increase in the long-term average bromide concentration at Barker Slough could necessitate
 33 upgrades or changes in operations at certain water treatment plants. While treatment technologies
 34 sufficient to achieve the necessary bromide removal exist, implementation of such technologies
 35 would likely require substantial investment in new or modified infrastructure. Should treatment
 36 plant upgrades not be undertaken, a change of such magnitude in long-term average bromide
 37 concentrations in drinking water sources would represent an increased risk for adverse effects on
 38 public health from DBPs in drinking water sources. Mitigation Measure WQ-5 is available to reduce
 39 these effects. Implementation of this measure along with a separate other commitment as set forth
 40 in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, relating to the potential
 41 increased treatment costs associated with bromide-related changes would reduce these effects.
 42 Further, as described for Impact PH-2 under Alternative 1A, the adverse water quality effects on the
 43 North Bay Aqueduct at Barker Slough may be further minimized by implementation of the AIP.

1 **CEQA Conclusion:** The operation of water supply facilities under Alternative 3 would be the same as
2 that described above for Alternative 1A. Water supply operations would increase relative
3 contributions from the San Joaquin River relative to the Sacramento River, and decrease the dilution
4 capacity of the Sacramento River for contaminants. This could result in changes in water quality.
5 Water quality modeling results indicate that changes in flows under Alternative 3 operations would
6 not, for the most part, result in increased exceedances of water quality criteria for constituents of
7 concern (DBPs, trace metals and pesticides) in the study area. However, relative to Existing
8 Conditions bromide concentrations would increase at the North Bay Aqueduct at Barker Slough,
9 Staten Island, and Emmaton on the Sacramento River, with the greatest increase occurring at Barker
10 Slough (34%). This increase would be more substantial during the drought period (85%).

11 The increase in long-term average bromide concentrations predicted for Barker Slough would result
12 in a substantial change in source water quality to existing drinking water treatment plants drawing
13 water from the North Bay Aqueduct. These modeled increases in bromide at Barker Slough could
14 lead to adverse changes in the formation of DBPs at drinking water treatment plants such that
15 considerable water treatment plant upgrades would be necessary in order to achieve equivalent
16 levels of drinking water health protection. This would be a significant impact.

17 While treatment technologies sufficient to achieve the necessary bromide removal exist,
18 implementation of such technologies would likely require substantial investment in new or modified
19 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
20 long-term average bromide concentrations in drinking water sources would represent an increased
21 risk for adverse effects on public health from DBP in drinking water sources. Assuming the adverse
22 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
23 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
24 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
25 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
26 based on currently available information.

27 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
28 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
29 separate other commitment to address the potential increased water treatment costs that could
30 result from bromide-related concentration effects on municipal water purveyor operations.
31 Potential options for making use of this financial commitment include funding or providing other
32 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
33 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
34 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
35 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
36 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
37 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
38 treatment entities will be fully funded or implemented successfully prior to the project's
39 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
40 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
41 or implemented before the project's contribution to the impact is made, a significant impact in the
42 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
43 significant and unavoidable. If, however, all financial contributions, technical contributions, or
44 partnerships required to avoid significant impacts prove to be feasible and any necessary
45 agreements are completed before the project's contribution to the effect is made, impacts would be
46 less than significant.

1 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 2 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 3 **Slough**

4 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

5 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 6 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

7 **NEPA Effects:** Alternative 3 would entail constructing and operating only Intakes 1 and 2, three
 8 fewer intakes than Alternative 1A would have; however, they would be constructed and operated in
 9 the same manner as under Alternative 1A. As described under Alternative 1A, sediment-disturbing
 10 activities during construction and maintenance of the water conveyance facilities under Alternative
 11 3 could result in the disturbance of existing constituents in sediment, such as pesticides or
 12 methylmercury. The public health effects associated with pesticides and methylmercury under
 13 Alternative 3 would be similar to, although slightly less than, those under Alternative 1A.

14 Intermittent and/or short-term construction-related activities (as would occur for in-river
 15 construction) would not be anticipated to result in contaminant discharges of sufficient magnitude
 16 or duration to contribute to long-term bioaccumulation processes, or cause measureable long-term
 17 degradation, as described under Alternative 1A. Legacy organochlorine pesticides typically bond to
 18 particulates, and do not mobilize easily. Construction and maintenance of Alternative 3 would not
 19 cause legacy organochlorine pesticides to be transported far from the source or to partition into the
 20 water column as described for Alternative 1A. Additionally, water supply operations under any
 21 BDCP action alternative would not be expected to change total suspended solids or turbidity levels
 22 (highs, lows, typical conditions) to any substantial degree. Changes in the magnitude, frequency, and
 23 geographic distribution of legacy pesticides in water bodies of the affected environment that would
 24 result in new or more severe adverse effects on beneficial uses, relative to the No Action Alternative,
 25 would not be expected to occur.

26 Modeling results indicate small, insignificant changes in total mercury and methylmercury levels in
 27 water and fish tissues resulting from Alternative 3 water operations (Chapter 8, *Water Quality*,
 28 Section 8.3.3.8). Upstream mercury contributions and methylmercury production in Delta waters
 29 would not be altered by the operation of Alternative 3, as it would not change existing mercury
 30 sources and would not substantially alter methylmercury concentrations in the Sacramento River or
 31 San Joaquin River. Results indicate that the percentage change in assimilative capacity of
 32 waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark showed the greatest
 33 decrease (0.8%) relative to the No Action Alternative at the Mokelumne River (South Fork) at Staten
 34 Island and Franks Tract. Similarly, changes in methylmercury concentration are expected to be very
 35 small. Fish tissue mercury concentrations showed small or no increase based on long-term annual
 36 average concentrations at the nine Delta locations modeled. There was an 8% increase in the
 37 exceedance quotient at the Mokelumne River (South Fork) at Staten Island relative to the No Action
 38 Alternative. All water export locations except the Contra Costa Pumping Plant #1 showed improved
 39 bass tissue mercury estimates (see Chapter 8, *Water Quality*).

40 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
 41 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
 42 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
 43 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
 44 area of disturbance during construction and maintenance. Examples of these BMPs are described

1 under Alternative 1A, Impact PH-3. Further, operations under Alternative 3 are not expected to
2 increase mercury concentrations substantially and therefore there would be no long-term water
3 quality degradation such that beneficial uses are adversely affected. Increases in mercury or
4 methylmercury concentrations are not likely to be measurable, and changes in mercury
5 concentrations or fish tissue mercury concentrations would not make any existing mercury-related
6 impairment measurably worse. Therefore, it is not expected that aquatic organisms would have
7 measurably higher body burdens of mercury as a result of Alternative 3 water operations.

8 Accordingly, the potential for Alternative 3 to create a public health effect from bioaccumulation of
9 legacy organochlorine pesticides and methylmercury in fish is minimal, and public health effects
10 from construction, operation, or maintenance of the water conveyance facilities are not expected to
11 be adverse.

12 **CEQA Conclusion:** Construction and maintenance of Alternative 3 would not cause legacy
13 organochlorine pesticides to be transported far from the source or to partition into the water
14 column based on the chemical properties of the pesticides. Although methylmercury currently
15 exceeds the TMDL, little to no change in methylmercury concentrations in water are expected under
16 Alternative 3 water conveyance facilities construction. BMPs implemented as part of Erosion and
17 Sediment Control Plans and SWPPPs would help ensure that construction activities would not
18 substantially increase or substantially mobilize legacy organochlorine pesticides or methylmercury
19 during construction and maintenance. Therefore, construction and maintenance of Alternative 3
20 would not cause increased exposure of the public to these bioaccumulative sediment constituents.

21 Alternative 3 would not result in increased tributary flows that would mobilize legacy
22 organochlorine pesticides in sediments. Modeling showed small changes in mercury and
23 methylmercury levels in water at certain Delta locations relative to Existing Conditions due to water
24 conveyance operations under this alternative. Specifically, there was a 0.7% decrease, relative to the
25 25 ng/L ecological risk benchmark, for Franks Tract, Old River at Rock Slough, and Contra Costa
26 Pumping Plant. There was a 4% increase in the mercury exceedance quotient for fish tissues,
27 relative to Existing Conditions, at the Mokelumne River (South Fork) at Staten Island, the San
28 Joaquin River at Buckley Cove, Franks Tract, and Old River at Rock Slough due to Alternative 3 water
29 operations. However, these changes would not substantially affect the current level of existing
30 methylmercury degradation in the study area or substantially affect the existing fish tissue
31 concentrations. Since construction, maintenance, or operation of Alternative 3 would not cause
32 substantial mobilization or substantial increase of constituents known to bioaccumulate, impacts on
33 public health would be less than significant. No mitigation is required.

34 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 35 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 36 **Facilities**

37 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
38 area. As described in Table 25-9, a total of 24.71 miles of new temporary 69 kV transmission lines;
39 8.68 mile of new permanent 69 kV transmission lines; and 42.68 miles of new permanent 230 kV
40 transmission lines would be required for this alternative. This alternative would have fewer intakes
41 than Alternative 1A, but would still include the pipeline/tunnel conveyance.

42 As with Alternative 1A, any new temporary and permanent transmission lines needed for
43 Alternative 3 would, for the most part, be located in rights-of-way of existing transmission lines or in
44 areas that are not densely populated and therefore would not expose substantially more people to

1 transmission lines (Figure 25-2). However, as indicated in Table 25-9, Stone Lakes National Wildlife
2 Refuge would be within 300 feet of a proposed temporary 69 kV transmission line. Visitors to this
3 area generally come for walks, water recreation, and hunting, and as such, it is unlikely that large
4 groups of people would be staying in the area within 300 feet of this proposed transmission line, so
5 any EMF exposure would be limited. Further, this line would be removed when construction of the
6 water conveyance facility features near this area is completed, so there would be no potential
7 permanent effects. Therefore, this temporary transmission line would not substantially increase
8 people's exposure to EMFs.

9 While the current scientific evidence does not show conclusively that EMF exposure can increase
10 health risks, the location and design of the proposed new transmission lines would be conducted in
11 accordance with CPUC's EMF Design Guidelines for Electrical Facilities, as described for Alternative
12 1A. Therefore, operation of the transmission line corridors would not expose substantially more
13 people to transmission lines generating EMFs, and there would be no adverse effect on public health.

14 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
15 transmission lines would be located in rights-of-way of existing transmission lines or in sparsely
16 populated areas generally away from existing potentially sensitive receptors. However, one
17 sensitive receptor, Stone Lakes National Wildlife Refuge, would be within 300 feet of a proposed 69
18 kV temporary transmission line. Because visitors to this area generally come for walks, water
19 recreation, and hunting, it is unlikely that large groups of people would be staying in the area within
20 300 feet of this proposed transmission line, so any EMF exposure would be limited. Further, this line
21 would be removed when construction of the water conveyance facility features near this area is
22 completed, so there would be no potential permanent effects. Therefore, this temporary
23 transmission line would not substantially increase people's exposure to EMFs. Design and
24 implementation of new temporary or permanent transmission lines not within the right-of-way of
25 existing transmission lines would follow CPUC's EMF Design Guidelines for Electrical Facilities and
26 would implement shielding, cancellation, or distance measures to reduce EMF exposure. Because
27 construction and operation of Alternative 3 would not expose substantially more people to
28 transmission lines that generate new sources of EMFs, impacts on public health would be less than
29 significant, and no mitigation is required.

30 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 31 **and CM11**

32 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
33 under Alternative 3 would be the same as that described for Alternative 1A. Although there would
34 be an increase in restored and enhanced aquatic habitat in the study area as a result of
35 implementing Alternative 3, implementation of environmental commitments, such as coordination
36 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
37 Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) would reduce the
38 potential for an increase in mosquito breeding habitat, and a substantial increase in vector-borne
39 diseases is unlikely to result. Furthermore, habitat would be restored in areas where potentially
40 suitable habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would
41 likely increase as a result of restoration and enhancement, which would keep mosquito populations
42 in check. Therefore, effects would be the same under Alternative 3 as under Alternative 1A and there
43 would not be a substantial increase in the public's risk of exposure to vector-borne diseases with
44 implementation of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

1 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 2 land potentially suitable for vector habitat (e.g., mosquitoes). However, Alternative 3 would require
 3 environmental commitments, such as coordination with MVCDs and implementation of BMPs under
 4 MMPs (as described under Impact PH-1 for Alternative 1A and in Appendix 3B, *Environmental*
 5 *Commitments, AMMs, and CMs*) that would help control mosquitoes and reduce the potential for an
 6 increase in mosquito breeding habitat. Furthermore, habitat would be restored where potentially
 7 suitable vector habitat already exists, and habitat restoration and enhancement would likely
 8 increase the number of mosquito predators. Therefore, as described for Alternative 1A,
 9 implementation of CM2-CM7, CM10 and CM11 under Alternative 3 would not substantially increase
 10 the public's risk of exposure to vector-borne diseases beyond what currently exists. Accordingly,
 11 this impact would be less than significant and no mitigation is required.

12 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 13 **Implementing the Restoration Conservation Measures**

14 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 15 under Alternative 3 would be the same as that described for Alternative 1A. Implementation of the
 16 restoration conservation measures would support habitat types, such as wetlands and agricultural
 17 areas, that produce pathogens as a result of the biological productivity in these areas (e.g., migrating
 18 birds, application of fertilizers, waste products of animals). As exemplified by the Pathogen
 19 Conceptual Model, any potential increase in pathogens associated with the habitat restoration would
 20 be localized and within the vicinity of the actual restoration. This would be similar for lands
 21 protected for agricultural uses. Depending on the level of recreational access granted by
 22 management plans, habitat restoration could increase or decrease opportunities for recreationists
 23 within the Delta region. However, effects associated with pathogens would be the same under
 24 Alternative 3 as under Alternative 1A. Accordingly, recreationists would not experience a
 25 substantial increase in exposure to pathogens as a result of implementing restoration conservation
 26 measures and no adverse effect would result.

27 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 3
 28 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 29 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers, and
 30 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 31 off of some types of pathogens once released into water bodies would generally prevent substantial
 32 pathogen exposure to recreationists. Accordingly, impacts would be less than significant. No
 33 mitigation is required.

34 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 35 **as a Result of Implementing CM2, CM4, CM5, and CM10**

36 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 3 as
 37 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
 38 known to bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of
 39 the newly inundated floodplains and marshes, as described under Alternative 1A. It is likely that the
 40 pesticide-bearing sediments would not be transported very far from the source area and would
 41 settle out with suspended particulates and be deposited close to the ROA. Further, CM2–CM21 do
 42 not include the use of pesticides known to be bioaccumulative in animals or humans.

43 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 44 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport

1 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
2 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
3 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
4 bioaccumulation of methylmercury in the study area's aquatic systems (i.e., fish and water) during
5 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
6 reduce the public's exposure to contaminated fish. Accordingly, adverse effects on public health due
7 to the substantial mobilization of or increase in methylmercury as a result of implementing CM2,
8 CM4, CM5, and CM10 are not expected to occur.

9 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
10 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
11 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
12 sediments would be transported very far from the source area and they would likely settle out with
13 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
14 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
15 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
16 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
17 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10
18 under Alternative 3 would not substantially mobilize or substantially increase the public's exposure
19 to constituents known to bioaccumulate and this impact would be less than significant. No
20 mitigation is required.

21 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 22 **Conveyance Facilities**

23 **NEPA Effects:** Because factors that affect *Microcystis* abundance in waters upstream of the Delta, in
24 the Delta, and in the SWP/CVP Export Services Areas under Alternative 1A would similarly change
25 under Alternative 3, *Microcystis* abundance, and thus microcystin concentrations, in water bodies of
26 the affected environment under Alternative 3 would be very similar (i.e., nearly the same) to those
27 discussed for Alternative 1A.

28 As described in Chapter 8, *Water Quality*, although *Microcystis* blooms have not occurred in the
29 Export Service Areas, conditions in the Export Service Areas under Alternative 3 may become more
30 conducive to *Microcystis* bloom formation because water temperatures will increase in the Export
31 Service Areas due to the expected increase in ambient air temperatures resulting from climate
32 change, but not from operation of the water conveyance facilities. Under Alternative 3, relative to No
33 Action Alternative, water exported to the SWP/CVP Export Service Area will be a mixture of
34 *Microcystis*-affected source water from the south Delta intakes and unaffected source water from the
35 Sacramento River, diverted at the north Delta intakes. It cannot be determined whether operations
36 and maintenance under Alternative 3 will result in increased or decreased levels of *Microcystis* and
37 microcystins in the mixture of source waters exported from Banks and Jones pumping plants.

38 Like Alternative 1A, elevated ambient water temperatures would occur in the Delta under
39 Alternative 3, which could lead to earlier occurrences of *Microcystis* blooms in the Delta, and
40 increase the overall duration and magnitude of blooms. However, as described in Chapter 8, *Water*
41 *Quality*, the increase in Delta water temperatures, and consequent potential increase in *Microcystis*
42 blooms, would be driven entirely by climate change, not by operation of water conveyance facilities.
43 There would be differences in the direction and magnitude of water residence time changes during
44 the *Microcystis* bloom period due to operation of the water conveyance facilities under Alternative 3

1 compared to Alternative 1A, relative to the No Action Alternative. As a result, *Microcystis* blooms,
 2 and therefore microcystin, could increase in surface waters throughout the Delta. Therefore, impacts
 3 on beneficial uses, including drinking water and recreational waters, could occur and public health
 4 could be affected. Although Mitigation Measure WQ-32a and WQ-32b are available to reduce the
 5 severity of degraded water quality in the Delta due to *Microcystis* blooms, this would be an adverse
 6 effect.

7 **CEQA Conclusion:** Under Alternative 3, operation of the water conveyance facilities is not expected
 8 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
 9 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
 10 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
 11 residence times in the Export Service Area would not be affected by operations of CM1, and
 12 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.
 13 Water exported from the Delta to the Export Service Area is expected to be a mixture of *Microcystis*-
 14 affected source water from the south Delta intakes and unaffected source water from the
 15 Sacramento River. Because of this, it cannot be determined whether operations and maintenance
 16 under Alternative 3 would result in increased or decreased levels of *Microcystis* and microcystins in
 17 the mixture of source waters exported from Banks and Jones pumping plants.

18 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
 19 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
 20 water temperature increases in the Delta would be due to climate change and not due to operation
 21 of the water conveyance facilities. Increases in Delta residence times would be due in small part to
 22 climate change and sea level rise, but due to a greater degree to operation of the water conveyance
 23 facilities and hydrodynamic impacts of restoration included in CM2 and CM4. Consequently, it is
 24 possible that increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms in
 25 the Delta would occur due to the operations and maintenance of the water conveyance facilities and
 26 the hydrodynamic impacts of restoration under CM2 and CM4. Accordingly, beneficial uses including
 27 drinking water and recreational waters would be impacted and, as a result, public health. Therefore,
 28 this impact would be significant.

29 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 30 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 31 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 32 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 33 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 34 to determine whether increases in abundance are significant. This mitigation measure also requires
 35 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 36 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
 37 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 38 measures for reducing water quality effects, and therefore potential public health effects, is
 39 uncertain, this impact would be significant and unavoidable.

40 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 41 ***Microcystis* Blooms**

42 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 43 in Chapter 8, *Water Quality*.

1 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
2 **Water Residence Time**

3 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
4 in Chapter 8, *Water Quality*.

5 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
6 **CM4**

7 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
8 under Alternative 3 would be the same as that described under Alternative 1A. Restoration activities
9 implemented under CM2 and CM4 that would create shallow backwater areas could result in local
10 increases in water temperature that may encourage *Microcystis* growth during the summer bloom
11 season. This would result in further degradation of water quality beyond the hydrodynamic effects
12 of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis* blooms
13 with implementation of CM2 and CM4 could potentially result in adverse effects on public health
14 through exposure via drinking water quality and recreational waters. Mitigation Measures WQ-32a
15 and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
16 temperatures and water residence time. The effectiveness of these mitigation measures to result in
17 feasible measures for reducing water quality effects related to *Microcystis* is uncertain. This would
18 be an adverse effect.

19 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 3 are the same as
20 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
21 create shallow backwater areas could result in local increases in water temperature conducive to
22 *Microcystis* growth during summer bloom season. This could compound the water quality
23 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
24 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
25 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
26 via drinking water quality and recreational waters. Therefore, this impact would be significant.
27 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
28 increased local water temperatures and water residence time. The effectiveness of these mitigation
29 measures to result in feasible measures for reducing water quality effects, and therefore potential
30 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

31 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
32 ***Microcystis* Blooms**

33 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
34 in Chapter 8, *Water Quality*.

35 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
36 **Water Residence Time**

37 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
38 in Chapter 8, *Water Quality*.

25.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)

Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of the Water Conveyance Facilities

NEPA Effects: Alternative 4 would involve construction and operation of three intakes (Intakes 2, 3, and 5); six sedimentation basins; 12 solids lagoons; a 243-acre intermediate forebay with a water surface area of 37 acres, a 131-acre inundation (emergency overflow) area adjacent to the intermediate forebay on Glannvale Tract, and an expanded Clifton Court Forebay. The Clifton Court Forebay would be expanded by approximately 590 acres; the north cell of the expanded Clifton Court Forebay would have a surface area of approximately 806 acres at maximum operation level, and the south cell would have surface area of approximately 1,691 acres. A map and a schematic diagram depicting the conveyance facilities associated with Alternative 4 are provided in Figures 3-9 and 3-10 in Chapter 3, *Description of Alternatives*. A detailed depiction is provided in Mapbook Figure M3-4 in Chapter 3.

Each intake site would require a temporary cofferdam to create a dewatered construction area encompassing the entire intake site. Construction of the cofferdams would take place from June through October, and it is expected that dewatering of the cofferdams (i.e., removing water from behind the cofferdams) would occur after the construction of the cofferdams, when generally there are fewer mosquitoes breeding, as mosquitoes in northern California typically breed April–October (Sacramento–Yolo Mosquito and Vector Control District 2008).

Sedimentation basins, solids lagoons, the intermediate forebay inundation area, the periphery of the intermediate forebay, and the expanded Clifton Court Forebay have the potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of the large volumes of water that would be held within these areas. The depth, design, and operation of the sedimentation basins and solids lagoons would prevent the development of suitable mosquito habitat (see Chapter 3, *Description of Alternatives*, Section 3.6.1). Specifically, the basins would be too deep (25 feet) and the constant movement of water would prevent mosquitoes from breeding and multiplying. The sedimentation basins would be triangular in shape and would be approximately 250 to 677 feet wide (with the maximum width facing the intake channels), 660 feet long and 25 feet deep. Solids lagoons would be approximately 160 feet wide at the bottom, and 350 feet long. The lagoons would be 15 feet deep. Use of the inundation area adjacent to the intermediate forebay would be limited to forebay emergency overflow situations and water would be physically pumped back to the intermediate forebay, creating circulation such that the area would have a low potential for creating suitable vector habitat. Similarly, water in the intermediate forebay and the expanded Clifton Court Forebay would be circulated regularly and, with the exception of shallower areas around the periphery, would be too deep to provide suitable mosquito breeding habitat.

The sedimentation basins and solids lagoons at Intake 2 would be located within 1 mile of and across the Sacramento River from Clarksburg, and the sedimentation basins and solids lagoons at Intake 3 would be located within 1 mile of Hood. The sedimentation basins and solids lagoons at Intake 5 would be located within 1.5 miles (south) of Hood and 2 miles (north) of Courtland. The sedimentation basins would have a mat slab foundation and interior concrete walls to create separate sedimentation channels. The solids lagoons would be concrete-lined and approximately 10 feet deep. Up to three solids lagoons would be used in a rotating cycle for each intake, with one basin filling, one settling, and the third being emptied of settled and dewatered solids. The rate of filling

1 and settling would depend on the volume of water pumped by the intakes; however, water would
2 continuously move through the basins at a relatively slow but regulated rate so that the solids and
3 sediments can be removed from the water, via settling, prior to discharge into the conveyance
4 facilities (Figure 25-1). The flow rates would be high enough to prevent water from stagnating, as
5 stagnant water would not facilitate conveying the water to the conveyance system or removing the
6 sediment from the water. As discussed in Section 25.1.1.5, mosquitoes typically prefer shallow
7 stagnant water with little movement. The sedimentation basins and solids lagoons would be
8 considered too deep and have too much regulated water movement to provide suitable mosquito
9 habitat. Furthermore, during sediment drying and basin cleaning operations, flow would be stopped
10 completely and the moisture in the sediment would be reduced to a point at which the sediment
11 would not support insect/mosquito larvae production. Therefore, it is anticipated that these basins
12 would not substantially increase suitable vector habitat and would not substantially increase the
13 public's exposure to vector-borne diseases. Accordingly, adverse effects are not expected.

14 There would be an approximately 131-acre inundation area adjacent to the 243-acre intermediate
15 forebay to accommodate emergency overflow from the forebay. Water would enter this inundation
16 area only during forebay emergency overflow situations; however, these situations could result in
17 standing water approximately 2 feet deep. While water of this depth would be suitable habitat for
18 mosquitoes, such events would be more likely to occur during high flow events in winter, when
19 fewer mosquitoes are breeding (Sacramento-Yolo Mosquito and Vector Control District 2008).
20 Water in the emergency overflow area would be pumped out and back to the intermediate forebay
21 once the danger of overflow has passed. This pumping would create circulation that would minimize
22 the amount of suitable habitat for mosquitoes. Because the area would be used only during
23 emergencies and the water would be pumped from the area, the potential for creating suitable
24 mosquito habitat would be low. Therefore, adverse effects are not expected.

25 Although the proposed intermediate forebay and the expanded Clifton Court Forebay will increase
26 surface water within the study area, it is unlikely that these water bodies would provide suitable
27 breeding habitat for mosquitoes given that the water in these forebays would not be stagnant and
28 would be too deep. However, the shallow edges of the forebays could provide suitable mosquito
29 breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed) were allowed to
30 grow. However, as part of the regular maintenance of these forebay areas, floating vegetation such
31 as pond weed would be harvested to maintain flow and forebay capacity. Further, BMPs to control
32 mosquitoes would be implemented as part of this alternative. As such, the intermediate forebay and
33 the expanded Clifton Court Forebay would not likely increase mosquito breeding habitat in the Plan
34 Area.

35 To minimize the potential for impacts related to increasing suitable vector habitat within the study
36 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
37 MVCDs and prepare and implement MMPs, as necessary, to control mosquitoes and reduce the
38 likelihood that construction and operation of the water conveyance facilities would require an
39 increase in mosquito abatement activities by the local MVCDs (Appendix 3B, *Environmental*
40 *Commitments, AMMs, and CMs*). BMPs to be implemented as part of the MMPs would help control
41 mosquitoes during construction and operation of the sedimentation basins, solids lagoons,
42 intermediate forebay, intermediate forebay inundation area, and the expanded Clifton Court
43 Forebay. BMP activities would be consistent with the CDPH's *Best Management Practices for*
44 *Mosquito Control* plan (described in Section 25.2.3.4) include, but not necessarily be limited to, the
45 following.

- 1 • Maintain stable water levels.
- 2 • Circulate water.
- 3 • Implement monitoring and sampling programs to detect early signs of mosquito population
- 4 problems.
- 5 • Use biological agents such as mosquito fish to limit larval mosquito populations, and introduce
- 6 biological agents to areas of standing water if mosquitoes are present.
- 7 • Use larvicides and adulticides, as necessary.
- 8 • Test for mosquito larvae during the high mosquito season (June through September).
- 9 • Reduce or eliminate emergent vegetation in and along the edges of water
- 10 • Introduce physical controls to areas of standing water (e.g., discharging water more frequently
- 11 or increasing circulation) if mosquitoes are present.

12 Accordingly, Alternative 4 would not substantially increase suitable vector habitat, and would not
13 substantially increase vector-borne diseases. No adverse effects on public health would result.

14 ***CEQA Conclusion:*** Sedimentation basins, solids lagoons, and the intermediate forebay inundation
15 area have the potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes)
16 because of the large volumes of water that would be held within these areas. However, during
17 operations, the depth, design, and operation of the sedimentation basins and solids lagoons would
18 prevent the development of suitable mosquito habitat. Specifically, the basins would be too deep and
19 the constant movement of water would prevent mosquitoes from breeding and multiplying.
20 Furthermore, the 131-acre inundation area adjacent to the intermediate forebay would be limited to
21 forebay emergency overflow situations and water would be pumped back to the intermediate
22 forebay, creating circulation such that the area would have a low potential for creating suitable
23 vector habitat. In addition, although the proposed intermediate forebay and the expanded Clifton
24 Court Forebay would increase surface water within the study area, it is unlikely that these water
25 bodies would provide suitable breeding habitat for mosquitoes given that the water in these
26 forebays would not be stagnant and would be too deep. However, the shallow edges of the forebays
27 could provide suitable mosquito breeding habitat if emergent vegetation or other aquatic plants
28 (e.g., pond weed) were allowed to grow.

29 To minimize the potential for impacts related to increasing suitable vector habitat within the study
30 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
31 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
32 control mosquitoes during construction and operation of the sedimentation basins, solids lagoons,
33 the expanded Clifton Court Forebay, the intermediate forebay, and the intermediate forebay
34 inundation area. Therefore, construction and operation of Alternative 4 would not result in a
35 substantial increase in vector-borne diseases and the impact on public health would be less than
36 significant. No mitigation is required.

37 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
38 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
39 **Facilities**

40 Facilities under Alternative 4 would be operated to provide diversions up to a total of 9,000 cfs from
41 the new north Delta intakes. Alternative 4 water conveyance operations would follow the guidelines

1 described as Operational Scenario H and would include criteria for north Delta diversion bypass
2 flows; south Delta OMR flows; south Delta E/I Ratio; flows over Fremont Weir into Yolo Bypass;
3 Delta inflow; Delta outflow, as determined by the outcome of a decision tree process needed to
4 account for uncertainties related to delta smelt and longfin smelt flow requirements; Delta Cross
5 Channel gate operations; Rio Vista minimum in-stream flow; operations for Delta water quality and
6 residence; and water quality for agricultural and municipal/industrial diversions. These criteria are
7 discussed in detail in Chapter 3, *Description of Alternatives*, Section 3.6.4.2.

8 **NEPA Effects:**

9 **Disinfection Byproducts**

10 As described in Chapter 8, *Water Quality*, modeling scenarios included assumptions regarding how
11 certain habitat restoration activities (CM2 and CM4) would affect Delta hydrodynamics, To the
12 extent that restoration actions alter hydrodynamics within the Delta region, which affects mixing of
13 source waters, these effects are included in this assessment of operations-related water quality
14 changes (i.e., CM1).

15 Changes to DOC and bromide concentrations and, by extension, DBPs, under Alternative 4
16 operational scenarios (H1–H4) suggest that there would not be exceedances of DBP criteria due to
17 operations, because long-term average DOC and bromide concentrations would be only slightly
18 higher under this alternative relative to the No Action Alternative. For all of the operational
19 scenarios relative to the No Action Alternative, the modeled DOC effects would be greatest at Franks
20 Tract, Rock Slough, and Contra Costa Pumping Plant #1. Increased long-term average DOC
21 concentrations at these locations would be greatest under Scenario H4 and would be least under
22 Scenario H1, although differences would generally be small (i.e., ≤ 0.2 mg/L). Under Scenario H4,
23 maximum increases of DOC would be $\leq 12\%$ for these locations. In addition, relative to the No Action
24 Alternative, the frequency which long-term average DOC concentrations would exceed 4 mg/L
25 during the modeled drought period at Buckley Cove would increase by 8%. In general, substantial
26 change in ambient DOC concentrations would need to occur before significant changes in drinking
27 water treatment plant design or operations are triggered. The increases in long-term average DOC
28 concentrations estimated to occur at various Delta locations under the four alternative operational
29 scenarios of Alternative 4 are of sufficiently small magnitude that they would not require existing
30 drinking water treatment plants to substantially upgrade treatment for DOC removal above levels
31 currently employed.

32 Under operational Scenarios H1-H4, modeled long-term average bromide concentrations would
33 increase at Buckley Cove, Staten Island, Emmaton, and Barker Slough, and would decrease at other
34 assessment locations, relative to the No Action Alternative. Overall effects would be greatest under
35 Scenario H2 at Barker Slough, source of the North Bay Aqueduct, where long-term average
36 concentrations are predicted to increase by 44% (97% during the drought period). Although
37 Scenario H2 would result in the greatest relative increase in long-term average bromide
38 concentrations at Barker Slough, the difference between operational scenarios is very small (see
39 Chapter 8, *Water Quality*, Section 8.3.3.9, for detail). Regardless of the particular Alternative 4
40 operational scenario, the increase in long-term average bromide concentrations at Barker Slough
41 could necessitate changes in water treatment plant operations or require treatment plant upgrades
42 in order to maintain DBP compliance.

1 Important to the results presented above is the assumed habitat restoration footprint on both the
2 temporal and spatial scales incorporated into the modeling. Modeling sensitivity analyses have
3 indicated that habitat restoration (which is reflected in the modeling—see Chapter 8, *Water Quality*,
4 Section 8.3.1.3), not operations covered under CM1, are the driving factor in the modeled bromide
5 increases. The timing, location, and specific design of habitat restoration will have effects on Delta
6 hydrodynamics, and any deviations from modeled habitat restoration and implementation schedule
7 will lead to different outcomes. Although habitat restoration near Barker Slough is an important
8 factor contributing to modeled bromide concentrations at the North Bay Aqueduct, BDCP habitat
9 restoration elsewhere in the Delta can also have large effects. Because of these uncertainties, and the
10 possibility of adaptive management changes to BDCP restoration activities, including location,
11 magnitude, and timing of restoration, the estimates are not predictive of the bromide levels that
12 would actually occur in Barker Slough or elsewhere in the Delta.

13 The Stage 1 Disinfectants and Disinfection Byproduct Rule, adopted by EPA in 1998 as part of the
14 SDWA, requires drinking water utilities to reduce TOC concentrations by specified percentages prior
15 to disinfection. These requirements were adopted because organic carbon, such as DOC, can react
16 with disinfectants during the water treatment disinfection process to form DBPs such as THMs and
17 HAAs, which can pose potential lifetime carcinogenic risks to humans. Water treatment plants that
18 utilize Delta water are designed and operated to meet EPA's 1998 requirements based on the
19 ambient concentrations and seasonal variability that currently exists in the Delta. Ambient DOC and
20 bromide concentrations would need to change substantially to trigger significant changes in plant
21 design or operations. Although the increases in long-term average DOC and bromide concentrations
22 estimated to occur at most modeled Delta locations under Alternative 4 operational scenarios are of
23 sufficiently small magnitude that they would not require existing drinking water treatment plants to
24 substantially upgrade treatment, the modeled average bromide concentration increase predicted for
25 the North Bay Aqueduct at Barker Slough could necessitate upgrades or changes in operations at
26 certain water treatment plants, and this would be considered an adverse effect.

27 While treatment technologies sufficient to achieve the necessary bromide removal exist,
28 implementation of such technologies would likely require substantial investment in new or modified
29 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
30 long-term average bromide concentrations in drinking water sources would represent an increased
31 risk for adverse effects on public health from DBPs in drinking water sources. Mitigation Measure
32 WQ-5 is available to reduce these effects (implementation of this measure along with a separate,
33 other commitment as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and*
34 *CMs*, relating to the potential increased treatment costs associated with bromide-related changes
35 would reduce these effects). Further, DWR issued a Notice of Preparation on December 2, 2009 to
36 construct and operate the AIP that would establish an alternative surface water intake on the
37 Sacramento River upstream of the Sacramento Regional Wastewater Treatment Plant discharge. The
38 AIP would connect to the existing North Bay Aqueduct system by a new segment of pipe. The
39 proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct
40 intake at Barker Slough. The proposed project would be designed to improve water quality and to
41 provide reliable deliveries of SWP supplies to its contractors, the Solano County Water Agency and
42 the Napa County Flood Control and Water Conservation District. The timing of DWR's
43 implementation of the AIP is uncertain at this time. The adverse water quality effects on the North
44 Bay Aqueduct at Barker Slough due to increased bromide may be minimized by implementation of
45 the AIP.

1 Trace Metals

2 Water quality modeling results indicate that water conveyance facilities operations would not
3 substantially change concentrations of metals of primarily human health and drinking water
4 concern (arsenic, iron, manganese) in Delta waters relative to the No Action Alternative. The arsenic
5 criterion was established to protect human health from the effects of long-term chronic exposure,
6 while secondary MCLs for iron and manganese were established as reasonable federal regulatory
7 goals for drinking water quality, and enforceable standards in California. Average concentrations for
8 arsenic, iron, and manganese in the primary source water (Sacramento River, San Joaquin River, and
9 the bay at Martinez) are below these criteria. No mixing of these three source waters could result in
10 a metal concentration greater than the highest source water concentration, and, given that the
11 modeled average water concentrations for arsenic, iron, and manganese do not exceed water quality
12 criteria, more frequent exceedances of drinking water criteria in the Delta would not be an expected
13 result under this alternative. Accordingly, no adverse effect on public health related to the trace
14 metals arsenic, iron, or manganese from drinking water sources is anticipated.

15 Pesticides

16 Sources of pesticides to the study area include direct input of surface runoff from in-Delta
17 agriculture and Delta urbanized areas as well as inputs from rivers upstream of the Delta. These
18 sources would not be affected by implementing Alternative 4. However, under Alternative 4
19 Scenarios H1-H4, the distribution and mixing of Delta source waters would change. Changes in
20 source water fractions at the modeled Delta assessment locations would vary depending on
21 operational scenario, but relative differences between the operational scenarios would be small. As
22 described in Chapter 8, *Water Quality*, Section 8.3.3.9, at most modeled Delta locations, these
23 modeled changes in the source water fractions of Sacramento, San Joaquin and Delta agriculture
24 water would not be of sufficient magnitude to substantially increase pesticide concentrations in
25 Delta waters and would not adversely affect beneficial uses of the Delta relative to the No Action
26 Alternative. However, depending on operational scenario, modeled San Joaquin River fractions at
27 Buckley Cove would increase between 16–17% in July (31–34% for the modeled drought period)
28 and 24–25% in August (47–49% for the modeled drought period). Despite these San Joaquin River
29 increases, the resulting net San Joaquin River source water fraction for July and August would
30 remain less than all other months. As such, these increases are of insufficient magnitude to
31 substantially alter the long-term risk of pesticide-related water quality degradation in the Delta, and
32 therefore there would be no adverse public health effect related to these changes in pesticide
33 concentrations.

34 **CEQA Conclusion:** Under Alternative 4, water supply operations would increase contributions from
35 the San Joaquin River relative to the Sacramento River, and decrease the dilution capacity of the
36 Sacramento River for contaminants. This could result in changes in water quality. Water quality
37 modeling results (Chapter 8, *Water Quality*, Section 8.3.3.9) indicate that changes in flows under
38 Alternative 4 operational scenarios would not, for the most part, result in increased exceedances of
39 water quality criteria for constituents of concern (DBPs, trace metals and pesticides) in the study
40 area. As described in Chapter 8, under this alternative there would be a modeled increase in source
41 water fraction of the San Joaquin River at Rock Slough and Contra Costa Pumping Plant #1 of 22-
42 23% in November. For all operational scenarios, relative to Existing Conditions, there would be no
43 modeled increases in Sacramento River fractions greater than 14% and Delta agricultural fractions
44 greater than 8%. These modeled changes in the source water fractions of Sacramento, San Joaquin
45 and Delta agriculture water are not of sufficient magnitude to substantially alter the long-term risk

1 of pesticide-related toxicity to aquatic life, nor adversely affect other beneficial uses of the Delta.
2 Long-term average DOC concentrations for the modeled 16-year hydrologic period and the modeled
3 drought period would be predicted to increase by $\leq 14\%$. Under Scenario H4, increases in long-term
4 average DOC concentrations at Franks Tract, Rock Slough, and Contra Costa Pumping Plant would
5 correspond to more frequent concentration threshold exceedances, with the greatest change
6 occurring at Rock Slough and Contra Costa Pumping Plant (see Chapter 8, Section 8.3.3.9). However,
7 this predicted change would not be expected to adversely affect MUN beneficial uses, or any other
8 beneficial use.

9 Further, relative to Existing Conditions, Scenario H1-H4 long-term average bromide concentrations
10 would increase at the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton on the
11 Sacramento River under Alternative 4. Overall effects would be greatest at Barker Slough, with the
12 smallest model predicted increases occurring under Scenario H3 (21%; 72% increase during the
13 drought period), and the largest model predicted increases occurring under Scenario H2 (40%; 98%
14 increase during the drought period). The increase in long-term average bromide concentrations
15 predicted for Barker Slough would result in a substantial change in source water quality to existing
16 drinking water treatment plants drawing water from the North Bay Aqueduct. These modeled
17 increases in bromide at Barker Slough could contribute to the formation of DBPs and could
18 potentially result in an exceedance of the MCL for DBPs at drinking water treatment plants
19 ultimately resulting in impacts on public health. Accordingly, this would be a significant impact.

20 The increase in bromide concentrations in drinking water sources could require considerable water
21 treatment plant upgrades in order to achieve equivalent levels of drinking water health protection.
22 While treatment technologies sufficient to achieve the necessary bromide removal exist,
23 implementation of such technologies would likely require substantial investment in new or modified
24 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
25 long-term average bromide concentrations in drinking water sources would represent an increased
26 risk for adverse effects on public health from DBPs in drinking water sources. Assuming the adverse
27 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
28 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
29 uses potentially provided in Barker Slough would remain significant.

30 Implementation of Mitigation Measure WQ-5 would reduce the severity of this impact. The proposed
31 mitigation requires a series of phased actions to identify and evaluate existing and possible feasible
32 actions to avoid, minimize, or offset increased bromide concentrations, followed by development
33 and implementation of the actions, if determined to be necessary. However, the feasibility and
34 effectiveness of this mitigation measure are uncertain based on currently available information.

35 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
36 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
37 separate, other commitment to address the potential increased water treatment costs that could
38 result from bromide-related concentration effects on municipal water purveyor operations.
39 Potential options for making use of this financial commitment include funding or providing other
40 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
41 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
42 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
43 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
44 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
45 Because the BDCP proponents cannot ensure that the results of coordinated actions with water

1 treatment entities will be fully funded or implemented successfully prior to the project's
 2 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
 3 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
 4 or implemented before the project's contribution to the impact is made, a significant impact in the
 5 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
 6 significant and unavoidable. If, however, all financial contributions, technical contributions, or
 7 partnerships required to avoid significant impacts prove to be feasible and any necessary
 8 agreements are completed before the project's contribution to the effect is made, impacts would be
 9 less than significant.

10 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 11 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 12 **Slough**

13 It remains to be determined whether, or to what degree, the available and existing salinity
 14 response and countermeasure actions of SWP and CVP facilities or municipal water purveyors
 15 would be capable of offsetting the actual level of changes in bromide that may occur from
 16 implementation of Alternative 4. Therefore, in order to determine the feasibility of reducing the
 17 effects of increased bromide levels, and potential adverse effects on beneficial uses associated
 18 with CM1 operations (and hydrodynamic effects of tidal restoration under CM4), the proposed
 19 mitigation requires a series of phased actions to identify and evaluate existing and possible
 20 feasible actions, followed by development and implementation of the actions, if determined to
 21 be necessary. The development and implementation of any mitigation actions shall be focused
 22 on those incremental effects attributable to implementation of Alternative 4 operations only.
 23 Development of mitigation actions for the incremental bromide effects attributable to climate
 24 change/sea level rise are not required because these changed conditions would occur with or
 25 without implementation of Alternative 4. The goal of specific actions would be to reduce/avoid
 26 additional degradation of Barker Slough water quality conditions with respect to the CALFED
 27 bromide goal.

28 BDCP proponents shall also consider effects of site-specific restoration areas proposed under
 29 CM4 on bromide concentrations in Barker Slough. Design and siting of restoration areas shall
 30 attempt to reduce potential effects to the extent possible without compromising proposed
 31 benefits of the restoration areas. It is anticipated that these efforts will be able to reduce the
 32 level of projected increase, though it is unknown whether it would be able to completely
 33 eliminate any increases.

34 In addition, following commencement of initial operations of CM1, the BDCP proponents will
 35 conduct additional evaluations described herein, and develop additional modeling (as
 36 necessary), to define the extent to which modified operations could reduce or eliminate the
 37 increased bromide concentrations currently modeled to occur under Alternative 4. The
 38 additional evaluations should also consider specifically the changes in Delta hydrodynamic
 39 conditions associated with tidal habitat restoration under CM4 (in particular the potential for
 40 increased bromide concentrations that could result from increased tidal exchange) once the
 41 specific restoration locations are identified and designed. The evaluations will also consider up-
 42 to-date estimates of climate change and sea level rise, if and when such information is available.

43 If sufficient operational flexibility to offset bromide increases is not practicable/feasible under
 44 Alternative 4 operations, and/or siting and design of restoration areas cannot feasibly reduce

1 bromide increases to a less than significant level without compromising the benefits of the
 2 proposed areas, achieving bromide reduction pursuant to this mitigation measure would not be
 3 feasible under this alternative.

4 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 5 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

6 *NEPA Effects:* Three intakes would be constructed and operated under Alternative 4. Sediment-
 7 disturbing activities during construction and maintenance of these intakes and other water
 8 conveyance facilities proposed near or in surface waters under this alternative could result in the
 9 disturbance of existing constituents in sediment, such as pesticides or methylmercury. In-channel
 10 construction activities, such as pile driving during the construction of cofferdams at the intakes and
 11 pier construction at the barge unloading facilities, which would occur over a period of 5 months,
 12 would result in the localized disturbance of river sediment. In addition, maintenance of the three
 13 proposed north Delta intakes and the intermediate forebay would entail periodic dredging for
 14 sediment removal at these locations. Sediment accumulation in both the northern and southern
 15 portion of the expanded Clifton Court Forebay is expected to be minimal over the 50-year permit
 16 period. However, it is anticipated that there may be some sediment accumulation at the inlet
 17 structure of the northern portion of Clifton Court Forebay. Therefore, while overall sediment
 18 accumulation in this forebay is not expected to be substantial, some dredging may be required at the
 19 inlet structure to maintain an even flow path. Under the various Alternative 4 operational scenarios
 20 (H1–H4), changes in dilution and mixing of sources of water could result in a change in constituents
 21 known to bioaccumulate. For example, the reduction of flows in the Sacramento River downstream
 22 of the proposed north Delta intakes may result in a decreased dilution of constituents known to
 23 bioaccumulate in the study area.

24 **Pesticides**

25 Legacy pesticides, such as organochlorines, have low water solubility; they do not readily volatilize
 26 and have a tendency to bond to particulates (e.g., soil and sediment), settle out into the sediment,
 27 and not be transported far from the source. If present in sediment within in-water construction
 28 areas, legacy pesticides would be disturbed locally and would not be expected to partition into the
 29 water column to any substantial degree. Therefore, no significant adverse effect on public health
 30 would result from construction.

31 Numerous pesticides are currently used throughout the affected environment. While some of these
 32 pesticides may be bioaccumulative, those present-use pesticides for which there is sufficient
 33 evidence of their presence in waters affected by SWP and CVP operations (i.e., organophosphate
 34 pesticides, such as diazinon, chlorpyrifos, diuron, and pyrethroids) are not considered
 35 bioaccumulative. Thus, changes in their concentrations would not directly cause bioaccumulative
 36 problems in aquatic life or humans. Furthermore, Alternative 4 would not result in increased
 37 tributary flows that would mobilize organochlorine pesticides in sediments. Thus, the change in
 38 source water in the Delta associated with the change in water supply operations is not expected to
 39 adversely affect public health with respect to bioaccumulation of pesticides.

40 **Methylmercury**

41 If mercury is sequestered in sediments at water facility construction sites, it could become
 42 suspended in the water column during construction activities, opening up a new pathway into the
 43 food chain. Disturbance of sediment associated with construction activities (e.g., pile driving and

1 cofferdam installation) at intake sites or barge landing locations would result in a localized, short-
 2 term increase in turbidity during the construction activity, which may suspend sediment that
 3 contains methylmercury. Please see Chapter 8, Section 8.1.3.9, *Mercury*, for a discussion of
 4 methylmercury concentrations in sediments.

5 As environmental commitments DWR would develop and implement Erosion and Sediment Control
 6 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
 7 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
 8 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
 9 area of disturbance. These BMPs would include, but not necessarily be limited to the following.

- 10 • Install physical erosion control stabilization features (hydroseeding, mulch, silt fencing, fiber
 11 rolls, sand bags, and erosion control blankets) to capture sediment and control both wind and
 12 water erosion.
- 13 • Retain trees and natural vegetation to the extent feasible to stabilize hillsides, retain moisture,
 14 and reduce erosion.
- 15 • Limit construction, clearing of vegetation, and disturbance of soils to areas of proven stability.
- 16 • Use sediment ponds, silt traps, wattles, straw bale barriers or similar measures to retain
 17 sediment transported by runoff water onsite.
- 18 • Collect and direct surface runoff at non-erosive velocities to the common drainage courses.
- 19 • Deposit or store excavated materials away from drainage courses.
- 20 • Prevent transport of sediment at the construction site perimeter, toe of erodible slopes, soil
 21 stockpiles, and into storm drains.
- 22 • Reduce runoff velocity on exposed slopes.
- 23 • Reduce offsite sediment tracking.

24 Implementation of these measures would help ensure that construction activities would not
 25 substantially increase or substantially mobilize methylmercury. Accordingly, there would be no
 26 adverse effect.

27 Water quality and fish tissue modeling results showed small, insignificant changes in total mercury
 28 and methylmercury levels in water and fish tissues resulting from Alternative 4 water operations
 29 (see Chapter 8, Section 8.3.3.9, *Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and*
 30 *Intakes 2, 3, and 5 [9,000 cfs; Operational Scenario H]*), for a detailed discussion). Upstream mercury
 31 contributions and methylmercury production in Delta waters would not be altered by the operation
 32 of Alternative 4, as it would not change existing mercury sources and would not substantially alter
 33 methylmercury concentrations in the Sacramento River or San Joaquin River. Water quality
 34 modeling results indicate that the percentage change in assimilative capacity of waterborne total
 35 mercury relative to the 25 ng/L Ecological Risk Benchmark was greatest for Scenario H4 relative to
 36 the No Action Alternative. These changes ranged, from 5.0% at the Jones Pumping Plant to -2.3% at
 37 Old River at Rock Slough. These same sites show the smallest range of effects on assimilative
 38 capacity for Alternative 4 H1, with 4.3% and -1.4% for these same two stations, respectively.
 39 Operational Scenarios H2 and H3 fall between these two extremes. The changes are not expected to
 40 result in adverse effects on beneficial uses. Similarly, changes in methylmercury concentration are
 41 expected to be very small as predicted by modeling.

1 Fish tissue estimates showed small or no increase in exceedance quotient based on long-term
2 annual average mercury concentrations at the nine Delta locations modeled. The greatest increases
3 in exceedance quotients relative to the No Action Alternative were estimated to be 12% for both Old
4 River at Rock Slough, and for Franks Tract. The lowest percentage change in modeled bass mercury
5 concentrations is predicted to occur under Operational Scenario H1 relative to the No Action
6 Alternative for these locations.

7 Currently, mercury concentrations in fish tissues exceed Delta TMDL guidance targets, which are set
8 for human health rather than effects on fish, and operation of Alternative 4 is not expected to
9 substantially alter this condition. Large sport fish throughout the Delta are currently uniformly in
10 exceedance of consumption guidelines for mercury, and Alternative 4 is not expected to
11 substantially alter that condition. Although methylmercury currently exceeds the TMDL, little to no
12 change in mercury or methylmercury concentrations in water is expected under Alternative 4
13 operational scenarios. Thus, the alternative would not result in increased exceedances of water
14 quality criteria. Because water operations would not substantially increase methylmercury above
15 what currently exists in the study area and would not expose people to an additional public health
16 hazard, adverse effects on public health are not expected to result. In addition, because these
17 increases are relatively small, and it is not evident that substantive increases are expected at
18 numerous locations throughout the Delta, these changes are expected to be within the uncertainty
19 inherent in the modeling approach, and would likely not be measurable in the environment. See
20 Appendix 8I, *Mercury*, for a discussion of the uncertainty associated with the fish tissue estimates.

21 **CEQA Conclusion:** Intermittent and/or short-term construction-related activities (as would occur
22 for in-river construction) would not be anticipated to result in contaminant discharges of sufficient
23 magnitude or duration to contribute to long-term bioaccumulation processes, or cause measureable
24 long-term degradation such that existing 303(d) impairments would be made discernibly worse or
25 TMDL actions to reduce loading would be adversely affected. Legacy organochlorine pesticides
26 typically bond to particulates and do not mobilize easily. Construction and maintenance of
27 Alternative 4 would not cause these legacy pesticides to be transported far from the source or to
28 partition into the water column. Other pesticides which are currently present in waters affected by
29 SWP and CVP operations are not considered bioaccumulative. Although methylmercury currently
30 exceeds the TMDL, little to no change in methylmercury concentrations in water are expected under
31 Alternative 4 water conveyance construction.

32 Alternative 4 would not result in increased flows in the tributaries that would mobilize legacy
33 organochlorine pesticides in sediments. Other pesticides that are present in study area water
34 channels are not considered bioaccumulative and any changes in concentrations due to Alternative
35 4 operations would not cause them to become bioaccumulative.

36 Water quality modeling results indicated small, insignificant changes in mercury and
37 methylmercury levels in water at certain Delta locations and in mercury in fish tissues due to
38 Alternative 4 operational scenarios (H1-H4). Specifically, modeling results indicate that the
39 percentage change in assimilative capacity of waterborne total mercury relative to the 25 ng/L
40 Ecological Risk Benchmark for this alternative relative to Existing Conditions would show the
41 greatest decrease (2.4%) in the Old River at Rock Slough and at the Contra Costa Pumping Plant.
42 These are bounded by Alternative 4 H1 estimates of -1.4% and -1.5% at these two locations,
43 respectively. In contrast the greatest increase in assimilative capacity relative to Existing Conditions
44 would be 4.4% for operational Scenario H4 at the Jones Pumping Plant. Scenarios H2 and H3 range
45 in changes in assimilative capacity in relation to Existing Conditions from -2.1% (H3 at Contra Costa

1 Pumping Plant) to 4.1% (H2 at Banks). These small changes in assimilative capacity are not
 2 expected to result in significant impacts to beneficial uses. Fish tissue estimates show only small or
 3 no increases in exceedance quotients based on long-term annual average concentrations for
 4 mercury at the nine Delta locations modeled. The greatest increase over Existing Conditions was for
 5 Scenario H4 and was 15% at Old River at Rock Slough and 13% for Franks Tract as compared to
 6 Scenario H1 estimates for both of those locations of 9%. Because these increases are relatively small,
 7 and it is not evident that substantive increases are expected at numerous locations throughout the
 8 Delta, these changes are expected to be within the uncertainty inherent in the modeling approach,
 9 and would likely not be measurable in the environment. See Appendix 8I, *Mercury*, for a discussion
 10 of the uncertainty associated with the fish tissue estimates.

11 BMPs implemented as part of Erosion and Sediment Control Plans and SWPPPs would help ensure
 12 that construction activities would not substantially increase or substantially mobilize legacy
 13 organochlorine pesticides or methylmercury during construction and maintenance. Further,
 14 because mercury concentrations are not expected to increase substantially, no long-term water
 15 quality degradation is expected to occur and, thus, no adverse effects to beneficial uses would occur.
 16 Because any increases in mercury or methylmercury concentrations are not likely to be measurable,
 17 changes in mercury concentrations or fish tissue mercury concentrations would not make any
 18 existing mercury-related impairment measurably worse. In comparison to Existing Conditions,
 19 Alternative 4 would not increase levels of mercury by frequency, magnitude, and geographic extent
 20 such that the affected environment would be expected to have measurably higher body burdens of
 21 mercury in aquatic organisms or humans consuming those organisms.

22 Therefore, construction, operation and maintenance of Alternative 4 would not cause increased
 23 exposure of the public to these bioaccumulative sediment constituents. Since construction,
 24 maintenance, or operation of the water conveyance facilities under Alternative 4 would not cause
 25 substantial mobilization or a substantial increase of constituents known to bioaccumulate, impacts
 26 on public health would be less than significant. No mitigation is required.

27 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
 28 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
 29 **Facilities**

30 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
 31 area. Under Alternative 4, the method of delivering power to construct and operate the water
 32 conveyance facilities is assumed to be a “split” system that would connect to the existing grid in two
 33 different locations—one in the northern section of the alignment, and one in the southern section of
 34 the alignment. As described in Table 25-9, a total of 6.08 miles of new temporary 69 kV transmission
 35 lines; 18.72 miles of new temporary 230 kV transmission lines; and 14.96 miles of new permanent
 36 230 kV transmission lines; 1.00 mile of new permanent 230 kV/34.5 kV (underbuild) transmission
 37 lines; and 11.28 miles of new permanent 230 kV/34.5 kV (underbuild) transmission lines would be
 38 constructed and operated under Alternative 4. In addition, an existing 1.19-mile 500 kV
 39 transmission line south/southeast of the Clifton Court Forebay will be relocated to an area less than
 40 half a mile southeast of the current location of the existing towers.

41 Any new temporary and permanent transmission lines constructed and operated under Alternative
 42 4 would, for the most part, be located in areas that are not densely populated (Figure 25-2) and,
 43 therefore, would not expose substantially more people to EMF from transmission lines. Table 25-9
 44 identifies four potential new sensitive receptors (Stone Lakes National Wildlife Refuge, Courtland

1 Fire Station 92, Cosumnes River Ecological Reserve, and Clifton Court Forebay) associated with the
 2 pipeline/tunnel alignment that are not currently within 300 feet of an existing transmission line; the
 3 majority of sensitive receptors are already located within 300 feet of an existing 69 kV or 230 kV
 4 transmission line. Accordingly, new temporary or new permanent transmission lines would not
 5 expose substantially more potential sensitive receptors or substantially more people to EMFs that
 6 they are not already experiencing. Stone Lakes National Wildlife Refuge and Cosumnes River
 7 Ecological Reserve would be within 300 feet of a proposed temporary 230 kV transmission line and
 8 Clifton Court Forebay would be within 300 feet of a proposed permanent 230 kV transmission line
 9 and a 230 kV/34.5 kV (underbuild) transmission line. Visitors to these areas generally come for
 10 walks, water recreation, fishing and hunting, and as such, it is unlikely that large groups of people
 11 would be staying in the area within 300 feet of this proposed transmission line, so any EMF
 12 exposure would be limited. Courtland Fire Station 92 would be within 300 feet of a temporary 69 kV
 13 transmission line. These temporary transmission lines would be removed following completion of
 14 construction of the water conveyance facility features near this area so there would be no potential
 15 permanent effects.

16 As discussed in Section 25.1.1.6, the current scientific evidence does not show conclusively that EMF
 17 exposure can increase health risks. In 2006, CPUC updated its EMF policy and reaffirmed that health
 18 hazards from exposures to EMF have not been established. State and federal public health
 19 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
 20 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should be
 21 continued. Based on this, utility companies are required to establish and maintain EMF Design
 22 Guidelines in order to reduce potential health risks associated with power lines. These guidelines
 23 would be implemented for any new temporary or new permanent transmission lines constructed
 24 and operated under Alternative 4, depending on which electric provider is selected by DWR.
 25 Furthermore, as described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, the
 26 location and design of the proposed new transmission lines would be conducted in accordance with
 27 CPUC's EMF Design Guidelines for Electrical Facilities, and would include one or more of three
 28 measures to reduce EMF exposure.

- 29 • Shielding by placing trees or other physical barriers along the transmission line right-of-way.
- 30 • Cancellation by configuring the conductors and other equipment on the transmission towers.
- 31 • Increasing the distance between the source of the EMF and the receptor either by increasing the
 32 height of the tower or increasing the width of the right-of-way.

33 Therefore, operation of the transmission line corridors would not expose substantially more people
 34 to transmission lines generating EMFs, and there would be no adverse effect on public health.

35 **CEQA Conclusion:** Under Alternative 4, the majority of proposed new temporary (69 kV and 230 kV)
 36 and new permanent (230 kV and 230 kV/34.5 kV) transmission lines would be located within the
 37 rights-of-way of existing transmission lines; any new temporary or permanent transmission lines
 38 not within the right-of-way of existing transmission lines would, for the most part, be located in
 39 sparsely populated areas generally away from existing sensitive receptors. Four potential new
 40 sensitive receptors (Stone Lakes National Wildlife Refuge, Courtland Fire Station 92, Cosumnes
 41 River Ecological Reserve, and Clifton Court Forebay) associated with the pipeline/tunnel alignment
 42 that are not currently within 300 feet of an existing transmission line; the majority of sensitive
 43 receptors are already located within 300 feet of an existing 69 kV or 230 kV transmission line.
 44 Accordingly, new temporary or new permanent transmission lines would not expose substantially

1 more potential sensitive receptors or substantially more people to EMFs that they are not already
 2 experiencing. Stone Lakes National Wildlife Refuge and Cosumnes River Ecological Reserve would
 3 be within 300 feet of a proposed temporary 230 kV transmission line and Clifton Court Forebay
 4 would be within 300 feet of a proposed permanent 230 kV transmission line and a 230 kV/34.5 kV
 5 (underbuild) transmission line. Visitors to these areas generally come for walks, water recreation,
 6 fishing and hunting, and as such, it is unlikely that large groups of people would be staying in the
 7 area within 300 feet of this proposed transmission line, so any EMF exposure would be limited.
 8 Courtland Fire Station 92 would be within 300 feet of a temporary 69 kV transmission line. The
 9 temporary transmission lines would be removed when construction of the water conveyance facility
 10 features is completed, so there would be no potential permanent effects. Therefore, these
 11 transmission lines would not substantially increase people's exposure to EMFs.

12 Additionally, design and implementation of new proposed temporary or permanent transmission
 13 lines not within the right-of-way of existing transmission lines would follow CPUC's EMF Design
 14 Guidelines for Electrical Facilities and would implement shielding, cancellation, or distance measures
 15 to reduce EMF exposure. Since construction and operation of Alternative 4 would not expose
 16 substantially more people to transmission lines that provide new sources of EMFs, impacts on public
 17 health would be less than significant. No mitigation is required.

18 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
 19 **and CM11**

20 **NEPA Effects:** Implementation of CM2-CM7, CM10 and CM11 under Alternative 4 would include
 21 fisheries enhancement (CM2); the restoration of up to 65,000 acres of tidal and freshwater habitat
 22 (CM3 and CM4), 10,000 acres of seasonally inundated floodplain (CM5), and 1,200 acres of nontidal
 23 marsh and 500 acres of managed wetlands (CM10); enhancement of channel margin and riparian
 24 habitat (CM6 and CM7); and protection of 150 acres of alkali seasonal wetland complex and 1,500
 25 acres of managed wetlands (CM3 and CM11). These activities could potentially increase suitable
 26 mosquito habitat within the study area.

27 Under CM2, *Yolo Bypass Fisheries Enhancement*, the frequency, duration, and magnitude of
 28 inundation of the Yolo Bypass would increase. The increased floodplain inundation and water
 29 surface may result in an increase in mosquitoes in the Yolo Bypass.

30 Of the approximate 65,000-acre tidal and freshwater habitat restoration target, approximately
 31 55,000 acres of this restoration will consist of tidal perennial aquatic, tidal mudflat, tidal freshwater
 32 emergent wetland, and tidal brackish emergent wetland natural communities, and the remaining up
 33 to 10,000 acres will consist of transitional uplands to accommodate sea level rise. Of the
 34 approximate 55,000 acres of tidally influenced natural community, approximately 20,600 acres
 35 must occur in particular ROAs as listed below.

- 36 • 7,000 acres of brackish tidal habitat, of which at least 4,800 acres would be tidal brackish
 37 emergent wetland and the remainder would be tidal perennial aquatic and tidal mudflat, in
 38 Suisun Marsh (ROA).
- 39 • 5,000 acres of freshwater tidal habitat in the Cache Slough ROA.
- 40 • 1,500 acres of freshwater tidal habitat in the Cosumnes/Mokelumne ROA.
- 41 • 2,100 acres of freshwater tidal habitat in the West Delta ROA.
- 42 • 5,000 acres of freshwater tidal habitat in the South Delta ROA.

1 The remaining 34,400 acres would be distributed among the ROAs or may occur outside the ROAs.
 2 The areas within the ROAs currently have potentially suitable habitat for mosquitoes and aquatic
 3 habitat restoration in these areas may increase mosquito populations.

4 Potentially suitable mosquito habitat resulting from the implementation of CM2–CM7, CM10 and
 5 CM11 would generally not be located near densely populated areas (Figure 25-3). Table 25-6
 6 outlines the distances travelled from breeding grounds for the species listed. These distances range
 7 from less than 1 mile to up to 30 miles. The conservation measures would generally expand existing
 8 habitat or replace existing agricultural areas, both of which are currently sources for mosquitoes. Of
 9 the ROAs, the South Delta ROA and West Delta ROA currently have the fewest acres of habitat
 10 suitable for mosquitoes and are the closest to more densely populated areas (Figure 25-3). Similarly,
 11 although much of Yolo Bypass is not proximate to densely populated areas, there are areas of Yolo
 12 Bypass near populated areas including El Macero, Davis, and West Sacramento. Therefore, habitat
 13 restoration in these ROAs and in the Yolo Bypass may result in an increase in mosquitoes and
 14 exposure to vector-borne diseases when compared with restoration of aquatic habitat within the
 15 other ROAs.

16 The habitat restoration and enhancement under all of these CMs would be performed in accordance
 17 with Natural Communities Enhancement and Management (CM11), which would require
 18 preparation and implementation of management plans for the protected natural communities and
 19 covered species habitats. The preparation and implementation of the management plans would be
 20 performed in consultation with the appropriate MVCDs. This consultation would occur when
 21 specific restoration and enhancement projects and locations are identified within the ROAs and
 22 prior to implementation of CM2. It is standard practice to use IPM to control mosquitoes, and, as
 23 part of the consultation with the MVCDs, BDCP proponents would prepare and implement MMPs
 24 (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). In addition, BMPs from the guidelines
 25 outlined in Section 25.2.3.4 and Section 25.2.5.7 and detailed in Appendix 3B would be incorporated
 26 into the proposed project and executed to maintain proper water circulation and flooding during
 27 appropriate times of the year (e.g., fall) to prevent stagnant water and habitat for mosquitoes. BMPs
 28 to be implemented as part of the MMPs would include, but not necessarily be limited to, the
 29 following.

- 30 • Delay or phase fall flooding—phased flooding involves flooding habitat throughout the fall and
 31 winter in proportion to wildlife need and takes into consideration other wetland habitat that
 32 may be available in surrounding areas.
- 33 • Use rapid fall flooding
- 34 • Use deep initial flooding
- 35 • Subsurface irrigate
- 36 • Utilize water sources with mosquito predators for flooding
- 37 • Drain irrigation water into ditches or other water bodies with abundant mosquito predators
- 38 • Employ vegetation management practices to reduce mosquito production in managed wetlands
 39 (e.g., mowing, burning, discing of vegetation that serves as mosquito breeding substrate)
- 40 • Design wetlands and operations to be inhospitable to mosquitoes
- 41 • Implement monitoring and sampling programs to detect early signs of mosquito population
 42 problems

- 1 • Use biological agents such as mosquito fish to limit larval mosquito populations.
- 2 • Use larvicides and adulticides, as necessary
- 3 • Test for mosquito larvae during the high mosquito season (June through September)

4 Finally, restoration of different types of habitat would potentially increase mosquito predators, such
 5 as birds and bats, using the habitat. Therefore, implementation of the habitat restoration and
 6 enhancement conservation measures would not significantly increase the public's risk of exposure
 7 to vector-borne diseases. Accordingly, there would be no adverse effect.

8 **CEQA Conclusion:** Although implementing Alternative 4 would increase restored and enhanced
 9 habitat in the study area that could result in a significant increase in vectors such as mosquitoes,
 10 implementation of environmental commitments, including consultation with the MVCDs and
 11 implementation of BMPs as part of MMPs as set forth in Appendix 3B, *Environmental Commitments*,
 12 *AMMs*, and *CMs*, would reduce the potential for an increase in mosquito breeding habitat, and, as
 13 such, an associated substantial increase in vector-borne diseases would not result. Furthermore,
 14 habitat would be restored in areas where existing potentially suitable habitat for mosquitoes
 15 already exists. Finally, predators on mosquitoes would likely increase as a result of restoration and
 16 enhancement, which would keep mosquito populations in check. Accordingly, implementation of
 17 CM2-CM7, CM10 and CM11 under Alternative 4 would not substantially increase the public's risk of
 18 exposure to vector-borne diseases beyond what currently exists and would be less than significant.
 19 No mitigation is required.

20 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 21 **Implementing the Restoration Conservation Measures**

22 **NEPA Effects:** The study area currently supports habitat types, such as tidal habitat, upland
 23 wetlands, and agricultural lands, that produce pathogens as a result of the biological productivity in
 24 these areas (e.g., migrating birds, application of fertilizers, waste products of animals). The study
 25 area does not currently have pathogen concentrations that rise to the level of adversely affecting
 26 beneficial uses of recreation. Restored habitat and protected agricultural lands under Alternative 4
 27 could result in an increase in pathogen loading in the study area because these land uses are known
 28 to generate pathogens. However, as exemplified by the Pathogen Conceptual Model, any potential
 29 increase in pathogens associated with the proposed habitat restoration and enhancement (as part of
 30 implementation of restoration conservation measure) would be localized and within the vicinity of
 31 the actual restoration. The result would be similar for lands protected for agricultural uses. This
 32 localized increase is not expected to be of sufficient magnitude and duration to result in adverse
 33 effects on recreationists as described in Chapter 8, *Water Quality*, Section 8.3.3.9. Furthermore,
 34 depending on the level of recreational access granted by management plans, habitat restoration and
 35 enhancement could increase or decrease opportunities for recreationists within the study area.
 36 Mechanisms that permit public access could increase opportunities related to upland hunting,
 37 hiking, walking, wildlife and botanical viewing, nature photography, picnicking, and sightseeing.
 38 Alternatively, land acquisition that would exclude public recreational use would decrease
 39 opportunities for these activities, thus limiting recreationists' potential exposure to pathogens. Even
 40 if recreationists were allowed in the ROAs, the characteristics of pathogens in water as described by
 41 the conceptual model would not substantially increase recreationists' exposure. Accordingly,
 42 implementation of the restoration conservation measures under Alternative 4 would not result in a
 43 substantial increase in recreationists' exposure to pathogens. There would be no adverse effect.

1 **CEQA Conclusion:** Implementation of the restoration conservation measures would support habitat
2 types, such as wetlands and agricultural lands, that could produce pathogens as a result of the
3 biological productivity in these areas (e.g., migrating birds, application of fertilizers, waste products
4 of animals). However, the localized nature of pathogen generation, as well as the quick die-off of
5 some types of pathogens once released into water bodies, would generally prevent substantial
6 pathogen exposure to recreationists. Therefore, impacts would be less than significant. No
7 mitigation is required.

8 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
9 **as a Result of Implementing CM2, CM4, CM5, and CM10**

10 **NEPA Effects:** The primary concern with habitat restoration regarding constituents known to
11 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
12 inundated floodplains and marshes. The mobilization depends on the presence of the constituent
13 and the biogeochemical behavior of the constituent to determine whether it could re-enter the
14 water column or be reintroduced into the food chain.

15 **Pesticides**

16 Organochlorines and other relatively water insoluble pesticides would likely be sequestered in the
17 former agricultural soils in ROAs. Additionally, because these chemicals tend to bind to particulates,
18 concentrations are typically highest in sediment. Flooding of former agricultural land, as would
19 occur under CM4, CM5, and CM10, is expected to result in some level of accessibility to biota through
20 uptake by benthic organisms. Moreover, CM2 and CM5 may be managed alongside continuing
21 agriculture, where pesticides may be used on a seasonal basis and where water during flood events
22 may come in contact with residues of these pesticides. However, rapid dissipation would be
23 expected, particularly in the large volumes of water involved in flooding; therefore, it is unlikely that
24 a substantial increase in bioaccumulation by fish would result. Further, implementation of CM2,
25 CM4, CM5, and CM10 would not include the use of bioaccumulative pesticides. Additionally,
26 significant increases in concentrations of organochlorine and other legacy pesticides are not
27 expected in the water column because these lipophilic chemicals strongly partition to sediments,
28 and concentrations in the water column would be relatively short-lived because these pesticides
29 settle out of the water column via sediment adsorption in low-velocity flow.

30 As described in Section D.4.6.1 of BDCP Appendix 5.D, if pesticide-laden sediment erodes and is
31 transported from an ROA, it is likely that the pesticides would not be transported very far from the
32 source area, and would settle out with suspended particulates and be deposited close to the ROA.
33 For these reasons, a substantial mobilization of, or a substantial increase in, bioaccumulative
34 pesticides in the study area is not anticipated. Therefore, no adverse effect on public health with
35 respect to bioaccumulation of pesticides is expected.

36 **Methylmercury**

37 Conversion of inorganic mercury to methylmercury occurs in flooded fine sediments subjected to
38 periodic drying-out periods and is associated with anaerobic (oxygen-depleted), reducing
39 environments (Alpers et al. 2008; Ackerman and Eagles-Smith 2010). Methylmercury production is
40 greatest in high marshes that are subjected to wet and dry periods over the highest monthly tidal
41 cycles; production appears to be less in low marshes that are always inundated and not subject to
42 dry periods (Alpers et al. 2008).

1 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
2 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
3 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
4 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
5 be mobilized into the aquatic system. Results of the CALFED Mercury Project Annual Report for
6 2007 (Stephenson et al. 2007) indicate that river inputs (11.5 grams per day [g/day]
7 methylmercury) and in-situ production from wetland/marsh sediments (11.3 g/day
8 methylmercury) are the leading sources of methylmercury to the Delta waters, and have roughly
9 comparable levels of input. Wood (2010) estimates that in-situ methylmercury production in open
10 water and wetlands contributes approximately 36% of the overall methylmercury load to the Delta
11 (approximately 5 g/day) but is less than riverine/tributary inputs (8 g/day). The higher estimate of
12 methylmercury production from sediments reported by Stephenson is based on periods of higher
13 water (wet) and may be more representative of what might occur when new ROAs are opened for
14 inundation. Once in the aquatic system, the methylmercury can be transported with water flow,
15 taken up by biota, volatilized, demethylated, or returned to sediment (but not necessarily at the
16 original restoration site).

17 The Sacramento River watershed, and specifically the Yolo Bypass, is the primary source of mercury
18 in the study area. The highest concentrations of mercury and methylmercury are in the Cache Creek
19 area and the Yolo Bypass. The amount of methylmercury produced in the Yolo Bypass has been
20 estimated to represent 40% of the total methylmercury production for the entire Sacramento River
21 watershed (Foe et al. 2008). Water discharging from the Yolo Bypass at Prospect Slough has a
22 reported average annual methylmercury concentration of 0.27 ng/L, more than four times greater
23 than the 0.06 ng/L TMDL.

24 The highest levels of methylmercury generation, mobilization, and bioavailability are expected in
25 the Yolo Bypass with implementation of CM2 under Alternative 4. Implementation of CM2 would
26 subject Yolo Bypass to more frequent and wider areas of inundation. The concentrations of
27 methylmercury in water exiting the Yolo Bypass would depend on many variables. However,
28 implementation of CM2 has the potential to significantly increase the loading, concentrations, and
29 bioavailability of methylmercury in the aquatic system.

30 As part of the implementation of conservation measures under Alternative 4, measures would be
31 developed to reduce the production of methylmercury in ROAs, and these measures would be
32 implemented as part of *CM12 Methylmercury Management*. These measures may include
33 construction and grading in a way that minimizes exposure of mercury-containing soils to the water
34 column; designing areas to support/enhance photodegradation; and pre-design field studies to
35 identify depositional areas where mercury accumulation is most likely and characterization and/or
36 design that avoids these areas. CM12 provides for consideration of new information related to
37 methylmercury degradation that could effectively mitigate methylmercury production and
38 mobilization.

39 In summary, Alternative 4 restoration actions are likely to result in increased production,
40 mobilization, and bioavailability of methylmercury in the aquatic system. Methylmercury would be
41 generated by inundation of restoration areas, with highest concentrations expected in the Yolo
42 Bypass, Cosumnes River and Mokelumne River, and at ROAs closest to these source areas as a result
43 of the BDCP actions. An increase in bioavailability in the aquatic system could result in a
44 corresponding increase in bioaccumulation in fish tissue, biomagnification through the food chain,
45 and human exposure. Because the increase in bioavailability in the food chain cannot be quantified,

1 the increase in human exposure also cannot be quantified. OEHHA standards would continue to be
 2 implemented for the consumption of study area fish and thus would serve to protect people against
 3 the overconsumption of fish with increased body burdens of mercury. Furthermore, implementation
 4 of *CM12 Methylmercury Management* would minimize effects because it provides for project-specific
 5 mercury management plans including a QA/QC program, and specific tidal habitat restoration
 6 design elements to reduce the potential for methylation of mercury and its bioavailability in tidal
 7 habitats. As such, adverse effects on public health due to the substantial mobilization of or increase
 8 in methylmercury are not expected to occur.

9 **CEQA Conclusion:** Flooding of former agricultural land under CM4, CM5, and CM10, could result in
 10 some level of accessibility of legacy organochlorine pesticides to biota through uptake by benthic
 11 organisms. Further, CM2 and CM5 may be managed alongside continuing agriculture, where
 12 pesticides may be used on a seasonal basis and where water during flood events may come in
 13 contact with organochlorine and legacy pesticide residues. However, rapid dissipation would be
 14 expected, particularly in the large volumes of water involved in flooding; therefore, it is unlikely that
 15 a substantial increase in bioaccumulation by fish would result. Additionally, while there would likely
 16 be an increase in mobilization of and potentially an increase in bioaccumulation of methylmercury
 17 in the study area's aquatic systems (e.g., fish and water) in the near term, it is unlikely to be
 18 substantial. Further, *CM12 Methylmercury Management* as well as existing OEHHA standards, would
 19 serve to reduce the public's exposure to contaminated fish. Implementation of CM2, CM4, CM5, and
 20 CM10 under Alternative 4 would not substantially mobilize or substantially increase the public's
 21 exposure to constituents known to bioaccumulate and would be less than significant. No mitigation
 22 is required.

23 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 24 **Conveyance Facilities**

25 Any modified reservoir operations under Alternative 4 are not expected to promote *Microcystis*
 26 production upstream of the Delta since large reservoirs upstream of the Delta are typically low in
 27 nutrient concentrations and phytoplankton outcompete cyanobacteria, including *Microcystis*.
 28 Further, in the rivers and streams of the Sacramento River watershed, watersheds of the eastern
 29 tributaries (Cosumnes, Mokelumne, and Calaveras Rivers), and the San Joaquin River upstream of
 30 the Delta, bloom development would be limited by high water velocity and low hydraulic residence
 31 times.

32 Conditions in the Export Service Areas under the four operational scenarios of Alternative 4 are not
 33 expected to become more conducive to *Microcystis* bloom formation, relative to the No Action
 34 Alternative, because neither water residence time nor water temperatures will increase in the
 35 Export Service Areas. As described in Chapter 8, *Water Quality*, *Microcystis* blooms in the Export
 36 Service Areas could increase due to increased water temperatures resulting from climate change,
 37 but not due to water conveyance facility operations. Similarly, residence times in the Export Service
 38 Area would not be affected by operations of CM1. Accordingly, conditions would not be more
 39 conducive to *Microcystis* bloom formation. Water diverted from the Sacramento River in the north
 40 Delta is expected to be unaffected by *Microcystis*, but the fraction of water flowing through the Delta
 41 that reaches the existing south Delta intakes is expected to be influenced by an increase in
 42 *Microcystis* blooms. Therefore, relative to the No Action Alternative, the addition of Sacramento
 43 River water from the north Delta under Alternative 4 would dilute *Microcystis* and microcystins in
 44 water diverted from the south Delta. Because the degree to which *Microcystis* blooms, and thus
 45 microcystins concentrations, would increase in source water from the south Delta is unknown, it

1 cannot be determined whether Alternative 4 will result in increased or decreased levels of
2 microcystins in the mixture of source waters exported from Banks and Jones pumping plants.

3 Ambient meteorological conditions are the primary driver of Delta water temperatures, and
4 therefore climate warming, and not water operations, would determine future water temperatures
5 in the Delta. Increasing water temperatures due to climate change could lead to earlier attainment of
6 the water temperature threshold of 19°C required to initiate *Microcystis* bloom formation, and
7 therefore earlier occurrences of *Microcystis* blooms in the Delta, as well as increases in the duration
8 and magnitude. However, these temperature-related changes under Alternative 4 would not be
9 different from what would occur under the No Action Alternative. Under H1-H4 operational
10 scenarios, the modeled increase in hydraulic residence time in the Delta indicate varying levels of
11 change depending on Delta location and timeframe (see Chapter 8, *Water Quality*). The changes in
12 hydraulic residence time are driven by several factors accounted for in the modeling, including the
13 hydrodynamic effects of restoration actions planned under CM2 and CM4, diversion of Sacramento
14 River water at the proposed north Delta intake facility, as well as changes in net Delta outflows.
15 Siting and design of restoration areas would have a substantial influence on the magnitude of
16 residence time increases under Alternative 4. The modeled increase in hydraulic residence time in
17 the Delta under operational scenarios H1-H4 could potentially increase the frequency, magnitude,
18 and geographic extent of *Microcystis* blooms, and therefore microcystin in the Delta. Therefore,
19 impacts on beneficial uses, including drinking water and recreational waters, could occur and, as
20 such, public health could be affected. Accordingly, this would be considered an adverse effect.
21 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
22 quality, and therefore potential public health effects due to *Microcystis*. However, because the
23 effectiveness of these mitigation measures to result in feasible measures for reducing water quality
24 effects, and therefore potential public health effects, is uncertain, the effect would still be considered
25 adverse.

26 **CEQA Conclusion:** Under Alternative 4, operation of the water conveyance facilities is not expected
27 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta
28 because large reservoirs upstream are typically low in nutrient concentrations and phytoplankton
29 outcompete cyanobacteria, including *Microcystis*, and high water velocity and low hydraulic
30 residence times in the upstream area limit the development of *Microcystis* blooms. *Microcystis*
31 blooms in the Export Service Areas could increase due to increased water temperatures resulting
32 from climate change, but not water conveyance facility operations. Residence times in the Export
33 Service Area would not be affected by operations of CM1, and therefore conditions would not be
34 more conducive to *Microcystis* bloom formation. Water exported from the Delta to the Export
35 Service Area is expected to be a mixture of *Microcystis*-affected source water from the south Delta
36 intakes and unaffected source water from the Sacramento River. Because of this, it cannot be
37 determined whether operations and maintenance under Alternative 4 would result in increased or
38 decreased levels of *Microcystis* and microcystins in the mixture of source waters exported from
39 Banks and Jones pumping plants.

40 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
41 would result in an increase in the frequency, magnitude and geographic extent of *Microcystis*, and
42 therefore microcystin levels. However, the potential water quality effects due to temperature
43 increases would be due to climate change, not effects resulting from operation of the water
44 conveyance facilities. Increases in Delta residence times under all Alternative 4 operational
45 scenarios (i.e., H1-H4) would be due in small part to climate change and sea level rise, but due to a
46 greater degree to operation of the water conveyance facilities and hydrodynamic impacts of

1 restoration included in CM2 and CM4. Consequently, it is possible that increases in the frequency,
 2 magnitude, and geographic extent of *Microcystis* blooms in the Delta would occur due to the
 3 operations and maintenance of the water conveyance facilities and the hydrodynamic impacts of
 4 restoration under CM2 and CM4. Accordingly, beneficial uses including drinking water and
 5 recreational waters would potentially be impacted and therefore, so would public health. Therefore
 6 this impact would be significant.

7 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 8 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 9 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 10 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 11 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 12 to determine whether increases in abundance are significant. This mitigation measure also requires
 13 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 14 investigate and evaluate measures that could be taken to manage hydraulic residence time in the
 15 affected areas of the Delta. However, because the effectiveness of these mitigation measures to
 16 result in feasible measures for reducing water quality effects, and therefore potential public health
 17 effects, is uncertain, this impact would be significant and unavoidable.

18 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 19 ***Microcystis* Blooms**

20 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 21 in Chapter 8, *Water Quality*.

22 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 23 **Water Residence Time**

24 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 25 in Chapter 8, *Water Quality*.

26 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 27 **CM4**

28 **NEPA Effects:** As described in Chapter 8, *Water Quality*, implementation of CM3 and CM6–CM21 is
 29 unlikely to affect *Microcystis* abundance in the rivers and reservoirs upstream of the Delta, in the
 30 Delta region, or the waters exported to the SWP/CVP Export Service Areas. Implementation of *CM5*
 31 *Seasonally Inundated Floodplain Restoration* could result in increased local water temperatures in
 32 areas near restored seasonally inundated floodplains. However, floodplain inundation typically
 33 occurs during spring and winter months when *Microcystis* growth is limited in general by low water
 34 temperatures and by insufficient surface water irradiance. Water temperatures would not increase
 35 sufficiently due to floodplain inundation such that effects on *Microcystis* growth would occur.
 36 Therefore, implementation of *CM5* is unlikely to affect *Microcystis* blooms in the study area.
 37 Implementation of *CM13 Invasive Aquatic Vegetation Control* may increase turbidity and flow
 38 velocity, particularly in restored aquatic habitats, which could discourage *Microcystis* growth in
 39 these areas. To the extent that IAV removal would affect turbidity and water velocity, it is possible
 40 that IAV removal could, to some degree, help offset the increase in *Microcystis* production expected
 41 under Alternative 4, relative to the No Action Alternative.

1 As discussed under Impact PH-8, development of restoration areas under CM2 and CM4 could
 2 potentially increase the frequency, magnitude, and geographic extent of *Microcystis* blooms due to
 3 the hydrodynamic impacts that are expected to increase water residence times throughout the
 4 Delta. Additionally, restoration activities implemented under CM2 and CM4 that create shallow
 5 backwater areas could result in local increases in water temperature that may encourage *Microcystis*
 6 growth during the summer bloom season, which could result in further degradation of water quality
 7 to the extent that beneficial uses are affected. Were *Microcystis* blooms to increase with
 8 implementation of CM2 and CM4, there would be an increase in the potential for impacts on public
 9 health as a result of potential effects on drinking water quality and recreational waters. Mitigation
 10 Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local
 11 water temperatures and water residence time, but the effects would be adverse.

12 **CEQA Conclusion:** Restoration activities implemented under Alternative 4 for CM2 and CM4 that
 13 create shallow backwater areas could result in local increases in water temperature conducive to
 14 *Microcystis* growth during summer bloom season. This could compound the water quality
 15 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 16 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 17 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 18 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 19 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 20 increased local water temperatures and water residence time. The effectiveness of these mitigation
 21 measures to result in feasible measures for reducing water quality effects, and therefore potential
 22 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

23 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 24 ***Microcystis* Blooms**

25 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 26 in Chapter 8, *Water Quality*.

27 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 28 **Water Residence Time**

29 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 30 in Chapter 8, *Water Quality*.

31 **25.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and**
 32 **Intake 1 (3,000 cfs; Operational Scenario C)**

33 Alternative 5 would involve construction activities similar to those described under Alternative 1A;
 34 therefore, types of construction impacts would be the same, although somewhat less because there
 35 would be only one intake compared to five. Construction impacts are summarized below for vector-
 36 borne diseases and water quality concerns. Alternative 5 would have four fewer intakes than
 37 Alternative 1A would have, and correspondingly fewer solids lagoons, sedimentation basins, and
 38 transmission lines. Therefore, the public health effects of Alternative 5 would be similar to but
 39 generally less than those identified for Alternative 1A. Water supply operations under Alternative 5
 40 would adhere to the Operational Scenario C criteria. The location of habitat restoration and
 41 enhancement that would occur under Alternative 5 would be similar to that of Alternative 1A;
 42 however, only 25,000 acres of tidal habitat restoration would occur under Alternative 5, rather than

1 65,000 acres. All other conservation measures under Alternative 5 would be the same as those
2 described under Alternative 1A.

3 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 4 **the Water Conveyance Facilities**

5 **NEPA Effects:** Alternative 5 would involve construction and operation of up to three solids lagoons,
6 one sedimentation basin, an intermediate forebay and associated 350-acre inundation area adjacent,
7 and Bryon Tract Forebay.; The mechanisms for potential public health effects are similar to those
8 described above for Alternative 1A. Specifically, the sedimentation basin, solids lagoons, Byron Tract
9 Forebay, the intermediate forebay, and the inundation area have the potential to provide habitat for
10 vectors that transmit diseases (e.g., mosquitoes) because of the large volumes of water that would
11 be held within these areas. The depth, design, and operation of the sedimentation basin and solids
12 lagoons would prevent the development of suitable mosquito habitat (Figure 25-1). Specifically, the
13 basins would be too deep and the constant movement of water would prevent mosquitoes from
14 breeding and multiplying. Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet
15 deep, and solids lagoons would be 165 feet long by 86 feet wide by 10 feet deep. Furthermore, use of
16 the 350-acre inundation area adjacent to the intermediate forebay would be limited to forebay
17 emergency overflow situations and water would be pumped back to the intermediate forebay,
18 creating circulation such that the inundation area would have a low potential for creating suitable
19 vector habitat. Similarly, water in the Byron Tract Forebay and intermediate forebay would be
20 circulated regularly and, with the exception of shallower areas around the periphery, would be too
21 deep to provide suitable mosquito habitat. The shallower edges of the forebays could provide
22 suitable mosquito breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed)
23 were allowed to grow.

24 To minimize the potential for impacts related to increasing suitable vector habitat within the study
25 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
26 MVCDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
27 control mosquitoes (see Impact PH-1 under Alternative 1A). These BMPs would be consistent with
28 practices presented in *Best Management Practices for Mosquito Control in California* (California
29 Department of Public Health 2012). Implementation of these BMPs would reduce the likelihood that
30 BDCP operations would require an increase in abatement activities by the local MVCDs. Accordingly,
31 as described under Alternative 1A, construction and operation of the intakes, solids lagoons,
32 sedimentation basins, the forebays, and the intermediate forebay inundation area under Alternative
33 5 would not substantially increase suitable vector habitat, and would not substantially increase
34 vector-borne diseases. Therefore, no adverse effects would result.

35 **CEQA Conclusion:** Implementation of CM1 under Alternative 5 would involve the construction and
36 operation of four fewer solids lagoons and one sedimentation basin relative to Alternative 1A, and
37 construction and operation of an intermediate forebay and associated 350-acre inundation area, and
38 Byron Tract Forebay. While these facilities could provide suitable habitat for vectors (e.g.,
39 mosquitoes), water depth and circulation would prevent the areas from substantially increasing
40 suitable vector habitat. The inundation area would only be used during emergency overflow
41 situations and water would be pumped back into the intermediate forebay, creating circulation that
42 would discourage mosquito breeding. The shallower periphery of the intermediate forebay and
43 Bryon Tract Forebay could provide suitable mosquito breeding habitat.

1 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 2 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 3 MVEDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 4 control mosquitoes. These BMPs would be consistent with practices presented in *Best Management*
 5 *Practices for Mosquito Control in California* (California Department of Public Health 2012). See
 6 Impact PH-1 under Alternative 1A. Therefore, construction and operation of the water conveyance
 7 facilities under Alternative 5 would not result in a substantial increase in vector-borne diseases and
 8 the impact on public health would be less than significant. No mitigation is required.

9 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 10 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 11 **Facilities**

12 **NEPA Effects:** Like Alternative 1A, the distribution and mixing of study area source waters would
 13 change under Alternative 5. Modeled changes in DOC concentrations and, by extension, DBPs
 14 relative to the No Action Alternative suggest that there would not be exceedances of DBP criteria
 15 due to operations. Long-term average DOC concentrations would be only slightly higher under this
 16 alternative relative to the No Action Alternative. Similarly, as discussed in Chapter 8, *Water Quality*,
 17 Section 8.3.3.10, water supply operations under Alternative 5 would not result in substantial
 18 increases in trace metal concentrations in the study area relative the No Action Alternative.

19 However, under Alternative 5, long-term average bromide concentrations would increase at Buckley
 20 Cove, Rock Slough, and Contra Costa Pumping Plant #1, Staten Island, Emmaton, and Barker Slough,
 21 with the greatest increase at Barker Slough (27%). The increase would be more substantial during
 22 the drought period (83%). This increase in bromide might require upgrades or changes in
 23 operations at water treatment plants. While treatment technologies sufficient to achieve the
 24 necessary bromide removal exist, implementation of such technologies would likely require
 25 substantial investment in new or modified infrastructure. Should treatment plant upgrades not be
 26 undertaken, a change of such magnitude in long-term average bromide concentrations in drinking
 27 water sources would represent an increased risk for adverse effects on public health from DBPs in
 28 drinking water sources. Mitigation Measure WQ-5 is available to reduce these effects.
 29 Implementation of this measure along with a separate, other commitment as set forth in EIR/EIS
 30 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, relating to the potential increased
 31 treatment costs associated with bromide-related changes would reduce these effects. Further, as
 32 described for Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay
 33 Aqueduct at Barker Slough may be further minimized by implementation of the AIP.

34 As described in Chapter 8, *Water Quality*, modeled July and August San Joaquin River fractions at
 35 Buckley Cove would increase relative to the No Action Alternative under this alternative, with
 36 increases of 12% in July (25% for the modeled drought period) and 22% in August (43% for the
 37 modeled drought period). Despite these increases, the resulting net San Joaquin River source water
 38 fraction for July and August would remain less than all other months. As a result, these modeled
 39 changes in the source water fractions are not of sufficient magnitude to adversely affect other
 40 beneficial uses of the Delta. Therefore, it is not anticipated that there would be adverse effects on
 41 public health related to levels of pesticides in drinking water sources.

42 **CEQA Conclusion:** The operation of water conveyance facilities under Alternative 5 would adhere to
 43 the criteria set forth under Operational Scenario C. Water quality modeling results indicate that, for
 44 the most part, there would be no substantial changes in trace metals, DBPs, or pesticides relative to

1 Existing Conditions under this operational scenario. An exception to this is that concentrations of
2 bromide would increase at the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton
3 on the Sacramento River under Alternative 5, with the greatest increase occurring at Barker Slough
4 (23%). This increase would be more substantial during the drought period (84%). These modeled
5 increases in bromide at Barker Slough could lead to adverse changes in the formation of DBPs at
6 drinking water treatment plants such that considerable water treatment plant upgrades would be
7 necessary to achieve equivalent levels of drinking water health protection. This would be a
8 significant impact.

9 While treatment technologies sufficient to achieve the necessary bromide removal exist,
10 implementation of such technologies would likely require substantial investment in new or modified
11 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
12 long-term average bromide concentrations in drinking water sources would represent an increased
13 risk for adverse effects on public health from DBPs in drinking water sources. Assuming the adverse
14 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
15 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
16 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
17 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
18 based on currently available information.

19 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
20 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
21 separate, other commitment to address the potential increased water treatment costs that could
22 result from bromide-related concentration effects on municipal water purveyor operations.
23 Potential options for making use of this financial commitment include funding or providing other
24 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
25 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
26 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
27 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
28 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
29 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
30 treatment entities will be fully funded or implemented successfully prior to the project's
31 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
32 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
33 or implemented before the project's contribution to the impact is made, a significant impact in the
34 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
35 significant and unavoidable. If, however, all financial contributions, technical contributions, or
36 partnerships required to avoid significant impacts prove to be feasible and any necessary
37 agreements are completed before the project's contribution to the effect is made, impacts would be
38 less than significant.

39 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
40 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
41 **Slough**

42 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

1 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
2 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

3 **NEPA Effects:** Alternative 5 would have four fewer intakes than Alternative 1A would have;
4 however, the intake would be constructed and operated in a similar manner to those under
5 Alternative 1A. As described under Alternative 1A, sediment-disturbing activities during
6 construction and maintenance of the water conveyance facilities under Alternative 5 could result in
7 the disturbance of existing constituents in sediment, such as pesticides or methylmercury.
8 Therefore, the public health effects associated with pesticides and methylmercury would be similar,
9 although, slightly less, than those associated with Alternative 1A. Intermittent and/or short-term
10 construction-related activities (as would occur for in-river construction) would not be anticipated to
11 result in contaminant discharges of sufficient magnitude or duration to contribute to long-term
12 bioaccumulation processes, or cause measureable long-term degradation, as described under
13 Alternative 1A. Legacy organochlorine pesticides typically bond to particulates, and do not mobilize
14 easily. Construction and maintenance of Alternative 5 would not cause legacy organochlorine
15 pesticides to be transported far from the source or to partition into the water column, as described
16 for Alternative 1A. Additionally, water supply operations under any BDCP action alternative would
17 not be expected to change total suspended solids or turbidity levels (highs, lows, typical conditions)
18 to any substantial degree. Changes in the magnitude, frequency, and geographic distribution of
19 legacy pesticides in water bodies of the affected environment that would result in new or more
20 severe adverse effects on beneficial uses, relative to the No Action Alternative, would not be
21 expected to occur.

22 Modeling results indicate small, insignificant changes in total mercury and methylmercury levels in
23 water and fish tissues resulting from Alternative 5 water operations (Chapter 8, *Water Quality*,
24 Section 8.3.3.10). Upstream mercury contributions and methylmercury production in Delta waters
25 would not be altered by the operation of Alternative 5, as it would not change existing mercury
26 sources and would not substantially alter methylmercury concentrations in the Sacramento River or
27 San Joaquin River. Results indicate that the percentage change in assimilative capacity of
28 waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark for this alternative
29 relative to the No Action Alternative would be greatest (a 0.9% decrease) at Franks Tract. This
30 change is not expected to result in adverse effects on beneficial uses. Similarly, changes in
31 methylmercury concentration are expected to be very small.

32 Fish tissue mercury concentrations showed small or no increase in exceedance quotients based on
33 long-term annual average concentrations at the nine Delta locations modeled. The greatest increase
34 relative to the No Action Alternative was 7% at Mokelumne River (South Fork) at Staten Island.

35 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
36 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
37 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
38 keep sediment that may contain organochlorine pesticides and methylmercury within the area of
39 disturbance during construction and maintenance. Examples of these BMPs are described under
40 Alternative 1A, Impact PH-3. Further, operations under Alternative 5 are not expected to increase
41 mercury concentrations substantially and therefore there would be no long-term water quality
42 degradation such that beneficial uses are adversely affected. Increases in mercury or methylmercury
43 concentrations are not likely to be measurable, and changes in mercury concentrations or fish tissue
44 mercury concentrations would not make any existing mercury-related impairment measurably

1 worse. Therefore, it is not expected that aquatic organisms would have measurably higher body
2 burdens of mercury as a result of Alternative 5 water operations.

3 Accordingly, the potential for Alternative 5 to create a public health effect from bioaccumulation of
4 legacy organochlorine pesticides and methylmercury in fish is minimal, and public health effects are
5 not expected to be adverse.

6 **CEQA Conclusion:** Construction and maintenance of Alternative 5 would not cause legacy
7 organochlorine pesticides to be transported far from the source or to partition into the water
8 column based on the chemical properties of the pesticides. Although methylmercury currently
9 exceeds the TMDL, little to no change in methylmercury concentrations in water is expected under
10 Alternative 5 water construction. BMPs implemented as part of Erosion and Sediment Control Plans
11 and SWPPPs would help ensure that construction activities would not substantially increase or
12 substantially mobilize legacy organochlorine pesticides or methylmercury during construction and
13 maintenance. Therefore, construction and maintenance of Alternative 5 would not cause increased
14 exposure of the public to these bioaccumulative sediment constituents.

15 Alternative 5 would not result in increased flows in the tributaries that would mobilize legacy
16 organochlorine pesticides in sediments. Modeling showed small changes in mercury and
17 methylmercury levels in water at certain Delta locations and in mercury in fish tissues due to
18 Alternative 5 water operations. Specifically, the analysis of percentage change in assimilative
19 capacity of waterborne total mercury of Alternative 5 relative to the 25 ng/L ecological risk
20 benchmark as compared to Existing Conditions showed the greatest decrease to be 0.9% at Old
21 River at Rock Slough and the Contra Costa Pumping Plant. Fish tissue estimates show only small or
22 no increases in exceedance quotients based on long-term annual average concentrations for
23 mercury at the Delta locations. The greatest change in exceedance quotients of 5% is expected for
24 Franks Tract and Old River at Rock Slough relative to Existing Conditions. However, these changes
25 would not substantially affect the current level of existing methylmercury degradation in the study
26 area or substantially affect the existing fish tissue concentrations.

27 Since construction, maintenance or operation of Alternative 5 are not expected to cause substantial
28 mobilization or a substantial increase of constituents known to bioaccumulate (i.e., organochlorine
29 pesticides), impacts on public health would be less than significant. No mitigation is required.

30 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 31 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 32 **Facilities**

33 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
34 area. As described in Table 25-9, a total of 24.71 miles of new temporary 69 kV transmission lines;
35 8.68 miles of new permanent 69 kV transmission lines; and 42.68 miles of new permanent 230 kV
36 transmission lines would be required for this alternative. This alternative would have fewer intakes
37 than Alternative 1A, but would still include the pipeline/tunnel conveyance.

38 As with Alternative 1A, any new temporary and permanent transmission lines needed for
39 Alternative 5 would be located in rights-of-way of existing transmission lines or in areas that are not
40 densely populated, and therefore would not expose substantially more people to transmission lines
41 (Figure 25-2). However, as indicated in Table 25-9, Stone Lakes National Wildlife Refuge would be
42 within 300 feet of a proposed temporary 69 kV transmission line. Visitors to this area generally
43 come for walks, water recreation, and hunting, and as such, it is unlikely that large groups of people

1 would be staying in the area within 300 feet of this proposed transmission line, so any EMF
2 exposure would be limited. Further, this line would be removed when construction of the water
3 conveyance facility features near this area is completed, so there would be no potential permanent
4 effects. Therefore, this temporary transmission line would not substantially increase people's
5 exposure to EMFs.

6 As described for Alternative 1A, the majority of sensitive receptors are already located within 300
7 feet of an existing transmission line; therefore, the majority of new temporary or new permanent
8 transmission lines would not expose new sensitive receptors or substantially more people to EMFs
9 that they are not already experiencing. Because the transmission lines would generally be located in
10 sparsely populated areas and would be within 300 feet of only one potential new sensitive
11 receptors, the proposed temporary and permanent transmission lines would not substantially
12 increase people's exposure to EMFs. While the current scientific evidence does not show
13 conclusively that EMF exposure can increase health risks, the location and design of the new
14 transmission lines would be conducted in accordance with CPUC's EMF Design Guidelines for
15 Electrical Facilities to reduce EMF exposure. Therefore, operation of the transmission line corridors
16 would not expose substantially more people to transmission lines generating EMFs and there would
17 be no adverse effect on public health.

18 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
19 transmission lines would be located within the rights-of-way of existing transmission lines and any
20 new temporary or permanent transmission lines not within the right-of-way of existing
21 transmission lines would, for the most part, be located in sparsely populated areas generally away
22 from existing sensitive receptors. However, one sensitive receptor, Stone Lakes National Wildlife
23 Refuge, would be within 300 feet of a proposed 69 kV temporary transmission line. Because visitors
24 to this area generally come for walks, water recreation, and hunting, it is unlikely that large groups
25 of people would be staying in the area within 300 feet of this proposed transmission line, so any
26 EMF exposure would be limited. Further, this line would be removed construction of the water
27 conveyance facility features near this area is completed, so there would be no potential permanent
28 effects. Therefore, this temporary transmission line would not substantially increase people's
29 exposure to EMFs. Design and implementation of new temporary or permanent transmission lines
30 not within the right-of-way of existing transmission lines would follow CPUC's EMF Design
31 Guidelines for Electrical Facilities and would implement shielding, cancelation, or distance measures
32 to reduce EMF exposure. Because construction and operation of Alternative 5 would not expose
33 substantially more people to transmission lines that generate new sources of EMFs, impacts would
34 be less than significant, and no mitigation is required.

35 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
36 **and CM11**

37 **NEPA Effects:** The location of habitat restoration and enhancement that would occur under
38 Alternative 5 would be similar to that of Alternative 1A; however, in addition to fisheries
39 enhancement (CM2), only approximately 25,000 acres of tidal habitat restoration would occur
40 under Alternative 5 rather than the approximate 65,000 acres under Alternative 1A. Because fewer
41 acres would be restored, effects would be less than those described under Alternative 1A.
42 Implementation of environmental commitments, such as coordination with MVCDs and
43 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
44 Appendix 3B, *Environmental Commitments, AMMs, and CMs*) would also reduce the potential for an
45 increase in mosquito breeding habitat, and a substantial increase in vector-borne diseases is

1 unlikely to result. Furthermore, habitat would be restored in areas where potentially suitable
2 habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would likely
3 increase as a result of restoration and enhancement, which would keep mosquito populations in
4 check. Therefore, effects would be similar to those under Alternative 1A and there would not be a
5 substantial increase in the public's risk of exposure to vector-borne diseases with implementation of
6 CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

7 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
8 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described for Alternative
9 1A, Alternative 5 would require environmental commitments such as coordination with MVCDs and
10 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
11 Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help control mosquitoes and
12 reduce the potential for an increase in mosquito breeding habitat. Furthermore, habitat would be
13 restored where existing potentially suitable vector habitat already exists and habitat restoration and
14 enhancement would likely increase the number of mosquito predators. Therefore, as described
15 under Alternative 1A, implementation of CM2-CM7, CM10 and CM11 under Alternative 5 would not
16 substantially increase the public's risk of exposure to vector-borne diseases beyond what currently
17 exists. Accordingly, this impact would be less than significant and no mitigation is required.

18 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of** 19 **Implementing the Restoration Conservation Measures**

20 **NEPA Effects:** The location of habitat restoration and enhancement that would occur under
21 Alternative 5 would be similar to that of Alternative 1A; however, only approximately 25,000 acres
22 of tidal habitat restoration would occur under Alternative 5 rather than the approximate 65,000
23 acres under Alternative 1A. Because fewer acres would be restored, effects would be less than those
24 described under Alternative 1A. Implementation of the restoration conservation measures would
25 support habitat types, such as wetlands and agricultural areas, that produce pathogens as a result of
26 the biological productivity in these areas (e.g., migrating birds, application of fertilizers, waste
27 products of animals). As exemplified by the Pathogen Conceptual Model, any potential increase in
28 pathogens associated with the habitat restoration would be localized and within the vicinity of the
29 actual restoration. This would be similar for lands protected for agricultural uses. Depending on the
30 level of recreational access granted by management plans, habitat restoration could increase or
31 decrease opportunities for recreationists within the Delta region. However, as discussed above for
32 Alternative 1A, recreationists would not experience a substantial increase of exposure to pathogens
33 as a result of the restoration, and no adverse effect would result

34 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 5
35 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
36 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
37 waste products of animals). However, only approximately 25,000 acres of tidal habitat would be
38 restored under Alternative 5, compared with the approximate 65,000 acres under Alternative 1A. In
39 addition, the localized nature of pathogen generation and the quick die-off of some types of
40 pathogens once released into water bodies would generally prevent substantial pathogen exposure
41 to recreationists. Accordingly, impacts would be less than significant and no mitigation is required.

1 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 2 **as a Result of Implementing CM2, CM4, CM5, and CM10**

3 **NEPA Effects:** The amount of habitat restoration would be less in Alternative 5 than described for
 4 Alternative 1A. The primary concern with habitat restoration regarding constituents known to
 5 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 6 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the pesticide-
 7 bearing sediments would not be transported very far from the source area, and would settle out
 8 with suspended particulates and be deposited close to the ROA. Further, CM2–CM21 do not include
 9 the use of pesticides known to be bioaccumulative in animals or humans.

10 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 11 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 12 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 13 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 14 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 15 bioaccumulation of methylmercury in the study area’s aquatic systems (i.e., fish and water) during
 16 the near-term, measures implemented under *CM12 Methylmercury Management* and existing
 17 OEHHA standards would serve to reduce the public’s exposure to contaminated fish. Therefore,
 18 implementation of CM2, CM4, CM5, and CM10 under Alternative 5 is not expected to result in an
 19 adverse effect on public health with respect to pesticides or methylmercury.

20 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 21 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 22 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 23 sediments would be transported very far from the source area and they would likely settle out with
 24 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 25 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 26 the study area’s aquatic systems (i.e., fish and water) during the near-term, measures implemented
 27 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
 28 public’s exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10
 29 under Alternative 5 would not substantially mobilize or substantially increase the public’s exposure
 30 to constituents known to bioaccumulate and this impact would be less than significant. No
 31 mitigation is required.

32 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water**
 33 **Conveyance Facilities**

34 **NEPA Effects:** Because factors that affect *Microcystis* abundance in waters upstream of the Delta, in
 35 the Delta, and in the SWP/CVP Export Services Areas under Alternative 1A would similarly change
 36 under Alternative 5, *Microcystis* abundance, and thus microcystin concentrations, in water bodies of
 37 the affected environment under Alternative 5 would be very similar (i.e., nearly the same) to those
 38 discussed for Alternative 1A.

39 As described in Chapter 8, *Water Quality*, although *Microcystis* blooms have not occurred in the
 40 Export Service Areas, conditions in the Export Service Areas under Alternative 5 may become more
 41 conducive to *Microcystis* bloom formation because water temperatures will increase in the Export
 42 Service Areas due to the expected increase in ambient air temperatures resulting from climate
 43 change, but not from operation of the water conveyance facilities. Under Alternative 5, relative to No
 44 Action Alternative, water exported to the SWP/CVP Export Service Areas will be a mixture of

1 *Microcystis*-affected source water from the south Delta intakes and unaffected source water from the
2 Sacramento River, diverted at the north Delta intakes. It cannot be determined whether operations
3 and maintenance under Alternative 5 will result in increased or decreased levels of *Microcystis* and
4 microcystins in the mixture of source waters exported from Banks and Jones pumping plants.

5 Like Alternative 1A, elevated ambient water temperatures would occur in the Delta under
6 Alternative 5, which could lead to earlier occurrences of *Microcystis* blooms in the Delta, and
7 increase the overall duration and magnitude of blooms. However, as described in Chapter 8, *Water*
8 *Quality*, the increase in Delta water temperatures, and consequent potential increase in *Microcystis*
9 blooms, would be driven entirely by climate change, not by operation of water conveyance facilities.
10 There would be differences in the direction and magnitude of water residence time changes during
11 the *Microcystis* bloom period due to operation of the water conveyance facilities under Alternative 5
12 compared to Alternative 1A, relative to the No Action Alternative. As a result, *Microcystis* blooms,
13 and therefore microcystin, could increase in surface waters throughout the Delta. Therefore, impacts
14 on beneficial uses, including drinking water and recreational waters, could occur and public health
15 could be affected. Although Mitigation Measure WQ-32a and WQ-32b are available to reduce the
16 severity of degraded water quality in the Delta due to *Microcystis* blooms, this would be an adverse
17 effect.

18 **CEQA Conclusion:** Under Alternative 5, operation of the water conveyance facilities is not expected
19 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
20 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
21 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
22 residence times in the Export Service Area would not be affected by operations of CM1, and
23 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.
24 Water exported from the Delta to the Export Service Area is expected to be a mixture of *Microcystis*-
25 affected source water from the south Delta intakes and unaffected source water from the
26 Sacramento River. Because of this, it cannot be determined whether operations and maintenance
27 under Alternative 5 would result in increased or decreased levels of *Microcystis* and microcystins in
28 the mixture of source waters exported from Banks and Jones pumping plants.

29 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
30 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
31 water temperature increases in the Delta would be due to climate change and not due to operation
32 of the water conveyance facilities. Increases in Delta hydraulic residence times would be due in
33 small part to climate change and sea level rise, but due to a greater degree to operation of the water
34 conveyance facilities and hydrodynamic impacts of restoration included in CM2 and CM4.
35 Consequently, it is possible that increases in the frequency, magnitude, and geographic extent of
36 *Microcystis* blooms in the Delta would occur due to the operations and maintenance of the water
37 conveyance facilities and the hydrodynamic impacts of restoration under CM2 and CM4.
38 Accordingly, beneficial uses including drinking water and recreational waters would be impacted
39 and, as a result, public health. Therefore, this impact would be significant.

40 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
41 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that residence time considerations
42 be incorporated into restoration area site design for CM2 and CM4 using the best available science at
43 the time of design. Mitigation Measure WQ-32b requires that the project proponents monitor for
44 *Microcystis* abundance in the Delta and use appropriate statistical methods to determine whether
45 increases in abundance are significant. This mitigation measure also requires that if *Microcystis*

1 abundance increases (relative to Existing Conditions), the project proponents will investigate and
 2 evaluate measures that could be taken to manage hydraulic residence time in the affected areas of
 3 the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 4 measures for reducing water quality effects, and therefore potential public health effects, is
 5 uncertain, this impact would be significant and unavoidable.

6 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 7 ***Microcystis* Blooms**

8 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 9 in Chapter 8, *Water Quality*.

10 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 11 **Water Residence Time**

12 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 13 in Chapter 8, *Water Quality*.

14 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 15 **CM4**

16 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 17 under Alternative 5 would be the same as that described under Alternative 1A, except that 25,000
 18 rather than 65,000 acres of tidal habitat would be restored under CM4. Restoration activities
 19 implemented under CM2 and CM4 that would create shallow backwater areas could result in local
 20 increases in water temperature that may encourage *Microcystis* growth during the summer bloom
 21 season. This would result in further degradation of water quality beyond the hydrodynamic effects
 22 of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis* blooms
 23 with implementation of CM2 and CM4 could potentially result in adverse effects on public health
 24 through exposure via drinking water quality and recreational waters. Mitigation Measures WQ-32a
 25 and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 26 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 27 feasible measures for reducing water quality effects related to *Microcystis* is uncertain. This would
 28 be an adverse effect.

29 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 5 are similar to
 30 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
 31 create shallow backwater areas could result in local increases in water temperature conducive to
 32 *Microcystis* growth during summer bloom season. This could compound the water quality
 33 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 34 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 35 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 36 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 37 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 38 increased local water temperatures and water residence time. The effectiveness of these mitigation
 39 measures to result in feasible measures for reducing water quality effects, and therefore potential
 40 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

1 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 2 ***Microcystis* Blooms**

3 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 4 in Chapter 8, *Water Quality*.

5 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 6 **Water Residence Time**

7 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 8 in Chapter 8, *Water Quality*.

9 **25.3.3.11 Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and**
 10 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

11 Alternative 6A would eliminate the use of south Delta intakes, which would result in an increase in
 12 San Joaquin River water flowing into the Delta. There would be the same number of north Delta
 13 intakes (five) and they would pump the same amount of water as described under Alternative 1A
 14 (up to 15,000 cfs). Because of changes in the relative amounts of San Joaquin River and Sacramento
 15 River water entering the Delta, this alternative may result in changes to the water quality in the
 16 Delta. The conservation measures under Alternative 6A would be the same as those described under
 17 1A.

18 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 19 **the Water Conveyance Facilities**

20 ***NEPA Effects:*** As described for Alternative 1A, Alternative 6A would involve similar construction
 21 and operation of up to 15 solids lagoons, five sedimentation basins, Byron Tract Forebay, and an
 22 intermediate forebay and associated 350-acre inundation area adjacent. These features have the
 23 potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of the large
 24 volumes of water that would be held within these areas. The depth, design, and operation of the
 25 sedimentation basins and solids lagoons would prevent the development of suitable mosquito
 26 habitat (Figure 25-1). Specifically, the basins would be too deep and the constant movement of
 27 water would prevent mosquitoes from breeding and multiplying. Sedimentation basins would be
 28 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons would be 165 feet long by 86 feet
 29 wide by 10 feet deep. Furthermore, use of the inundation area would be limited to forebay
 30 emergency overflow situations and water would be physically pumped back to the intermediate
 31 forebay, creating circulation such that the inundation area would have a low potential for creating
 32 suitable vector habitat. Similarly, water in the Byron Tract Forebay and intermediate forebay would
 33 be circulated regularly and, with the exception of shallower areas around the periphery, would be
 34 too deep to provide suitable mosquito habitat. The shallower edges of the forebays could provide
 35 suitable mosquito breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed)
 36 were allowed to grow.

37 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 38 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 39 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 40 control mosquitoes (see Impact PH-1 under Alternative 1A). These BMPs would be consistent with
 41 practices presented in *Best Management Practices for Mosquito Control in California* (California
 42 Department of Public Health 2012). Implementation of these BMPs would reduce the likelihood that

1 BDCP operations would require an increase in abatement activities by the local MVCDs. Therefore,
 2 as described for Alternative 1A, construction and operation of the intakes, solids lagoons,
 3 sedimentation basins, the forebays and the intermediate forebay inundation area under Alternative
 4 6A would not substantially increase suitable vector habitat, and would not substantially increase in
 5 vector-borne diseases. Accordingly, no adverse effects would result.

6 **CEQA Conclusion:** As described for Alternative 1A, implementation of CM1 under Alternative 6A
 7 would involve construction and operation of solids lagoons, sedimentation basins, intermediate
 8 forebay and associated 350-acre inundation area, and Bryon Tract Forebay which would have the
 9 potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes). While these
 10 facilities could provide suitable habitat for vectors (e.g., mosquitoes), water depth and circulation
 11 would prevent the areas from substantially increasing suitable vector habitat. The shallower
 12 periphery of the intermediate forebay and Bryon Tract Forebay could provide suitable mosquito
 13 breeding habitat.

14 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 15 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 16 MVCDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 17 control mosquitoes. These BMPs would be consistent with practices presented in *Best Management*
 18 *Practices for Mosquito Control in California* (California Department of Public Health 2012). See
 19 Impact PH-1 under Alternative 1A. Therefore, construction and operation of the water conveyance
 20 facilities under Alternative 6A would not result in a substantial increase in vector-borne diseases
 21 and the impact on public health would be less than significant. No mitigation is required.

22 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 23 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 24 **Facilities**

25 **NEPA Effects:**

26 **Disinfection Byproducts**

27 Modeled long-term average DOC concentrations and, by extension, DBPs, would decrease at Banks
 28 and Jones pumping plants, as described in Chapter 8, *Water Quality*, Section 8.3.3.11, relative to the
 29 No Action Alternative. Such long-term average DOC concentrations would include fewer
 30 exceedances of concentration thresholds. This modeled improvement would correspond to
 31 substantial improvement in SWP/CVP Export Service Areas water quality with respect to DOC.
 32 However, as discussed in Chapter 8, long-term average concentrations of DOC and, by extension,
 33 DBPs, are estimated to substantially increase at Franks Tract, Rock Slough and Contra Costa
 34 Pumping Plant #1 ($\leq 41\%$ net increase) relative to the No Action Alternative. DOC water quality
 35 exceedance would conflict with the Basin Plan, as it exceeds the Basin Plan's requirements. These
 36 increases could potentially trigger substantial changes in drinking water treatment plant design or
 37 operations. In particular, assessment locations at Rock Slough and Contra Costa Pumping Plant #1
 38 represent municipal intakes servicing existing drinking water treatment plants. Under Alternative
 39 6A, drinking water treatment plants obtaining water from these interior Delta locations would likely
 40 need to upgrade existing treatment systems in order to achieve EPA Stage 1 Disinfectants and
 41 Disinfection Byproduct Rule action thresholds.

42 Relative to the No Action Alternative, Alternative 6A would result in increases in long-term average
 43 bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at Barker

1 Slough. Increases would be greatest at Staten Island (45%; 41% during the drought period) and at
2 Barker Slough (22%; 72% during the drought period). The long-term average increase predicted for
3 Barker Slough could necessitate changes in water treatment plant operations or require treatment
4 plant upgrades in order to maintain DBP compliance.

5 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
6 implementation of such technologies would likely require substantial investment in new or modified
7 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
8 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
9 DOC and bromide concentrations in drinking water sources would represent an increased risk for
10 adverse effects on public health from DBPs. Mitigation Measure WQ-17 is available to partially
11 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
12 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
13 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
14 effects of increased bromide in drinking water sources at Barker Slough. Implementation of this
15 measure along with a separate other commitment as set forth in Appendix 3B, *Environmental*
16 *Commitments, AMMs, and CMs*, relating to the potential increased treatment costs associated with
17 bromide-related changes would reduce these effects. Further, as described for Impact PH-2 under
18 Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at Barker Slough may
19 be further minimized by implementation of the AIP. However, the overall effect on public health
20 related to potential increases in DBPs (resulting from DOC and bromide increases) at the
21 aforementioned Delta locations would still be considered adverse unless affected water treatment
22 plants are upgraded or undergo operational changes in order to achieve drinking water compliance
23 standards.

24 **Trace Metals**

25 Alternative 6A would not result in substantial increases in trace metal concentrations in the Delta
26 relative to the No Action Alternative. Changes in source water fraction would occur in the south
27 Delta (see Appendix 8D, *Source Water Fingerprinting Results*). Throughout much of the south Delta,
28 San Joaquin River water would replace Sacramento River water, with the future trace metals profile
29 largely reflecting that of the San Joaquin River. However, trace metal concentration profiles between
30 the San Joaquin and Sacramento Rivers are very similar and currently meet Basin Plan objectives
31 and CTR criteria. While the change in trace metal concentrations in the south Delta would likely be
32 measurable, Alternative 6A would not be expected to substantially increase the frequency with
33 which applicable Basin Plan objectives or CTR criteria would be exceeded in the Delta or
34 substantially degrade the quality of Delta waters with regard to trace metals. Therefore, trace metal
35 concentrations are not expected to increase above conditions under the No Action Alternative and
36 would not result in adverse impacts on public health.

37 **Pesticides**

38 The change in source water (e.g., more San Joaquin River water) associated with Alternative 6A
39 would be of sufficient magnitude to increase the existing pesticide concentrations in the Delta,
40 resulting in an increased risk of toxicity to aquatic life in certain areas (Buckley Cove, Franks Tract,
41 Rock Slough, the San Joaquin River at Antioch, and Contra Costa Pumping Plant #1) during certain
42 times of the year relative to the No Action Alternative. A conclusion regarding the risk to human
43 health at these locations, based on the predicted adverse effects from pesticides on aquatic life,
44 cannot be made. The prediction of adverse effects of pesticides fundamentally assumes that the

1 present pattern of pesticide incidence in surface water would continue at similar levels into the
2 future. In reality, the use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the
3 basis for concluding a substantially increased San Joaquin River source water fraction, is on the
4 decline with their replacement by pyrethroids on the rise. Furthermore, water treatment plants are
5 required to meet drinking water requirements set forth in the California Safe Drinking Water Act
6 and the regulations adopted by CDPH. Therefore, it is not anticipated that there would be adverse
7 effects on public health from pesticides in drinking water sources.

8 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
9 operation of the water conveyance facilities under Alternative 6A would be of sufficient magnitude
10 to increase the existing pesticide concentrations in the Delta relative to Existing Conditions,
11 according to water quality modeling results. This increase could result in an increased risk of
12 toxicity to aquatic life at some locations in the study area (Buckley Cove, Franks Tract, Rock Slough,
13 the San Joaquin River at Antioch, and Contra Costa Pumping Plant #1) during certain times of the
14 year relative to Existing Conditions. A conclusion regarding the risk to human health at these
15 locations, based on the predicted adverse effects from pesticides on aquatic life, cannot be made.
16 However, the prediction of adverse effects of pesticides relative to Existing Conditions
17 fundamentally assumes that the present pattern of pesticide incidence in surface water would
18 continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon pesticides,
19 the two pesticides that serve as the basis for concluding a substantially increased San Joaquin River
20 source water fraction, is on the decline with their replacement by pyrethroids on the rise.
21 Furthermore, water treatment plants are required to meet drinking water requirements set forth in
22 the California Safe Drinking Water Act and the regulations adopted by CDPH. Thus, these potential
23 increases in pesticide concentrations would not significantly impact public health. The change in
24 source water would not alter trace metal concentrations in the study area to the degree that there
25 would be an impairment in beneficial uses. Finally, under Alternative 6A, modeled long-term
26 average bromide concentrations would increase at Staten Island (41%; 37% during the drought
27 period) and Barker Slough (19%; 73% during the drought period) relative to Existing Conditions.
28 Modeled long-term average DOC concentrations at Franks Tract, Rock Slough and Contra Costa
29 Pumping Plant #1 would increase $\leq 46\%$. The increases in bromide and DOC concentrations at these
30 locations may be substantial enough to necessitate water treatment plant upgrades or changes in
31 plant operations in order to maintain DBP compliance. Should treatment plant upgrades not be
32 undertaken for the affected Delta locations, a change of such magnitude in long-term average DOC
33 and bromide concentrations in drinking water sources would represent an increased risk for effects
34 on public health from DBPs, which would be a significant impact.

35 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
36 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
37 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
38 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
39 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
40 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
41 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
42 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
43 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
44 less-than-significant level.

45 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
46 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a

1 separate other commitment to address the potential increased water treatment costs that could
 2 result from bromide-related concentration effects on municipal water purveyor operations.
 3 Potential options for making use of this financial commitment include funding or providing other
 4 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
 5 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
 6 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
 7 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
 8 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
 9 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
 10 treatment entities will be fully funded or implemented successfully prior to the project's
 11 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
 12 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
 13 or implemented before the project's contribution to the impact is made, a significant impact in the
 14 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
 15 significant and unavoidable. If, however, all financial contributions, technical contributions, or
 16 partnerships required to avoid significant impacts prove to be feasible and any necessary
 17 agreements are completed before the project's contribution to the effect is made, impacts would be
 18 less than significant.

19 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 20 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 21 **Slough**

22 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

23 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 24 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

25 To reduce the effect of CM1 operations on increased DOC concentrations specifically predicted
 26 to occur at municipal water purveyors obtaining raw source water through south Delta intakes
 27 at Rock Slough and those associated with Contra Costa Pumping Plant #1, the BDCP proponents
 28 shall consult with the purveyors (i.e., Contra Costa water district and entities to which they
 29 supply raw water) to identify the means to either avoid, minimize, or offset increases in long-
 30 term average DOC concentrations that affect the beneficial use of the water. The BDCP
 31 proponents shall consult with these entities to determine existing DBP concentrations (as
 32 system-wide running averages), and then implement any combination of measures sufficient to
 33 maintaining these concentrations at existing levels in treated drinking water of affected water
 34 purveyors. Such actions may include, but not be limited to: 1) upgrading and maintaining
 35 adequate drinking water treatment systems, 2) developing or obtaining replacement surface
 36 water supplies from other water rights holders, 3) developing replacement groundwater
 37 supplies, or 4) physically routing a portion of the water diverted from the Sacramento River
 38 through the associated new conveyance pipelines/tunnel to affected purveyors.

39 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 40 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

41 **NEPA Effects:** As described for Alternative 1A, intermittent and/or short-term construction-related
 42 activities (as would occur for in-river construction) would not be anticipated to result in
 43 contaminant discharges (i.e., bioaccumulative organochlorine pesticides and methylmercury) of

1 sufficient magnitude or duration to contribute to long-term bioaccumulation processes, or cause
2 measureable long-term water quality degradation. Legacy organochlorine pesticides typically bond
3 to particulates, and do not mobilize easily. Construction and maintenance of Alternative 6A would
4 not cause legacy organochlorine pesticides to be transported far from the source or to partition into
5 the water column. Water supply operations under any BDCP action alternative would not be
6 expected to change total suspended solids or turbidity levels (highs, lows, typical conditions) to any
7 substantial degree. Changes in the magnitude, frequency, and geographic distribution of legacy
8 pesticides in water bodies of the affected environment that would result in new or more severe
9 adverse effects on beneficial uses, relative to the No Action Alternative, would not be expected to
10 occur.

11 Water quality modeling results indicate small, insignificant changes in total mercury and
12 methylmercury levels in water resulting from Alternative 6A water operations (Chapter 8, *Water*
13 *Quality*, Section 8.3.3.11). Modeling results indicate that the percentage change in assimilative
14 capacity of waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark for this
15 alternative showed the greatest decrease (9.1%) at the Contra Costa Pumping Plant relative to the
16 No Action Alternative. These changes are not expected to result in adverse effects on beneficial uses.
17 Similarly, changes in methylmercury concentration are expected to be relatively small.

18 Fish tissue estimates showed substantial increases in concentration and exceedance quotients at
19 some Delta locations modeled. The greatest increase in exceedance quotients (ranging from 33 to
20 64%) are expected for Franks Tract and Old River at Rock Slough relative to the No Action
21 Alternative. These changes in fish tissue mercury concentrations would make existing mercury-
22 related impairments in the Delta measurably worse. Relative to the No Action Alternative, body
23 burdens of mercury in fish would be measurably higher, and could thereby substantially increase
24 the health risks to people consuming those fish. Accordingly, the potential for Alternative 6A to
25 create a public health effect from bioaccumulation of mercury would exist and this is considered an
26 adverse effect.

27 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
28 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
29 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
30 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
31 area of disturbance during construction and maintenance. Additionally, OEHHA standards would
32 continue to be implemented for the consumption of study area fish and thus would serve to protect
33 people against the overconsumption of fish with increased body burdens of mercury.

34 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative
35 6A would not cause legacy organochlorine pesticides to be transported far from the source or to
36 partition into the water column based on the chemical properties of the pesticides. Therefore,
37 construction and maintenance of Alternative 6A water conveyance facilities would not cause
38 increased exposure of the public to these pesticides. As environmental commitments, DWR would
39 develop and implement Erosion and Sediment Control Plans and SWPPPs (Appendix 3B,
40 *Environmental Commitments, AMMs, and CMs*). BMPs implemented under the Erosion and Sediment
41 Control Plans and the SWPPPs would help reduce turbidity and keep sediment that may contain
42 legacy organochlorine pesticides and methylmercury within the area of disturbance.

43 Based on water quality modeling results, changes in water concentrations of mercury and
44 methylmercury would occur at some locations relative to Existing Conditions as a result of

1 operations under Alternative 6A. Specifically, the analysis of percentage change in assimilative
 2 capacity of waterborne total mercury of Alternative 6A relative to the 25 ng/L ecological risk
 3 benchmark as compared to Existing Conditions showed the greatest decrease to be 9.2% at the
 4 Contra Costa Pumping Plant, This change would not alter beneficial uses of waters in the study area.
 5 However, relative to Existing Conditions, modeling results indicate that body burdens of mercury in
 6 fish would be measurably higher at Franks Tract and Old River at Rock Slough; the increases in
 7 exceedance quotients are expected to range from 33% to 64% at these location. These increases in
 8 the body burdens of mercury, could increase the health risks to people consuming those fish.
 9 Accordingly, the potential for Alternative 6A to create a public health effect from bioaccumulation of
 10 mercury would exist and this is considered a significant and unavoidable impact. The estimated
 11 increases of mercury body burdens in fish are based on the changes expected from the modeled
 12 blending of source waters that define CM1 for Alternative 6A, and are therefore inherent to the
 13 alternative. OEHHA standards would continue to be implemented for the consumption of study area
 14 fish and thus would serve to protect people against the overconsumption of fish with increased body
 15 burdens of mercury.

16 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
 17 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
 18 **Facilities**

19 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
 20 area. A total of 24.71 miles of new temporary 69 kV transmission lines; 8.94 miles of new permanent
 21 69 kV transmission lines; and 42.68 miles of new permanent 230 kV transmission lines would be
 22 required for this alternative. The temporary and permanent transmission lines needed for
 23 Alternative 6A (Table 25-9) would be very similar in location and length to those for Alternative 1A
 24 because 6A would involve the construction and operation of five intakes and a pipeline/tunnel
 25 conveyance as described for Alternative 1A. As with Alternative 1A, any new temporary and
 26 permanent transmission lines needed for Alternative 6A would, for the most part, be located in
 27 rights-of-way of existing transmission lines or areas that are not densely populated (Figure 25-2).

28 However, as indicated in Table 25-9, Stone Lakes National Wildlife Refuge would be within 300 feet
 29 of a proposed temporary 69 kV transmission line. Visitors to this area generally come for walks,
 30 water recreation, and hunting, and as such, it is unlikely that large groups of people would be
 31 staying in the area within 300 feet of this proposed transmission line, so any EMF exposure would
 32 be limited. Further, this line would be removed construction of the water conveyance facility
 33 features near this area is completed, so there would be no potential permanent effects. Therefore,
 34 this temporary transmission line would not substantially increase people's exposure to EMFs.

35 While the current scientific evidence does not show conclusively that EMF exposure can increase
 36 health risks, the location and design of the new transmission lines would be conducted in
 37 accordance with CPUC's EMF Design Guidelines for Electrical Facilities, as described for Alternative
 38 1A. Therefore, operation of the transmission line corridors would not expose substantially more
 39 people to transmission lines generating EMFs. Because the lines would be located in sparsely
 40 populated areas and would be within 300 feet of only one potential new sensitive receptors, the
 41 proposed temporary and permanent transmission lines would not substantially increase people's
 42 exposure to EMFs, and there would be no adverse effect on public health.

43 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
 44 transmission lines would be located within the right-of-way of existing transmission lines and any

1 new temporary or permanent transmission lines not within the right-of-way of existing
2 transmission lines would, for the most part, be located in sparsely populated areas generally away
3 from existing sensitive receptors. However, one sensitive receptor, Stone Lakes National Wildlife
4 Refuge, would be within 300 feet of a proposed temporary 69 kV temporary transmission line.
5 Because visitors to this area generally come for walks, water recreation, and hunting, it is unlikely
6 that large groups of people would be staying in the area within 300 feet of this proposed
7 transmission line, so any EMF exposure would be limited. Further, this line would be removed
8 construction of the water conveyance facility features near this area is completed, so there would be
9 no potential permanent effects. Therefore, this temporary transmission line would not substantially
10 increase people's exposure to EMFs. While the current scientific evidence does not show
11 conclusively that EMF exposure can increase health risks, design and implementation of new
12 temporary or permanent transmission lines not within the right-of-way of existing transmission
13 lines would follow CPUC's EMF Design Guidelines for Electrical Facilities and would implement
14 shielding, cancellation, or distance measures to reduce EMF exposure. Since construction and
15 operation of Alternative 6A would not expose substantially more people to transmission lines that
16 generate new sources of EMFs, impacts on public health would be less than significant, and no
17 mitigation is required.

18 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
19 **and CM11**

20 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
21 under Alternative 6A would be the same as that described for Alternative 1A. Although there would
22 be an increase in restored and enhanced aquatic habitat in the study area as a result of
23 implementing Alternative 6A, implementation of environmental commitments such as coordination
24 with MVCDS and implementation of BMPs under MMPs (as described under Impact PH-1 for
25 Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*), would reduce the
26 potential for an increase in mosquito breeding habitat, and a substantial increase in vector-borne
27 diseases is unlikely to result. Furthermore, habitat would be restored in areas where potentially
28 suitable habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would
29 likely increase as a result of restoration and enhancement, which would keep mosquito populations
30 in check. Therefore, effects on public health would be the same under Alternative 6A as under
31 Alternative 1A and there would not be a substantial increase in the public's risk of exposure to
32 vector-borne diseases with implementation of CM2-CM7, CM10 and CM11. Accordingly, there would
33 be no adverse effect.

34 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
35 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described for Alternative
36 1A, Alternative 6A would require environmental commitments, such as coordination with MVCDS
37 and implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and
38 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help control mosquitoes
39 and reduce the potential for an increase in mosquito breeding habitat. Furthermore, habitat would
40 be restored where potentially suitable vector habitat already exists and habitat restoration and
41 enhancement would likely increase the number of mosquito predators. Therefore, as described for
42 Alternative 1A, implementation of CM2-CM7, CM10 and CM11 under Alternative 6A would not
43 substantially increase the public's risk of exposure to vector-borne diseases beyond what currently
44 exists. Accordingly, this impact would be less than significant and no mitigation is required.

1 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 2 **Implementing the Restoration Conservation Measures**

3 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 4 under Alternative 6A would be the same as that described for Alternative 1A. Implementation of the
 5 restoration conservation measures would support habitat types, such as wetlands and agricultural
 6 areas, that produce pathogens as a result of the biological productivity in these areas (e.g., migrating
 7 birds, application of fertilizers, waste products of animals). As exemplified by the Pathogen
 8 Conceptual Model, any potential increase in pathogens associated with the proposed habitat
 9 restoration would be localized and within the vicinity of the actual restoration. This would be
 10 similar for lands protected for agricultural uses. Depending on the level of recreational access
 11 granted by management plans, habitat restoration could increase or decrease opportunities for
 12 recreationists within the Delta region. However, effects associated with pathogens
 13 would be the same under Alternative 6A as under Alternative 1A. Recreationists would not
 14 experience a substantial increase in exposure to pathogens as a result of the restoration and no
 15 adverse effect would result.

16 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 6A
 17 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 18 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 19 waste products of animals). However, the localized nature of pathogen generation and the quick die
 20 off of pathogens once released into water bodies would generally prevent substantial pathogen
 21 exposure to recreationists. Accordingly, impacts on public health would be less than significant. No
 22 mitigation is required.

23 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 24 **as a Result of Implementing CM2, CM4, CM5, and CM10**

25 **NEPA Effects:** The amount of habitat restoration under Alternative 6A would be the same as for
 26 Alternative 1A. The primary concern with habitat restoration regarding constituents known to
 27 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 28 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the legacy
 29 organochlorine pesticide-bearing sediments would not be transported very far from the source area
 30 and would settle out with suspended particulates and be deposited close to the ROA. Further, CM2–
 31 CM21 do not include the use of pesticides known to be bioaccumulative in animals or humans.

32 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 33 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 34 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 35 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 36 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 37 bioaccumulation of methylmercury in the study area's aquatic systems (i.e., fish and water) during
 38 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
 39 reduce the public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,
 40 and CM10 under Alternative 6A is not expected to result in an adverse effect on public health with
 41 respect to pesticides or methylmercury.

42 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 43 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 44 sediment during habitat restoration construction. However, it is unlikely that the legacy

1 organochlorine pesticide-bearing sediments would be transported very far from the source area and
 2 they would likely settle out with suspended particulates and be deposited close to the ROAs during
 3 habitat restoration construction. While there would likely be an increase in mobilization and
 4 bioaccumulation of methylmercury in the study area's aquatic systems (i.e., fish and water) during
 5 the near-term, measures implemented under *CM12 Methylmercury Management*, and existing
 6 OEHHA standards would serve to reduce the public's exposure to contaminated fish. Therefore,
 7 implementation of CM2, CM4, CM5, and CM10 under Alternative 6A would not substantially mobilize
 8 or substantially increase the public's exposure to constituents known to bioaccumulate and this
 9 impact would be less than significant. No mitigation is required.

10 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 11 **Conveyance Facilities**

12 ***NEPA Effects:*** Because factors that affect *Microcystis* abundance in waters upstream of the Delta, in
 13 the Delta, and in the SWP/CVP Export Services Areas under Alternative 1A would similarly change
 14 under Alternative 6A, *Microcystis* abundance, and thus microcystin concentrations, in water bodies
 15 of the affected environment under Alternative 6A would be nearly the same as those discussed for
 16 Alternative 1A.

17 As described in Chapter 8, *Water Quality*, although *Microcystis* blooms have not occurred in the
 18 Export Service Areas, conditions in the Export Service Areas under Alternative 6A may become more
 19 conducive to *Microcystis* bloom formation because water temperatures will increase in the Export
 20 Service Areas due to the expected increase in ambient air temperatures resulting from climate
 21 change, but not from operation of the water conveyance facilities. In contrast to Alternative 1A,
 22 under Alternative 6A, relative to No Action Alternative, water exported to the SWP/CVP Export
 23 Service Areas will consist entirely of water from the Sacramento River from the north Delta, which is
 24 unaffected by *Microcystis*. Accordingly, the effects of *Microcystis* on water exported to the SWP/CVP
 25 Export Service Areas could be lower under Alternative 6A relative to Alternative 1A.

26 Like Alternative 1A, elevated ambient water temperatures would occur in the Delta under
 27 Alternative 6A, which could lead to earlier occurrences of *Microcystis* blooms in the Delta, and
 28 increase the overall duration and magnitude of blooms. However, as described in Chapter 8, *Water*
 29 *Quality*, the increase in Delta water temperatures, and consequent potential increase in *Microcystis*
 30 blooms, would be driven entirely by climate change, not by operation of water conveyance facilities.
 31 There would be differences in the direction and magnitude of water residence time changes during
 32 the *Microcystis* bloom period due to operation of the water conveyance facilities under Alternative
 33 6A compared to Alternative 1A, relative to the No Action Alternative. As a result, *Microcystis* blooms,
 34 and therefore microcystin, could increase in surface waters throughout the Delta, similar to
 35 Alternative 1A. Therefore, impacts on beneficial uses, including drinking water and recreational
 36 waters, could occur and public health could be affected. Although Mitigation Measure WQ-32a and
 37 WQ-32b are available to reduce the severity of degraded water quality in the Delta due to
 38 *Microcystis* blooms, this would be an adverse effect.

39 ***CEQA Conclusion:*** Under Alternative 6A, operation of the water conveyance facilities is not expected
 40 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
 41 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
 42 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
 43 residence times in the Export Service Area would not be affected by operations of CM1, and
 44 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.

1 Water exported from the Delta to the Export Service Area is expected to be diverted entirely from
 2 the Sacramento River from the north Delta, which is not affected by *Microcystis*. Therefore, the
 3 effects of *Microcystis* on water exported to the SWP/CVP Export Service Areas could be lower under
 4 Alternative 6A relative to Alternative 1A.

5 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
 6 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
 7 water temperature increases in the Delta would be due to climate change and not due to operation
 8 of the water conveyance facilities. Increases in Delta residence times would be due in small part to
 9 climate change and sea level rise, but due to a greater degree to operation of the water conveyance
 10 facilities and hydrodynamic impacts of restoration included in CM2 and CM4. Consequently, it is
 11 possible that increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms in
 12 the Delta would occur due to the operations and maintenance of the water conveyance facilities and
 13 the hydrodynamic impacts of restoration under CM2 and CM4. Accordingly, beneficial uses including
 14 drinking water and recreational waters would be impacted and, as a result, public health. Therefore,
 15 this impact would be significant.

16 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 17 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 18 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 19 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 20 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 21 to determine whether increases in abundance are significant. This mitigation measure also requires
 22 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 23 investigate and evaluate measures that could be taken to reduce hydraulic residence time in the
 24 affected areas of the Delta. However, because the effectiveness of these mitigation measures to
 25 result in feasible measures for reducing water quality effects, and therefore potential public health
 26 effects, is uncertain, this impact would be significant and unavoidable.

27 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 28 ***Microcystis* Blooms**

29 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 30 in Chapter 8, *Water Quality*.

31 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 32 **Water Residence Time**

33 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 34 in Chapter 8, *Water Quality*.

35 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 36 **CM4**

37 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 38 under Alternative 6A would be the same as that described under Alternative 1A. Restoration
 39 activities implemented under CM2 and CM4 that would create shallow backwater areas could result
 40 in local increases in water temperature that may encourage *Microcystis* growth during the summer
 41 bloom season. This would result in further degradation of water quality beyond the hydrodynamic
 42 effects of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis*

1 blooms with implementation of CM2 and CM4 could potentially result in adverse effects on public
 2 health through exposure via drinking water quality and recreational waters. Mitigation Measures
 3 WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 4 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 5 feasible measures for reducing water quality effects related to *Microcystis* is uncertain. This would
 6 be an adverse effect.

7 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 6A would be the
 8 same as those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4
 9 that create shallow backwater areas could result in local increases in water temperature conducive
 10 to *Microcystis* growth during summer bloom season. This could compound the water quality
 11 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 12 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 13 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 14 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 15 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 16 increased local water temperatures and water residence time. The effectiveness of these mitigation
 17 measures to result in feasible measures for reducing water quality effects is uncertain. Therefore,
 18 this impact would be significant and unavoidable.

19 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 20 ***Microcystis* Blooms**

21 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 22 in Chapter 8, *Water Quality*.

23 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 24 **Water Residence Time**

25 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 26 in Chapter 8, *Water Quality*.

27 **25.3.3.12 Alternative 6B—Isolated Conveyance with East Alignment and**
 28 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

29 The operation of water supply facilities under Alternative 6B would generally be the same as the
 30 operation described above for 6A. The primary difference between the two alternatives is that water
 31 conveyance under Alternative 6B would be in a lined or unlined canal, instead of a pipeline/tunnel,
 32 and there would be no intermediate forebay or emergency inundation area. The conservation
 33 measures under Alternative 6B would be the same as those described under Alternative 1A.

34 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 35 **the Water Conveyance Facilities**

36 **NEPA Effects:** As described for Alternative 1A, Alternative 6B would involve construction and
 37 operation of five north Delta intakes, up to 15 solids lagoons, five sedimentation basins, and Byron
 38 Tract Forebay. These facilities have the potential to provide habitat for vectors that transmit
 39 diseases (e.g., mosquitoes) because of the large volumes of water that would be held within these
 40 areas. The depth, design, and operation of the sedimentation basins, solids lagoons and Byron Tract
 41 Forebay would prevent the development of suitable mosquito habitat (Figure 25-1). The

1 sedimentation basins would be too deep and the constant movement of water would prevent
2 mosquitoes from breeding and multiplying. Sedimentation basins would be 120 feet long by 40 feet
3 wide by 55 feet deep, and solids lagoons would be 165 feet long by 86 feet wide by 10 feet deep.

4 Although the proposed Byron Tract Forebay would increase surface water within the study area, it
5 is unlikely that the forebay would provide suitable breeding habitat for mosquitoes given that the
6 water in this forebay would not be stagnant and would be too deep. However, the shallow edges of
7 the forebay could potentially provide suitable mosquito breeding habitat if emergent vegetation or
8 other aquatic plants (e.g., pond weed) were allowed to grow. However, as part of the regular
9 maintenance of the forebay, floating vegetation such as pond weed would be harvested to maintain
10 flow and forebay capacity.

11 To minimize the potential for impacts related to increasing suitable vector habitat within the study
12 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
13 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
14 control mosquitoes. These BMPs would be consistent with practices presented in *Best Management
15 Practices for Mosquito Control in California* (California Department of Public Health 2012). See
16 Impact PH-1 under Alternative 1A. Therefore, as described for Alternative 1A, construction and
17 operation of the water conveyance facilities under Alternative 6B would not substantially increase
18 suitable vector habitat, and would not substantially increase vector-borne diseases. Accordingly, no
19 adverse effects would result.

20 **CEQA Conclusion:** As described for Alternative 1A, implementation of CM1 under Alternative 6B
21 would involve construction and operation of solids lagoons, sedimentation basins, and the Byron
22 Tract Forebay. These areas could provide suitable habitat for vectors (e.g., mosquitoes). During
23 operations, water depth and circulation would prevent the areas from substantially increasing
24 suitable vector habitat. However, the shallow edges on the periphery of Byron Tract Forebay could
25 potentially provide suitable mosquito breeding habitat if emergent vegetation or other aquatic
26 plants (e.g., pond weed) were allowed to grow. To minimize the potential for impacts related to
27 increasing suitable vector habitat within the study area, DWR would consult and coordinate with
28 San Joaquin County and Sacramento-Yolo County MVCs and prepare and implement MMPs. BMPs
29 to be implemented as part of the MMPs would help control mosquitoes. See Impact PH-1 under
30 Alternative 1A. These BMPs would be consistent with practices presented in *Best Management
31 Practices for Mosquito Control in California* (California Department of Public Health 2012).
32 Therefore, construction and operation of the water conveyance facilities under Alternative 6B would
33 not result in a substantial increase in vector-borne diseases and the impact on public health would
34 be less than significant. No mitigation is required.

35 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
36 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
37 **Facilities**

38 The description of water quality and public health effects related to DBPs, pesticides and trace
39 metals for Alternative 6A also appropriately characterizes effects under this alternative.

1 **NEPA Effects:**

2 **Disinfection Byproducts**

3 Modeled long-term average DOC concentrations and, by extension, DBPs would decrease at Banks
4 and Jones pumping plants; however, long-term average concentrations of DOC are estimated to
5 substantially increase at Franks Tract, Rock Slough and Contra Costa Pumping Plant #1 relative to
6 the No Action Alternative, as under Alternative 6A. Exceedances of water quality objectives would
7 conflict with the Basin Plan because it would exceed Basin Plan requirements. These increases could
8 potentially trigger substantial changes in drinking water treatment plant design or operations. In
9 particular, assessment locations at Rock Slough and Contra Costa Pumping Plant #1 represent
10 municipal intakes servicing existing drinking water treatment plants. Drinking water treatment
11 plants obtaining water from these interior Delta locations would likely need to upgrade existing
12 treatment systems in order to achieve EPA Stage 1 Disinfectants and Disinfection Byproduct Rule
13 action thresholds.

14 Relative to the No Action Alternative, Alternative 6B would result in increases in long-term average
15 bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at Barker
16 Slough. Increases would be greatest at Staten Island and at Barker Slough, as indicated under
17 Alternative 6A. The long-term average increase predicted for Barker Slough could necessitate
18 changes in water treatment plant operations or require treatment plant upgrades in order to
19 maintain DBP compliance.

20 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
21 implementation of such technologies would likely require substantial investment in new or modified
22 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
23 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
24 DOC and bromide concentrations in drinking water sources would represent an increased risk for
25 adverse effects on public health from DBPs. While Mitigation Measure WQ-17 is available to partially
26 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
27 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
28 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
29 effects of increased bromide in drinking water sources at Barker Slough. Implementation of this
30 measure along with a separate other commitment as set forth in EIR/EIS Appendix 3B,
31 *Environmental Commitments, AMMs, and CMs*, relating to the potential increased treatment costs
32 associated with bromide-related changes would reduce these effects. Further, as described for
33 Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at
34 Barker Slough may be further minimized by implementation of the AIP. However, the overall effect
35 on public health related to potential increases in DBPs (resulting from DOC and bromide increases)
36 at the aforementioned Delta locations would still be considered adverse.

37 **Trace Metals**

38 Alternative 6B has the same diversion and conveyance operations as Alternative 6A. Because there
39 would be no difference in operations, there would be no differences between these two alternatives
40 in source fractions to various Delta locations, and hydrodynamics in the Delta. Therefore, trace
41 metal concentrations are not expected to increase above conditions under the No Action Alternative
42 and would not result in adverse impacts.

1 Pesticides

2 The change in source water (e.g., more San Joaquin River water) associated with Alternative 6B
3 would be of sufficient magnitude to increase the existing pesticide concentrations in the Delta,
4 resulting in an increased risk of toxicity to aquatic life at Buckley Cove, Franks Tract, Rock Slough,
5 the San Joaquin River at Antioch, and Contra Costa Pumping Plant #1 during certain times of the
6 year relative to the No Action Alternative. A conclusion regarding the risk to human health at these
7 locations, based on the predicted adverse effects from pesticides on aquatic life cannot be made. The
8 prediction of adverse effects of pesticides fundamentally assumes that the present pattern of
9 pesticide incidence in surface water would continue at similar levels into the future. In reality, the
10 use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for concluding
11 a substantially increased San Joaquin River source water fraction, is on the decline with their
12 replacement by pyrethroids on the rise. Furthermore, water treatment plants are required to meet
13 drinking water requirements set forth in the California Safe Drinking Water Act and the regulations
14 adopted by CDPH. Therefore, it is not anticipated that there would be adverse effects on public
15 health from pesticides in drinking water sources.

16 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
17 operation of the water conveyance facilities under Alternative 6B would be of sufficient magnitude
18 to increase the existing pesticide concentrations in the Delta, according to water quality modeling
19 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
20 the study area (Buckley Cove, Franks Tract, Rock Slough, the San Joaquin River at Antioch, and
21 Contra Costa Pumping Plant #1) during certain times of the year relative to Existing Conditions. A
22 conclusion regarding the risk to human health at these locations, based on the predicted adverse
23 effects from pesticides on aquatic life, cannot be made. However, the prediction of adverse effects of
24 pesticides relative to Existing Conditions fundamentally assumes that the present pattern of
25 pesticide incidence in surface water would continue at similar levels into the future. In reality, the
26 use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for concluding
27 a substantially increased San Joaquin River source water fraction, is on the decline with their
28 replacement by pyrethroids on the rise. Furthermore, water treatment plants are required to meet
29 drinking water requirements set forth in the California Safe Drinking Water Act and the regulations
30 adopted by CDPH. Thus, these potential increases in pesticide concentrations would not significantly
31 impact public health. The change in source water would not alter trace metal concentrations in the
32 study area to the degree that there would be a beneficial use impairment. Finally, under Alternative
33 6B, modeled increases in bromide concentrations at Barker Slough, and in DOC concentrations at
34 Franks Tract, Rock Slough, and Contra Costa Pumping Plant #1 (described under Alternative 6A),
35 may be substantial enough to necessitate water treatment plant upgrades or changes in plant
36 operations in order to maintain DBP compliance. Should treatment plant upgrades not be
37 undertaken for the affected Delta locations, a change of such magnitude in long-term average DOC
38 and bromide concentrations in drinking water sources would represent an increased risk for effects
39 on public health from DBPs, which would be a significant impact.

40 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
41 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
42 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
43 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
44 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
45 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
46 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain

1 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
 2 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
 3 less-than-significant level.

4 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
 5 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
 6 separate other commitment to address the potential increased water treatment costs that could
 7 result from bromide-related concentration effects on municipal water purveyor operations.
 8 Potential options for making use of this financial commitment include funding or providing other
 9 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
 10 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
 11 water supply diversion facilities. Please refer to Appendix 3B, *Environmental Commitments, AMMs,*
 12 *and CMs*, for the full list of potential actions that could be taken pursuant to this commitment in
 13 order to reduce the water quality treatment costs associated with water quality effects relating to
 14 chloride, electrical conductivity, and bromide. Because the BDCP proponents cannot ensure that the
 15 results of coordinated actions with water treatment entities will be fully funded or implemented
 16 successfully prior to the project's contribution to the impact, the ability to fully mitigate this impact
 17 is uncertain. If a solution that is identified by the BDCP proponents and an affected water purveyor
 18 is not fully funded, constructed, or implemented before the project's contribution to the impact is
 19 made, a significant impact in the form of increased DBP in drinking water sources could occur.
 20 Accordingly, this impact would be significant and unavoidable. If, however, all financial
 21 contributions, technical contributions, or partnerships required to avoid significant impacts prove to
 22 be feasible and any necessary agreements are completed before the project's contribution to the
 23 effect is made, impacts would be less than significant.

24 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 25 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 26 **Slough**

27 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

28 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 29 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

30 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

31 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 32 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

33 **NEPA Effects:** As described for Alternative 1A, intermittent and/or short-term construction-related
 34 activities (as would occur for in-river construction) would not be anticipated to result in
 35 contaminant discharges of sufficient magnitude or duration to contribute to long-term
 36 bioaccumulation processes, or cause measureable long-term degradation. Legacy organochlorine
 37 pesticides typically bond to particulates, and do not mobilize easily. Construction and maintenance
 38 of Alternative 6B would not cause legacy organochlorine pesticides to be transported far from the
 39 source or to partition into the water column. Additionally, water supply operations under any BDCP
 40 action alternative would not be expected to change total suspended solids or turbidity levels (high,
 41 lows, typical conditions) to any substantial degree. Changes in the magnitude, frequency, and
 42 geographic distribution of legacy pesticides in water bodies of the affected environment that would

1 result in new or more severe adverse effects on beneficial uses, relative to the No Action Alternative,
2 would not be expected to occur.

3 Water quality modeling results indicate small, insignificant changes in total mercury and
4 methylmercury levels in water resulting from Alternative 6B water operations, as described under
5 Impact PH-3 for Alternative 6A (Chapter 8, *Water Quality*, Section 8.3.3.11). These changes are not
6 expected to result in adverse effects on beneficial uses. Similarly, changes in methylmercury
7 concentration are expected to be relatively small.

8 Fish tissue mercury concentrations showed substantial increases in some Delta locations modeled,
9 as described under Impact PH-3 for Alternative 6A. These changes in fish tissue mercury
10 concentrations would make existing mercury-related impairments in the Delta measurably worse.
11 Relative to the No Action Alternative, body burdens of mercury in fish would be measurably higher,
12 and could thereby substantially increase the health risks to people consuming those fish.
13 Accordingly, the potential for Alternative 6B to create a public health effect from bioaccumulation of
14 mercury would exist and this is considered an adverse effect.

15 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
16 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
17 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
18 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
19 area of disturbance during construction and maintenance. Additionally, OEHHA standards would
20 continue to be implemented for the consumption of study area fish and thus would serve to protect
21 people against the overconsumption of fish with increased body burdens of mercury.

22 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative
23 6B would not cause legacy organochlorine pesticides to be transported far from the source or to
24 partition into the water column based on the chemical properties of the pesticides. Therefore,
25 construction and maintenance of Alternative 6B water conveyance facilities would not cause
26 increased exposure of the public to these pesticides as a result of construction and maintenance. As
27 environmental commitments, DWR would develop and implement Erosion and Sediment Control
28 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
29 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
30 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
31 area of disturbance.

32 Based on water quality modeling results, changes in water concentrations of mercury and
33 methylmercury would occur at some locations relative to Existing Conditions as a result of
34 operations under Alternative 6B but would not alter beneficial uses of waters in the study area.
35 However, relative to Existing Conditions, modeling results indicate that body burdens of mercury in
36 fish would be measurably higher at certain locations in the Delta, which could increase the health
37 risks to people consuming those fish. Accordingly, the potential for Alternative 6B to create a public
38 health effect from bioaccumulation of mercury would exist and this is considered a significant and
39 unavoidable impact. The estimated increases of mercury body burdens in fish are based on the
40 changes expected from the modeled blending of source waters that define CM1 for Alternative 6B,
41 and are therefore inherent to the Alternative. OEHHA standards would continue to be implemented
42 for the consumption of study area fish and thus would serve to protect people against the
43 overconsumption of fish with increased body burdens of mercury.

1 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
2 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
3 **Facilities**

4 **NEPA Effects:** As described in Table 25-9, a total of 13.49 miles of new temporary 69 kV
5 transmission lines; 36.79 miles of new permanent 69 kV transmission lines; and 16.35 miles of new
6 permanent 230 kV transmission lines would be required for this alternative. The temporary and
7 permanent transmission lines needed for Alternative 6B would be very similar in location and
8 length to those for Alternative 1B because 6B would involve the construction and operation of five
9 intakes and the primary conveyance would be a canal along the east side of the Delta, carrying water
10 to an intermediate pumping plant located approximately 3 miles south of the point where the
11 alignment crosses the San Joaquin River, on Lower Roberts Island. As with Alternative 1B, any new
12 temporary and permanent transmission lines needed for Alternative 6B would be located in rights-
13 of-way of existing transmission lines or in areas that are not densely populated and therefore would
14 not expose substantially more people to transmission lines (Figure 25-2). Table 25-9 identifies only
15 one potential new sensitive receptor (Stone Lakes National Wildlife Refuge) that is not currently
16 within 300 feet of an existing transmission line; the majority of sensitive receptors are already
17 located within 300 feet of an existing 69 kV or 230 kV transmission line. Stone Lakes National
18 Wildlife Refuge would be within 300 feet of a proposed permanent 69 kV transmission line. Visitors
19 to this area generally come for walks, water recreation, and hunting, and as such, it is unlikely that
20 large groups of people would be staying in the area within 300 feet of this proposed transmission
21 line, so any EMF exposure would be limited.

22 While the current scientific evidence does not show conclusively that EMF exposure increases
23 health risks, the location and design of the new transmission lines would be conducted in
24 accordance with CPUC's EMF Design Guidelines for Electrical Facilities, as described under Impact
25 PH-4 for Alternative 1A (and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
26 Measures implemented under these guidelines would reduce EMF exposure from the proposed
27 transmission lines. Therefore, operation of the transmission line corridors would not expose
28 substantially more people to transmission lines generating EMFs. Because the lines would be
29 located in sparsely populated areas and would be within 300 feet of only two potential new
30 sensitive receptors, the proposed temporary and permanent transmission lines would not
31 substantially increase people's exposure to EMFs and there would be no adverse effect on public
32 health.

33 **CEQA Conclusion:** Under Alternative 6B, the majority of temporary and permanent transmission
34 lines would be located within the right-of-way of existing transmission lines and any new temporary
35 or permanent transmission lines not within the right-of-way of existing transmission lines would be
36 located in sparsely populated areas generally away from existing sensitive receptors. However, one
37 sensitive receptor, Stone Lakes National Wildlife Refuge, would be within 300 feet of a proposed
38 permanent 69 kV transmission line. Because visitors to this area generally come for walks, water
39 recreation, and hunting, it is unlikely that large groups of people would be staying in the area within
40 300 feet of this proposed transmission line, so any EMF exposure would be limited. Design and
41 implementation of new temporary or permanent transmission lines not within the right-of-way of
42 existing transmission lines would follow CPUC's EMF Design Guidelines for Electrical Facilities and
43 would implement shielding, cancellation or distance measures to reduce EMF exposure. Because
44 construction and operation of Alternative 6B would not expose substantially more people to
45 transmission lines that generate new sources of EMFs, impacts on public health would be less than
46 significant, and no mitigation is required.

1 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
 2 **and CM11**

3 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 4 under Alternative 6B would be the same as that described for Alternative 1A. Although there would
 5 be an increase in restored and enhanced aquatic habitat in the study area as a result of
 6 implementing Alternative 6B, implementation of environmental commitments such as coordination
 7 with MVCDS and implementation of BMPs under MMPs (as described under Impact PH-1 for
 8 Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) would reduce the
 9 potential for an increase in mosquito breeding habitat. Thus, a substantial increase in vector-borne
 10 diseases is unlikely to result. Furthermore, habitat would be restored in areas where potentially
 11 suitable habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would
 12 likely increase as a result of restoration and enhancement, which would keep mosquito populations
 13 in check. Therefore, effects would be the same under Alternative 6B as under Alternative 1A, and
 14 there would not be a substantial increase in the public's risk of exposure to vector-borne diseases
 15 with implementation of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

16 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 17 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described for Alternative
 18 1A, Alternative 6B would require environmental commitments such as coordination with MVCDS
 19 and implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and
 20 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help control mosquitoes
 21 and reduce the potential for an increase in mosquito breeding habitat. Furthermore, habitat would
 22 be restored where potentially suitable vector habitat already exists and habitat restoration and
 23 enhancement would likely increase the number of mosquito predators. Therefore, as described for
 24 Alternative 1A, implementation of CM2-CM7, CM10 and CM11 under Alternative 6B would not
 25 substantially increase the public's risk of exposure to vector-borne diseases beyond what currently
 26 exists. Accordingly, this impact would be less than significant and no mitigation is required.

27 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 28 **Implementing the Restoration Conservation Measures**

29 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 30 under Alternative 6B would be the same as that described for Alternative 1A. Implementation of the
 31 restoration conservation measures would support habitat types, such as wetlands and agricultural
 32 areas, that produce pathogens as a result of the biological productivity in these areas (e.g., migrating
 33 birds, application of fertilizers, waste products of animals). As exemplified by the Pathogen
 34 Conceptual Model, any potential increase in pathogens associated with the proposed habitat
 35 restoration would be localized and within the vicinity of the actual restoration. This would be
 36 similar for lands protected for agricultural uses. Depending on the level of recreational access
 37 granted by management plans, habitat restoration could increase or decrease opportunities for
 38 recreationists within the Delta region. However, effects associated with pathogens would be the
 39 same under Alternative 6B as under Alternative 1A. Recreationists would not experience a
 40 substantial increase in exposure to pathogens as a result of the restoration and no adverse effect
 41 would result.

42 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 6B
 43 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 44 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,

1 waste products of animals). However, the localized nature of pathogen generation and the quick die-
2 off of some types of pathogens once released into water bodies would generally prevent a
3 substantial increase in pathogen exposure by recreationists. Therefore, impacts would be less than
4 significant and no mitigation is required.

5 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
6 **as a Result of Implementing CM2, CM4, CM5, and CM10**

7 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 6B as
8 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
9 known to bioaccumulate (i.e., legacy organochlorine pesticides and methylmercury) is the potential
10 for mobilizing contaminants sequestered in sediments of the newly inundated floodplains and
11 marshes, as described under Alternative 1A. It is likely that the pesticide-bearing sediments would
12 not be transported very far from the source area and would settle out with suspended particulates
13 and be deposited close to the ROA. Further, CM2–CM21 do not include the use of pesticides known
14 to be bioaccumulative in animals or humans.

15 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
16 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
17 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
18 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
19 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
20 bioaccumulation of methylmercury in the study area's aquatic systems (i.e., fish and water) during
21 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
22 reduce the public's exposure to contaminated fish. Implementation of methylmercury management
23 measures under CM12 would minimize conditions conducive to generation of methylmercury in
24 restored areas.

25 Therefore, implementation of CM2, CM4, CM5, and CM10 under Alternative 6B would not result in
26 the substantial mobilization or increase of constituents known to bioaccumulate and, as such, would
27 not result in an adverse effect on public health with respect to pesticides or methylmercury.

28 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
29 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
30 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
31 sediments would be transported very far from the source area and they would likely settle out with
32 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
33 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
34 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
35 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
36 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10
37 under Alternative 6B would not substantially mobilize or substantially increase the public's
38 exposure to constituents known to bioaccumulate and this impact would be less than significant. No
39 mitigation is required.

1 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water**
2 **Conveyance Facilities**

3 **NEPA Effects:** Water operations under Alternative 6B would be the same as under Alternative 6A.
4 Therefore, potential effects on public health due to changes in water quality and beneficial uses as a
5 result of *Microcystis* blooms and microcystin levels would be the same.

6 Any modified reservoir operations under Alternative 6B are not expected to promote *Microcystis*
7 production in waters upstream of the Delta. As described in Chapter 8, *Water Quality*, *Microcystis*
8 blooms in the Export Service Areas could increase due to increased water temperatures resulting
9 from climate change, but not due to water conveyance facility operations. Similarly, hydraulic
10 residence times in the Export Service Area would not be affected by operations of CM1. Accordingly,
11 conditions would not be more conducive to *Microcystis* bloom formation. Water diverted from the
12 Sacramento River in the north Delta is expected to be unaffected by *Microcystis*. Under Alternative
13 6B, water exported to the SWP/CVP Export Service Areas will consist entirely of water from the
14 Sacramento River from the north Delta, which is unaffected by *Microcystis*. Accordingly, the effects of
15 *Microcystis* on water exported to the SWP/CVP Export Service Areas could be lower under
16 Alternative 6B relative to Alternative 1A.

17 Ambient meteorological conditions would be the primary driver of Delta water temperatures, and
18 climate warming, not water operations, would determine future water temperatures in the Delta.
19 Increasing water temperatures could lead to earlier attainment of the water temperature threshold
20 required to initiate *Microcystis* bloom formation, and therefore earlier occurrences of *Microcystis*
21 blooms in the Delta, as well as increases in the duration and magnitude. However, these
22 temperature-related changes would not be different from what would occur under the No Action
23 Alternative. Siting and design of restoration areas would have a substantial influence on the
24 magnitude of residence time increases under Alternative 6B. The modeled increase in hydraulic
25 residence time in the Delta could result in an increase in the frequency, magnitude, and geographic
26 extent of *Microcystis* blooms, and thus microcystin levels. Therefore, impacts on beneficial uses,
27 including drinking water and recreational waters, could occur and public health could be affected.
28 Accordingly, this would be considered an adverse effect.

29 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
30 quality, and therefore potential public health effects, in the Delta due to *Microcystis*. However,
31 because the effectiveness of these mitigation measures to result in feasible measures for reducing
32 water quality effects, and therefore potential public health effects, is uncertain, the effect would still
33 be considered adverse.

34 **CEQA Conclusion:** Under Alternative 6B, operation of the water conveyance facilities is not expected
35 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
36 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
37 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
38 residence times in the Export Service Area would not be affected by operations of CM1, and
39 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.
40 Water exported from the Delta to the Export Service Area is expected to be diverted entirely from
41 the Sacramento River from the north Delta, which is not affected by *Microcystis*. Therefore, the
42 effects of *Microcystis* on water exported to the SWP/CVP Export Service Areas could be lower under
43 Alternative 6B relative to Alternative 1A.

1 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
 2 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
 3 water temperature increases in the Delta would be due to climate change primarily and not due to
 4 operation of the water conveyance facilities. Increases in Delta residence times would be due in
 5 small part to climate change and sea level rise, but due to a greater degree to operation of the water
 6 conveyance facilities and hydrodynamic impacts of restoration included in CM2 and CM4.
 7 Consequently, it is possible that increases in the frequency, magnitude, and geographic extent of
 8 *Microcystis* blooms in the Delta would occur due to the operations and maintenance of the water
 9 conveyance facilities and the hydrodynamic impacts of restoration under CM2 and CM4.
 10 Accordingly, beneficial uses including drinking water and recreational waters would be impacted
 11 and, as a result, there could be potential impacts on public health. Therefore, this impact would be
 12 significant.

13 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 14 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 15 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 16 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 17 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 18 to determine whether increases in abundance are significant. This mitigation measure also requires
 19 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 20 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
 21 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 22 measures for reducing water quality effects, and therefore potential public health effects, is
 23 uncertain, this impact would be significant and unavoidable.

24 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 25 ***Microcystis* Blooms**

26 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 27 in Chapter 8, *Water Quality*.

28 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 29 **Water Residence Time**

30 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 31 in Chapter 8, *Water Quality*.

32 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 33 **CM4**

34 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 35 under Alternative 6B would be the same as that described under Alternative 1A. Restoration
 36 activities implemented under CM2 and CM4 that would create shallow backwater areas could result
 37 in local increases in water temperature that may encourage *Microcystis* growth during the summer
 38 bloom season. This would result in further degradation of water quality beyond the hydrodynamic
 39 effects of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis*
 40 blooms with implementation of CM2 and CM4 could potentially result in adverse effects on public
 41 health through exposure via drinking water quality and recreational waters. Mitigation Measures
 42 WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local water

1 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 2 feasible measures for reducing water quality effects, and therefore potential public health effects, is
 3 uncertain. This would be an adverse effect.

4 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 6B are the same as
 5 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
 6 create shallow backwater areas could result in local increases in water temperature conducive to
 7 *Microcystis* growth during summer bloom season. This could compound the water quality
 8 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 9 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 10 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 11 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 12 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 13 increased local water temperatures and water residence time. The effectiveness of these mitigation
 14 measures to result in feasible measures for reducing water quality effects, and therefore potential
 15 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

16 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 17 ***Microcystis* Blooms**

18 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 19 in Chapter 8, *Water Quality*.

20 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 21 **Water Residence Time**

22 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 23 in Chapter 8, *Water Quality*.

24 **25.3.3.13 Alternative 6C—Isolated Conveyance with West Alignment and**
 25 **Intakes W1–W5 (15,000 cfs; Operational Scenario D)**

26 The operation of water supply facilities under Alternative 6C would generally be the same as the
 27 operation described above for 6A. The primary difference between the two alternatives is that under
 28 Alternative 6C, the five intakes would be located on the west bank of the Sacramento River between
 29 Clarksburg and Walnut Grove; and instead of a pipeline/tunnel, the water conveyance under
 30 Alternative 6C would be a lined or unlined canal on the western side of the Delta carrying water to
 31 an intermediate pumping plant, from where it would be pumped through a dual-bore tunnel to a
 32 continuing canal to the proposed Byron Tract Forebay immediately northwest of Clifton Court
 33 Forebay. The lined versus unlined canal is not expected to have an adverse effect on public health, as
 34 discussed below. The conservation measures under Alternative 6C would be the same as those
 35 described under Alternative 1A.

36 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 37 **the Water Conveyance Facilities**

38 **NEPA Effects:** As described for Alternative 1A, Alternative 6C would involve construction and
 39 operation of five north Delta intakes, up to 15 solids lagoons, five sedimentation basins, and the
 40 Bryon Tract Forebay. These facilities have the potential provide habitat for vectors that transmit
 41 diseases (e.g., mosquitoes) because of the large volumes of water that would be held within these

1 areas. The depth, design, and operation of the sedimentation basins and solids lagoons would
2 prevent the development of suitable mosquito habitat (Figure 25-1). Specifically, the basins would
3 be too deep and the constant movement of water would prevent mosquitoes from breeding and
4 multiplying. Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids
5 lagoons would be 165 feet long by 86 feet wide by 10 feet deep.

6 Although the proposed Byron Tract Forebay would increase surface water within the study area, it
7 is unlikely that the forebay would provide suitable breeding habitat for mosquitoes given that the
8 water in this forebay would not be stagnant and would be too deep. However, the shallow edges of
9 the forebay could potentially provide suitable mosquito breeding habitat if emergent vegetation or
10 other aquatic plants (e.g., pond weed) were allowed to grow. However, as part of the regular
11 maintenance of the forebay, floating vegetation such as pond weed would be harvested to maintain
12 flow and forebay capacity.

13 To minimize the potential for causing impacts related to increasing suitable mosquito habitat in the
14 Plan Area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo
15 County MVCDDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs
16 would help control mosquitoes. These BMPs would be consistent with practices presented in *Best
17 Management Practices for Mosquito Control in California* (California Department of Public Health
18 2012). See Impact PH-1 under Alternative 1A. Therefore, as described for Alternative 1A,
19 construction and operation of the water conveyance facilities under Alternative 6C would not
20 substantially increase suitable vector habitat, and would not substantially increase vector-borne
21 diseases. Accordingly, there would be no adverse effects.

22 **CEQA Conclusion:** As described for Alternative 1A, implementation of CM1 under Alternative 6C
23 would involve construction and operation of solids lagoons, sedimentation basins, and the Byron
24 Tract Forebay could provide suitable habitat for vectors (e.g., mosquitoes). During operations, water
25 depth and circulation would prevent the areas from substantially increasing suitable vector habitat.
26 However, the shallow edges on the periphery of Byron Tract Forebay could potentially provide
27 suitable mosquito breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed)
28 were allowed to grow. To minimize the potential for impacts related to increasing suitable vector
29 habitat within the study area, DWR would consult and coordinate with San Joaquin County and
30 Sacramento-Yolo County MVCDDs and prepare and implement MMPs. BMPs to be implemented as
31 part of the MMPs would help control mosquitoes. See Impact PH-1 under Alternative 1A. These
32 BMPs would be consistent with practices presented in *Best Management Practices for Mosquito
33 Control in California* (California Department of Public Health 2012). Therefore, construction and
34 operation of the water conveyance facilities under Alternative 6C would not result in a substantial
35 increase in vector-borne diseases and the impact on public health would be less than significant. No
36 mitigation is required.

37 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
38 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
39 **Facilities**

40 The description of water quality and public health effects related to DBPs, pesticides and trace
41 metals for Alternative 6A also appropriately characterizes effects under this alternative.

1 **NEPA Effects:**

2 **Disinfection Byproducts**

3 Modeled long-term average DOC concentrations and, by extension, DBPs would decrease at Banks
4 and Jones pumping plants; however, long-term average concentrations of DOC are estimated to
5 substantially increase at Franks Tract, Rock Slough and Contra Costa Pumping Plant #1 relative to
6 the No Action Alternative, as described under Alternative 6B. Exceedances of water quality
7 objectives would conflict with the Basin Plan because it would exceed Basin Plan requirements.
8 These increases could potentially trigger substantial changes in drinking water treatment plant
9 design or operations. In particular, assessment locations at Rock Slough and Contra Costa Pumping
10 Plant #1 represent municipal intakes servicing existing drinking water treatment plants. Drinking
11 water treatment plants obtaining water from these interior Delta locations would likely need to
12 upgrade existing treatment systems in order to achieve EPA Stage 1 Disinfectants and Disinfection
13 Byproduct Rule action thresholds.

14 Relative to the No Action Alternative, Alternative 6C would result in increases in long-term average
15 bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at Barker
16 Slough. Increases would be greatest at Staten Island and at Barker Slough, as indicated under
17 Alternative 6A. The long-term average increase predicted for Barker Slough could necessitate
18 changes in water treatment plant operations or require treatment plant upgrades in order to
19 maintain DBP compliance.

20 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
21 implementation of such technologies would likely require substantial investment in new or modified
22 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
23 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
24 DOC and bromide concentrations in drinking water sources would represent an increased risk for
25 adverse effects on public health from DBPs. While Mitigation Measure WQ-17 is available to partially
26 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
27 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
28 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
29 effects of increased bromide in drinking water sources at Barker Slough. Implementation of this
30 measure along with a separate other commitment as set forth in EIR/EIS Appendix 3B,
31 *Environmental Commitments, AMMs, and CMs*, relating to the potential increased treatment costs
32 associated with bromide-related changes would reduce these effects. Further, as described for
33 Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at
34 Barker Slough may be further minimized by implementation of the AIP. However, the overall effect
35 on public health related to potential increases in DBPs (resulting from DOC and bromide increases)
36 at the aforementioned Delta locations would still be considered adverse.

37 **Trace Metals**

38 Alternative 6C has the same diversion and conveyance operations as Alternative 6A. Because there
39 would be no difference in operations, there would be no differences between these two alternatives
40 in source fractions to various Delta locations, and hydrodynamics in the Delta. Accordingly, trace
41 metal concentrations are not expected to increase above conditions under the No Action Alternative
42 and would not result in adverse impacts on public health.

1 Pesticides

2 The change in source water (e.g., more San Joaquin River water) associated with Alternative 6C
3 would be sufficient in magnitude to increase the existing pesticide concentrations in the Delta,
4 resulting in an increased risk of toxicity to aquatic life at Buckley Cove, Franks Tract, Rock Slough,
5 the San Joaquin River at Antioch, and Contra Costa Pumping Plant #1 during certain times of the
6 year relative to the No Action Alternative. A conclusion regarding the risk to human health at these
7 locations, based on the predicted adverse effects from pesticides on aquatic life cannot be made. The
8 prediction of adverse effects of pesticides fundamentally assumes that the present pattern of
9 pesticide incidence in surface water would continue at similar levels into the future. In reality, the
10 use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for concluding
11 a substantially increased San Joaquin River source water fraction, is on the decline with their
12 replacement by pyrethroids on the rise. Furthermore, water treatment plants are required to meet
13 drinking water requirements set forth in the California Safe Drinking Water Act and the regulations
14 adopted by CDPH. Therefore, it is not anticipated that there would be adverse effects on public
15 health from pesticides in drinking water sources.

16 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
17 operation of the water conveyance facilities under Alternative 6C would be of sufficient magnitude
18 to increase the existing pesticide concentrations in the Delta, according to water quality modeling
19 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
20 the study area (Buckley Cove, Franks Tract, Rock Slough, the San Joaquin River at Antioch, and
21 Contra Costa Pumping Plant #1) during certain times of the year relative to Existing Conditions. A
22 conclusion regarding the risk to human health at these locations, based on the predicted adverse
23 effects from pesticides on aquatic life, cannot be made. However, the prediction of adverse effects of
24 pesticides relative to Existing Conditions fundamentally assumes that the present pattern of
25 pesticide incidence in surface water would continue at similar levels into the future. In reality, the
26 use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for concluding
27 a substantially increased San Joaquin River source water fraction, is on the decline with their
28 replacement by pyrethroids on the rise. Furthermore, water treatment plants are required to meet
29 drinking water requirements set forth in the California Safe Drinking Water Act and the regulations
30 adopted by CDPH. Thus, these potential increases in pesticide concentrations would not significantly
31 impact public health. The change in source water would not alter trace metal concentrations in the
32 study area to the degree that there would be a beneficial use impairment. Finally, under Alternative
33 6C, modeled increases in bromide concentrations at Barker Slough, and in DOC concentrations at
34 Franks Tract, Rock Slough and Contra Costa Pumping Plant #1 (as described under Alternative 6A),
35 may be substantial enough to necessitate water treatment plant upgrades or changes in plant
36 operations in order to maintain DBP compliance. Should treatment plant upgrades not be
37 undertaken for the affected Delta locations, a change of such magnitude in long-term average DOC
38 and bromide concentrations in drinking water sources would represent an increased risk for effects
39 on public health from DBPs, which would be a significant impact.

40 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
41 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
42 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
43 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
44 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
45 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
46 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain

1 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
 2 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
 3 less-than-significant level.

4 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
 5 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
 6 separate other commitment to address the potential increased water treatment costs that could
 7 result from bromide-related concentration effects on municipal water purveyor operations.
 8 Potential options for making use of this financial commitment include funding or providing other
 9 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
 10 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
 11 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
 12 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
 13 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
 14 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
 15 treatment entities will be fully funded or implemented successfully prior to the project's
 16 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
 17 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
 18 or implemented before the project's contribution to the impact is made, a significant impact in the
 19 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
 20 significant and unavoidable. If, however, all financial contributions, technical contributions, or
 21 partnerships required to avoid significant impacts prove to be feasible and any necessary
 22 agreements are completed before the project's contribution to the effect is made, impacts would be
 23 less than significant.

24 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 25 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 26 **Slough**

27 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

28 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 29 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

30 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

31 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 32 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

33 **NEPA Effects:** As described for Alternative 1A, intermittent and/or short-term construction-related
 34 activities (as would occur for in-river construction) would not be anticipated to result in
 35 contaminant discharges of sufficient magnitude or duration to contribute to long-term
 36 bioaccumulation processes, or cause measureable long-term degradation. Legacy organochlorine
 37 pesticides typically bond to particulates, and do not mobilize easily. Construction and maintenance
 38 of Alternative 6C would not cause legacy organochlorine pesticides to be transported far from the
 39 source or to partition into the water column. Water supply operations under any BDCP action
 40 alternative would not be expected to change total suspended solids or turbidity levels (highs, lows,
 41 typical conditions) to any substantial degree. Changes in the magnitude, frequency, and geographic
 42 distribution of legacy pesticides in water bodies of the affected environment that would result in

1 new or more severe adverse effects on beneficial uses, relative to the No Action Alternative, would
2 not be expected to occur.

3 Water quality modeling results indicate small, insignificant changes in total mercury and
4 methylmercury levels in water resulting from Alternative 6C water operations (Chapter 8, *Water*
5 *Quality*, Section 8.3.3.13), as described under Impact PH-3 for Alternative 6A. These changes are not
6 expected to result in adverse effects on beneficial uses. Similarly, changes in methylmercury
7 concentration are expected to be relatively small. However, fish tissue mercury concentrations
8 showed substantial increases in some Delta locations modeled, as described under Impact PH-3 for
9 Alternative 6A. These changes in fish tissue mercury concentrations would make existing mercury-
10 related impairments in the Delta measurably worse. Relative to the No Action Alternative, body
11 burdens of mercury in fish would be measurably higher, and could thereby substantially increase
12 the health risks to people consuming those fish. Accordingly, the potential for Alternative 6C to
13 create a public health effect from bioaccumulation of mercury would exist and this is considered an
14 adverse effect.

15 As environmental commitments, DWR would develop and implement an Erosion and Sediment
16 Control Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs
17 implemented under the Erosion and Sediment Control Plans and the SWPPPs would help reduce
18 turbidity and keep sediment that may contain legacy organochlorine pesticides and methylmercury
19 within the area of disturbance. Additionally, OEHHA standards would continue to be implemented
20 for the consumption of study area fish and thus would serve to protect people against the
21 overconsumption of fish with increased body burdens of mercury.

22 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative
23 6C would not cause legacy organochlorine pesticides to be transported far from the source or to
24 partition into the water column based on the chemical properties of the pesticides. Therefore,
25 construction and maintenance of Alternative 6C water conveyance facilities would not cause
26 increased exposure of the public to these pesticides. As environmental commitments, DWR would
27 develop and implement Erosion and Sediment Control Plans and SWPPPs (Appendix 3B,
28 *Environmental Commitments, AMMs, and CMs*). BMPs implemented under the Erosion and Sediment
29 Control Plans and the SWPPPs would help reduce turbidity and keep sediment that may contain
30 legacy organochlorine pesticides and methylmercury within the area of disturbance.

31 Based on water quality modeling results, changes in water concentrations of mercury and
32 methylmercury would occur at some locations relative to Existing Conditions as a result of
33 operations under Alternative 6C but would not alter beneficial uses of waters in the study area.
34 However, relative to Existing Conditions, modeling results indicate that body burdens of mercury in
35 fish would be measurably higher at certain locations in the Delta, which could increase the health
36 risks to people consuming those fish. Accordingly, the potential for Alternative 6C to create a public
37 health effect from bioaccumulation of mercury would exist and this is considered a significant and
38 unavoidable impact. The estimated increases of mercury body burdens in fish are based on the
39 changes expected from the modeled blending of source waters that define CM1 for Alternative 6C
40 and are therefore inherent to the alternative. OEHHA standards would continue to be implemented
41 for the consumption of study area fish and thus would serve to protect people against the
42 overconsumption of fish with increased body burdens of mercury.

1 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
2 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
3 **Facilities**

4 **NEPA Effects:** As described in Table 25-9, a total of 13.73 miles of new temporary 69 kV
5 transmission lines; 17.61 miles of new permanent 69 kV transmission lines; and 18.45 miles of new
6 permanent 230 kV transmission lines would be required for this alternative. The temporary and
7 permanent transmission lines needed for Alternative 6C would be very similar in location and
8 length to those described under Alternative 1C (Table 25-9). This is because Alternative 6C would
9 involve the construction and operation of five intakes on the western bank of the Sacramento River
10 between Clarskburg and Walnut Grove, a canal on the western side of the Delta to convey water
11 from intakes to the intermediate pumping plant, and a dual-bore tunnel to convey water to a
12 continuing canal to the proposed Byron Tract Forebay immediately northwest of Clifton Court
13 Forebay. The primary difference would be that Alternative 6C would eliminate the use of existing
14 South Delta intakes. As with Alternative 1C, any new temporary and permanent transmission lines
15 needed for Alternative 6C would be located in in existing rights-of-way or areas that are not densely
16 populated and therefore would not expose substantially more people to transmission lines (Figure
17 25-2). Furthermore, the majority of sensitive receptors that would be within 300 feet of a new
18 transmission line are already located within 300 feet of an existing transmission line. However,
19 under this alternative, a proposed temporary 69 kV transmission line would be located within 300
20 feet of Fire Station 63 (in Walnut Grove) (Table 25-9).

21 While the current scientific evidence does not show conclusively that EMF exposure can increase
22 health risks, the location and design of the new transmission lines would be conducted in
23 accordance with CPUC's EMF Design Guidelines for Electrical Facilities, as described for Alternative
24 1A. Further, this temporary transmission line would be removed once construction of the water
25 conveyance facilities for Alternative 6C is completed. Therefore, operation of the transmission line
26 corridors would not expose substantially more people to transmission lines generating EMFs.
27 Because the lines would be located in sparsely populated areas and would be within 300 feet of only
28 one potential new sensitive receptor, the proposed temporary transmission line would not
29 substantially increase people's exposure to EMFs and there would be no adverse effect on public
30 health.

31 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
32 transmission lines would be located within the right-of-way of existing transmission lines and any
33 new temporary or permanent transmission lines not within the right-of-way of existing
34 transmission lines would, for the most part, be located in sparsely populated areas generally away
35 from existing sensitive receptors. However, under this alternative, a temporary 69 kV transmission
36 line would be located within 300 feet of Fire Station 63 (in Walnut Grove) (Table 25-9). While the
37 current scientific evidence does not show conclusively that EMF exposure can increase health risks,
38 design and implementation of new temporary or permanent transmission lines not within the right-
39 of-way of existing transmission lines would follow CPUC's EMF Design Guidelines for Electrical
40 Facilities and would implement shielding, cancelation, or district measures to reduce EMF exposure.
41 Further, this temporary transmission line would be removed when construction of the water
42 conveyance facilities for Alternative 6C is completed. Since construction and operation of
43 Alternative 6C would not expose substantially more people to transmission lines that generate new
44 sources of EMFs, impacts on public health would be less than significant, and no mitigation is
45 required.

1 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
 2 **and CM11**

3 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 4 under Alternative 6C would be the same as that described above for Alternative 1A. Although there
 5 would be an increase in restored and enhanced aquatic habitat in the study area as a result of
 6 implementing Alternative 6C, environmental commitments such as coordination with MVCDs and
 7 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 8 Appendix 3B, *Environmental Commitments, AMMs, and CMs*), would reduce the potential for an
 9 increase in mosquito breeding habitat, and a substantial increase in vector-borne diseases is
 10 unlikely to result. Furthermore, habitat would be restored in areas where potentially suitable
 11 habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would likely
 12 increase as a result of restoration and enhancement, which would keep mosquito populations in
 13 check. Therefore, effects on public health would be the same under Alternative 6C as under
 14 Alternative 1A and there would not be a substantial increase in the public's risk of exposure to
 15 vector-borne diseases with implementation of CM2-CM7, CM10 and CM11. Accordingly, there would
 16 be no adverse effect.

17 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 18 land potentially suitable for vector habitat (e.g., mosquitoes). However, Alternative 6C would
 19 require environmental commitments such as coordination with MVCDs and implementation of
 20 BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in Appendix 3B,
 21 *Environmental Commitments, AMMs, and CMs*) that would help control mosquitoes and reduce the
 22 potential for an increase in mosquito breeding habitat. Furthermore, habitat would be restored
 23 where potentially suitable vector habitat already exists and habitat restoration and enhancement
 24 would likely increase the number of mosquito predators. Therefore, as described for Alternative 1A,
 25 implementation of CM2-CM7, CM10 and CM11 under Alternative 6C would not substantially
 26 increase the public's risk of exposure to vector-borne diseases beyond what currently exists.
 27 Accordingly, this impact would be less than significant and no mitigation is required.

28 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 29 **Implementing the Restoration Conservation Measures**

30 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 31 under Alternative 6C would be the same as that described above for Alternative 1A. Implementation
 32 of the restoration conservation measures would support habitat types, such as wetlands and
 33 agricultural areas, that produce pathogens as a result of the biological productivity in these areas
 34 (e.g., migrating birds, application of fertilizers, waste products of animals). As exemplified by the
 35 Pathogen Conceptual Model, any potential increase in pathogens associated with the proposed
 36 habitat restoration would be localized and within the vicinity of the actual restoration. This would
 37 be similar for lands protected for agricultural uses. Depending on the level of recreational access
 38 granted by management plans, habitat restoration could increase or decrease opportunities for
 39 recreationists within the Delta region. However, effects associated with pathogens would be the
 40 same under Alternative 6C as under Alternative 1A. Recreationists would not experience a
 41 substantial increase in exposure to pathogens as a result of the restoration and no adverse effect
 42 would result.

43 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 6C
 44 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a

1 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 2 waste products of animals). However, the localized nature of pathogen generation and the quick die
 3 off of pathogens once released into water bodies would generally prevent substantial pathogen
 4 exposure to recreationists. Accordingly, impacts on public health would be less than significant. No
 5 mitigation is required.

6 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 7 **as a Result of Implementing CM2, CM4, CM5, and CM10**

8 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 6C as
 9 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
 10 known to bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of
 11 the newly inundated floodplains and marshes, as described under Alternative 1A. It is likely that the
 12 pesticide-bearing sediments would not be transported very far from the source area and would
 13 settle out with suspended particulates and be deposited close to the ROA. Further, CM2–CM21 do
 14 not include the use of pesticides known to be bioaccumulative in animals or humans.

15 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 16 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 17 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 18 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 19 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 20 bioaccumulation of methylmercury in the study area's aquatic systems (i.e., fish and water) during
 21 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
 22 reduce the public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,
 23 and CM10 under Alternative 6C is not expected to result in an adverse effect on public health with
 24 respect to pesticides or methylmercury.

25 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 26 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 27 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 28 sediments would be transported very far from the source area and they would likely settle out with
 29 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 30 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 31 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
 32 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
 33 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10
 34 under Alternative 6C would not substantially mobilize or substantially increase the public's
 35 exposure to constituents known to bioaccumulate and this impact would be less than significant. No
 36 mitigation is required.

37 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water**
 38 **Conveyance Facilities**

39 **NEPA Effects:** Water operations under Alternative 6C would be the same as under Alternative 6A.
 40 Therefore, potential effects on public health due to changes in water quality and beneficial uses as a
 41 result of *Microcystis* blooms and microcystin levels would be the same.

42 Any modified reservoir operations under Alternative 6C are not expected to promote *Microcystis*
 43 production in waters upstream of the Delta. As described in Chapter 8, *Water Quality, Microcystis*

1 blooms in the Export Service Areas could increase due to increased water temperatures resulting
2 from climate change, but not due to water conveyance facility operations. Similarly, hydraulic
3 residence times in the Export Service Area would not be affected by operations of CM1. Accordingly,
4 conditions would not be more conducive to *Microcystis* bloom formation. Water diverted from the
5 Sacramento River in the north Delta is expected to be unaffected by *Microcystis*. Under Alternative
6 6C, water exported to the SWP/CVP Export Service Areas will consist entirely of water from the
7 Sacramento River from the north Delta, which is unaffected by *Microcystis*. Accordingly, the effects of
8 *Microcystis* on water exported to the SWP/CVP Export Service Areas could be lower under
9 Alternative 6C relative to Alternative 1A.

10 Ambient meteorological conditions would be the primary driver of Delta water temperatures, and
11 climate warming, not water operations, would determine future water temperatures in the Delta.
12 Increasing water temperatures could lead to earlier attainment of the water temperature threshold
13 required to initiate *Microcystis* bloom formation, and therefore earlier occurrences of *Microcystis*
14 blooms in the Delta, as well as increases in the duration and magnitude. However, these
15 temperature-related changes would not be different from what would occur under the No Action
16 Alternative. Siting and design of restoration areas would have a substantial influence on the
17 magnitude of hydraulic residence time increases under Alternative 6C. The modeled increase in
18 residence time in the Delta could result in an increase in the frequency, magnitude, and geographic
19 extent of *Microcystis* blooms, and thus microcystin levels. Therefore, impacts on beneficial uses,
20 including drinking water and recreational waters, could occur and public health could be affected.
21 Accordingly, this would be considered an adverse effect.

22 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
23 quality, and therefore potential public health effects, in the Delta due to *Microcystis*. However,
24 because the effectiveness of these mitigation measures to result in feasible measures for reducing
25 water quality effects, and therefore potential public health effects, is uncertain, the effect would still
26 be considered adverse.

27 **CEQA Conclusion:** Under Alternative 6C, operation of the water conveyance facilities is not expected
28 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
29 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
30 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
31 residence times in the Export Service Area would not be affected by operations of CM1, and
32 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.
33 Water exported from the Delta to the Export Service Area is expected to be diverted entirely from
34 the Sacramento River from the north Delta, which is not affected by *Microcystis*. Therefore, the
35 effects of *Microcystis* on water exported to the SWP/CVP Export Service Areas could be lower under
36 Alternative 6C relative to Alternative 1A.

37 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
38 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
39 water temperature increases in the Delta would be due to climate change primarily and not due to
40 operation of the water conveyance facilities. Increases in Delta residence times would be due in
41 small part to climate change and sea level rise, but due to a greater degree to operation of the water
42 conveyance facilities and hydrodynamic impacts of restoration included in CM2 and CM4.
43 Consequently, it is possible that increases in the frequency, magnitude, and geographic extent of
44 *Microcystis* blooms in the Delta would occur due to the operations and maintenance of the water
45 conveyance facilities and the hydrodynamic impacts of restoration under CM2 and CM4.

1 Accordingly, beneficial uses including drinking water and recreational waters would be impacted
 2 and, as a result, there could be potential impacts on public health. Therefore, this impact would be
 3 significant.

4 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 5 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 6 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 7 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 8 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 9 to determine whether increases in abundance are significant. This mitigation measure also requires
 10 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 11 investigate and evaluate measures that could be taken to reduce hydraulic residence time in the
 12 affected areas of the Delta. However, because the effectiveness of these mitigation measures to
 13 result in feasible measures for reducing water quality effects, and therefore potential public health
 14 effects, is uncertain, this impact would be significant and unavoidable.

15 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 16 ***Microcystis* Blooms**

17 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 18 in Chapter 8, *Water Quality*.

19 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 20 **Water Residence Time**

21 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 22 in Chapter 8, *Water Quality*.

23 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 24 **CM4**

25 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 26 under Alternative 6C would be the same as that described under Alternative 1A. Restoration
 27 activities implemented under CM2 and CM4 that would create shallow backwater areas could result
 28 in local increases in water temperature that may encourage *Microcystis* growth during the summer
 29 bloom season. This would result in further degradation of water quality beyond the hydrodynamic
 30 effects of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis*
 31 blooms with implementation of CM2 and CM4 could potentially result in adverse effects on public
 32 health through exposure via drinking water quality and recreational waters. Mitigation Measures
 33 WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 34 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 35 feasible measures for reducing water quality effects, and therefore potential public health effects, is
 36 uncertain. This would be an adverse effect.

37 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 6C are the same as
 38 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
 39 create shallow backwater areas could result in local increases in water temperature conducive to
 40 *Microcystis* growth during summer bloom season. This could compound the water quality
 41 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 42 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An

1 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 2 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 3 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 4 increased local water temperatures and water residence time. The effectiveness of these mitigation
 5 measures to result in feasible measures for reducing water quality effects, and therefore potential
 6 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

7 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 8 ***Microcystis* Blooms**

9 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 10 in Chapter 8, *Water Quality*.

11 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 12 **Water Residence Time**

13 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 14 in Chapter 8, *Water Quality*.

15 **25.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**
 16 **3, and 5, and Enhanced Aquatic Conservation (9,000 cfs;**
 17 **Operational Scenario E)**

18 The construction of the water conveyance facilities and implementation of CM2–CM21 under
 19 Alternative 7 would generally be the same as described under Alternative 1A. However, 20
 20 additional linear miles of channel margin habitat would be enhanced for a total of 40 linear miles,
 21 and an additional 10,000 acres of seasonally inundated floodplain would be restored for a total of
 22 20,000 acres of seasonally inundated floodplain. The locations of these habitat enhancements would
 23 be similar to those described in 1A, throughout the 11 different conservation zones and expanding
 24 on existing channel margin habitat and floodplain locations. Therefore, construction effects would
 25 be the same as under Alternative 1A and are summarized below for vector-borne diseases and water
 26 quality concerns.

27 Alternative 7 would have two fewer intakes than Alternative 1A would have. There would be fewer
 28 solids lagoons and sedimentation basins and fewer transmission lines. Water supply operations
 29 under Alternative 7 would be different from Alternative 1A and would adhere to Operational
 30 Scenario E criteria.

31 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 32 **the Water Conveyance Facilities**

33 **NEPA Effects:** Alternative 7 would involve construction and operation of up to nine solids lagoons,
 34 three sedimentation basins, Byron Tract Forebay, and an intermediate forebay and associated 350-
 35 acre inundation area. The mechanisms for potential public health effects are similar to those these
 36 water conveyance features have the potential to provide habitat for vectors that transmit diseases
 37 (e.g., mosquitoes) because of the large volumes of water that would be held within these areas. The
 38 depth, design, and operation of the sedimentation basins and solids lagoons would prevent the
 39 development of suitable mosquito habitat (Figure 25-1). Specifically, the basins would be too deep
 40 and the constant movement of water would prevent mosquitoes from breeding and multiplying.
 41 Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons

1 would be 165 feet long by 86 feet wide by 10 feet deep. Furthermore, use of the inundation area
 2 would be limited to forebay emergency overflow situations and water would be pumped back to the
 3 intermediate forebay, creating circulation such that the inundation area would have a low potential
 4 for creating suitable vector habitat. Similarly, water in the Byron Tract Forebay would be circulated
 5 regularly and, with the exception of shallower areas around the periphery, would be too deep to
 6 provide suitable mosquito habitat. The shallower edges of the forebay could provide suitable
 7 mosquito breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed) were
 8 allowed to grow.

9 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 10 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 11 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 12 control mosquitoes (see Impact PH-1 under Alternative 1A). These BMPs would be consistent with
 13 practices presented in *Best Management Practices for Mosquito Control in California* (California
 14 Department of Public Health 2012). Implementation of these BMPs would reduce the likelihood that
 15 BDCP operations would require an increase in abatement activities by the local MVCs. Therefore,
 16 as described under Alternative 1A, construction and operation of the intakes, solids lagoons,
 17 sedimentation basins, the forebays, and the intermediate forebay inundation area would not
 18 substantially increase suitable vector habitat, and would not substantially increase vector-borne
 19 diseases under Alternative 7. Accordingly, no adverse effects on public health would result.

20 **CEQA Conclusion:** As described for Alternative 1A, implementation of CM1 under Alternative 7
 21 would involve construction and operation of solids lagoons, sedimentation basins, intermediate
 22 forebay and associated 350-acre inundation area, and Byron Tract Forebay. While these areas could
 23 provide suitable habitat for vectors (e.g., mosquitoes), water depth and circulation would prevent
 24 the areas from substantially increasing suitable vector habitat. The inundation area would only be
 25 used during emergency overflow situations and water would be pumped back into the intermediate
 26 forebay, creating circulation that would discourage mosquito breeding. The shallower periphery of
 27 the intermediate forebay and Byron Tract Forebay could provide suitable mosquito breeding
 28 habitat.

29 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 30 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 31 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 32 control mosquitoes. These BMPs would be consistent with practices presented in *Best Management
 33 Practices for Mosquito Control in California* (California Department of Public Health 2012). See
 34 Impact PH-1 under Alternative 1A. Therefore, construction and operation of the water conveyance
 35 facilities under Alternative 7 would not result in a substantial increase in vector-borne diseases and
 36 the impact on public health would be less than significant. No mitigation is required.

37 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 38 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 39 **Facilities**

40 **NEPA Effects:**

41 **Disinfection Byproducts**

42 Under Alternative 7, the geographic extent of effects pertaining to long-term average DOC
 43 concentrations and, by extension, DBPs in the study area would be similar to that described for

1 Alternative 1A. However, the magnitude of predicted long-term increase and relative frequency of
2 concentration threshold exceedances would be substantially greater for Alternative 7. Exceedances
3 of water quality objectives would conflict with the Basin Plan because it would exceed Basin Plan
4 requirements. Modeled effects would be greatest at Franks Tract, Rock Slough, and Contra Costa
5 Pumping Plant #1 relative to the No Action Alternative. Alternative 7 would lead to predicted
6 improvements in long-term average DOC concentrations at Barker Slough, and Banks and Jones
7 pumping plants. The increases in long-term average DOC concentrations estimated to occur at
8 Franks Tract, Rock Slough, and Contra Costa Pumping Plant #1 ($\leq 26\%$ net increase) are considered
9 substantial and could potentially trigger significant changes in drinking water treatment plant
10 design or operations. In particular, assessment locations at Rock Slough and Contra Costa Pumping
11 Plant No. 1 represent municipal intakes servicing existing drinking water treatment plants. Under
12 Alternative 7, drinking water treatment plants obtaining water from these interior Delta locations
13 would likely need to upgrade existing treatment systems in order to achieve EPA Stage 1
14 Disinfectants and Disinfection Byproduct Rule action thresholds.

15 In addition, relative to the No Action Alternative, Alternative 7 would result in increases in long-
16 term average bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at
17 Barker Slough. Increases would be greatest at Staten Island (31%; 29% during the drought period)
18 and at Barker Slough (1%; 34% during the drought period). The long-term average increase
19 predicted for Barker Slough could necessitate changes in water treatment plant operations or
20 require treatment plant upgrades in order to maintain DBP compliance. While the increase in long-
21 term average bromide concentrations at Barker Slough is predicted to be relatively small when
22 modeled over a representative 16-year hydrologic period, increases during the modeled drought
23 period would represent a substantial change in source water quality during a season of drought.
24 These predicted drought season related increases in bromide at Barker Slough could lead to adverse
25 changes in the formation of disinfection byproducts at drinking water treatment plants such that
26 considerable water treatment plant upgrades would be necessary to achieve equivalent levels of
27 drinking water health protection.

28 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
29 implementation of such technologies would likely require substantial investment in new or modified
30 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
31 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
32 DOC and bromide concentrations in drinking water sources would represent an increased risk for
33 adverse effects on public health from DBPs. While Mitigation Measure WQ-17 is available to partially
34 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
35 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
36 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
37 effects of increased bromide in drinking water sources at Barker Slough. Implementation of this
38 measure along with a separate other commitment as set forth in EIR/EIS Appendix 3B,
39 *Environmental Commitments, AMMs, and CMs*, relating to the potential increased treatment costs
40 associated with bromide-related changes would reduce these effects. Further, as described for
41 Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at
42 Barker Slough may be further minimized by implementation of the AIP. However, the overall effect
43 on public health related to potential increases in DBPs (resulting from DOC and bromide increases)
44 at the aforementioned Delta locations would still be considered adverse.

1 Trace Metals

2 Alternative 7 would not result in substantial increases in trace metal (arsenic, iron, or manganese)
3 concentrations in the Delta relative to conditions under the No Action Alternative. Throughout much
4 of the south Delta, San Joaquin River water would replace Sacramento River water, with the future
5 trace metals profile largely reflecting that of the San Joaquin River (see Appendix 8D, *Source Water*
6 *Fingerprinting Results*). However, trace metal concentration profiles between the San Joaquin and
7 Sacramento Rivers are very similar and currently meet Basin Plan objectives and CTR criteria. While
8 the change in trace metal concentrations in the south Delta would likely be measurable, Alternative
9 7 would not be expected to substantially increase the frequency with which applicable Basin Plan
10 objectives would be exceeded in the Delta or substantially degrade the quality of Delta waters with
11 regard to trace metals. Accordingly, no adverse effect on public health related to the trace metals
12 arsenic, iron, or manganese from drinking water sources is anticipated.

13 Pesticides

14 Under Alternative 7, the distribution and mixing of Delta source waters would change. Relative to
15 the No Action Alternative, the change in source water (e.g., more San Joaquin River water)
16 associated with Alternative 7 would be sufficient in magnitude to increase the existing pesticide
17 concentrations in the Delta, resulting in an increased risk of toxicity to aquatic life in certain areas
18 (Franks Tract, Rock Slough, the San Joaquin River at Antioch, and Contra Costa Pumping Plant #1)
19 during certain times of the year. Further, there would be modeled increases in risk of toxicity to
20 aquatic life at Buckley Cove during July and August; however, these changes are not considered to be
21 substantial.

22 A conclusion regarding the risk to human health at these locations, based on the predicted adverse
23 effects from pesticides on aquatic life, cannot be made. The prediction of adverse effects of
24 pesticides fundamentally assumes that the present pattern of pesticide incidence in surface water
25 would continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon
26 pesticides, the two pesticides that serve as the basis for concluding a substantially increased San
27 Joaquin River source water fraction, is on the decline with their replacement by pyrethroids on the
28 rise. Furthermore, water treatment plants are required to meet drinking water requirements set
29 forth in the California Safe Drinking Water Act and the regulations adopted by CDPH. Therefore, it is
30 not anticipated that there would be adverse effects on public health from pesticides in drinking
31 water sources.

32 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
33 operation of the water conveyance facilities under Alternative 7 would be of sufficient magnitude to
34 increase the existing pesticide concentrations in the Delta, according to water quality modeling
35 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
36 the study area relative to Existing Conditions (Franks Tract, Rock Slough, the San Joaquin River at
37 Antioch, and Contra Costa Pumping Plant #1) during certain times of the year relative to Existing
38 Conditions. A conclusion regarding the risk to human health at these locations, based on the
39 predicted adverse effects from pesticides on aquatic life, cannot be made. However, the prediction of
40 adverse effects of pesticides relative to Existing Conditions fundamentally assumes that the present
41 pattern of pesticide incidence in surface water would continue at similar levels into the future. In
42 reality, the use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for
43 concluding a substantially increased San Joaquin River source water fraction, is on the decline with
44 their replacement by pyrethroids on the rise. Furthermore, water treatment plants are required to

1 meet drinking water requirements set forth in the California Safe Drinking Water Act and the
2 regulations adopted by CDPH. Thus, these potential increases in pesticide concentrations would not
3 significantly impact public health. The change in source water would not alter trace metal
4 concentrations in the study area to the degree that there would be a beneficial use impairment.
5 Finally, under Alternative 7, modeled increases in bromide concentrations (34% relative increase)
6 at Barker Slough (during the drought period only), and in DOC concentrations at Franks Tract, Rock
7 Slough, and Contra Costa Pumping Plant #1 ($\leq 30\%$ increase), may be substantial enough to
8 necessitate water treatment plant upgrades or changes in plant operations in order to maintain DBP
9 compliance. Should treatment plant upgrades not be undertaken for the affected Delta locations, a
10 change of such magnitude in long-term average DOC and bromide concentrations in drinking water
11 sources would represent an increased risk for effects on public health from DBPs, which would be a
12 significant impact.

13 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
14 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
15 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
16 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
17 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
18 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
19 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
20 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
21 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
22 less-than-significant level. Additionally,

23 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
24 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
25 separate other commitment to address the potential increased water treatment costs that could
26 result from bromide-related concentration effects on municipal water purveyor operations.
27 Potential options for making use of this financial commitment include funding or providing other
28 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
29 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
30 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
31 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
32 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
33 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
34 treatment entities will be fully funded or implemented successfully prior to the project's
35 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
36 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
37 or implemented before the project's contribution to the impact is made, a significant impact in the
38 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
39 significant and unavoidable. If, however, all financial contributions, technical contributions, or
40 partnerships required to avoid significant impacts prove to be feasible and any necessary
41 agreements are completed before the project's contribution to the effect is made, impacts would be
42 less than significant.

1 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 2 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 3 **Slough**

4 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

5 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 6 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

7 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

8 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 9 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

10 **NEPA Effects:** Alternative 7 would have the two fewer intakes than Alternative 1A would have, for a
 11 total of three intakes; however, they would be constructed and operated in a similar manner to
 12 intakes under Alternative 1A.

13 As described under Alternative 1A, sediment-disturbing activities during construction and
 14 maintenance of the water conveyance facilities under Alternative 7 could result in the disturbance of
 15 existing constituents, such as legacy organochlorine pesticides or methylmercury, in sediment.
 16 Therefore, the public health effects associated with pesticides and methylmercury for construction
 17 and maintenance of the water conveyance facilities under this alternative would be similar,
 18 although, slightly less, than those associated with Alternative 1A. Intermittent and/or short-term
 19 construction-related activities (as would occur for in-river construction) would not be anticipated to
 20 result in contaminant discharges of sufficient magnitude or duration to contribute to long-term
 21 bioaccumulation processes, or cause measureable long-term degradation, as described under
 22 Alternative 1A. Legacy organochlorine pesticides typically bond to particulates, and do not mobilize
 23 easily. Construction and maintenance of Alternative 7 would not cause legacy organochlorine
 24 pesticides to be transported far from the source or to partition into the water column, as described
 25 for Alternative 1A. Water supply operations under any BDCP action alternative would not be
 26 expected to change total suspended solids or turbidity levels (highs, lows, typical conditions) to any
 27 substantial degree. Changes in the magnitude, frequency, and geographic distribution of legacy
 28 pesticides in water bodies of the affected environment that would result in new or more severe
 29 adverse effects on beneficial uses, relative to the No Action Alternative, would not be expected to
 30 occur.

31 Water quality modeling results indicate that the percentage change in assimilative capacity of
 32 waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark for this alternative
 33 would decrease by 6.6% at Old River at Rock Slough and Contra Costa Pumping Plant relative to the
 34 No Action Alternative. These changes are not expected to result in adverse effects on beneficial uses.
 35 Similarly, changes in methylmercury concentration are expected to be relatively small.

36 Fish tissue estimates showed substantial increases in exceedance quotients at some Delta locations
 37 modeled. The greatest change in exceedance quotients relative to the No Action Alternative would
 38 occur at the Contra Costa Pumping Plant (30-39% increase) and Old River at Rock Slough (32-45%
 39 increase). These changes in fish tissue mercury concentrations would make existing mercury-
 40 related impairments in the Delta measurably worse. Relative to the No Action Alternative, body
 41 burdens of mercury in fish would be measurably higher, and could thereby substantially increase
 42 the health risks to people consuming those fish. Accordingly, the potential for Alternative 7 to create

1 a public health effect from bioaccumulation of mercury would exist and this is considered an
2 adverse effect.

3 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
4 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
5 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
6 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
7 area of disturbance during construction and maintenance. Additionally, OEHHA standards would
8 continue to be implemented for the consumption of study area fish and thus would serve to protect
9 people against the overconsumption of fish with increased body burdens of mercury.

10 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative 7
11 would not cause legacy organochlorine pesticides to be transported far from the source or to
12 partition into the water column based on the chemical properties of the pesticides. Therefore, there
13 would be no increased exposure of the public to these pesticides as a result of construction and
14 maintenance. As environmental commitments, DWR would develop and implement Erosion and
15 Sediment Control Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
16 BMPs implemented under the Erosion and Sediment Control Plans and the SWPPPs would help
17 reduce turbidity and keep sediment that may contain legacy organochlorine pesticides and
18 methylmercury within the area of disturbance.

19 Based on water quality modeling results, changes in water concentrations of mercury and
20 methylmercury would occur at some locations relative to Existing Conditions as a result of
21 operations under Alternative 7. Specifically, the analysis of percentage change in assimilative
22 capacity of waterborne total mercury of Alternative 7 relative to the 25 ng/L ecological risk
23 benchmark as compared to Existing Conditions showed a 6.7% reduction at Old River at Rock
24 Slough and Contra Costa Pumping Plant. Changes in methylmercury concentrations are expected to
25 be small. The beneficial uses of waters in the study area would not be adversely affected by these
26 changes. However, relative to Existing Conditions, modeling results indicate that body burdens of
27 mercury in fish would be measurably higher at the Contra Costa Pumping Plant (30-39% increase)
28 and in Old River at Rock Slough (32-45% increase). This could increase the health risks to people
29 consuming those fish. Accordingly, the potential for Alternative 7 to create a public health effect
30 from bioaccumulation of mercury would exist and this is considered a significant and unavoidable
31 impact. The estimated increases of mercury body burdens in fish are based on the changes expected
32 from the modeled blending of source waters that define CM1 for Alternative 7 and are therefore
33 inherent to the Alternative. OEHHA standards would continue to be implemented for the
34 consumption of study area fish and thus would serve to protect people against the overconsumption
35 of fish with increased body burdens of mercury.

36 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
37 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
38 **Facilities**

39 **NEPA Effects:** As described in Table 25-9, a total of 24.71 miles of new temporary 69 kV
40 transmission lines; 7.03 miles of new permanent 69 kV transmission lines; and 42.68 miles of new
41 permanent 230 kV transmission lines would be required for this alternative. The new temporary
42 and permanent transmission lines needed for Alternative 7 would be in locations similar to those in
43 Alternative 1A as depicted in Mapbook Figure M3-1 in Chapter 3, *Description of Alternatives*. As with
44 Alternative 1A, any new temporary and permanent transmission lines needed for Alternative 7

1 would be located in rights-of-way of existing transmission lines or in areas that are not densely
2 populated and, therefore, would not expose substantially more people to transmission lines (Figure
3 25-2). Furthermore, the majority of sensitive receptors that would be within 300 feet of a new
4 transmission line are already located within 300 feet of an existing transmission line. However, as
5 indicated in Table 25-9, Stone Lakes National Wildlife Refuge would be within 300 feet of a
6 proposed temporary 69 kV transmission line. Visitors to this area generally come for walks, water
7 recreation, and hunting, and as such, it is unlikely that large groups of people would be staying in the
8 area within 300 feet of this proposed transmission line, so any EMF exposure would be limited.
9 Further, this line would be removed when construction of the water conveyance facility features
10 near this area is completed, so there would be no potential permanent effects. Therefore, this
11 temporary transmission line would not substantially increase people's exposure to EMFs.

12 While the current scientific evidence does not show conclusively that EMF exposure can increase
13 health risks, the location and design of the new transmission lines would be conducted in
14 accordance with CPUC's EMF Design Guidelines for Electrical Facilities to minimize health risks
15 associated with power lines. Therefore, operation of the transmission line corridors would not
16 expose substantially more people to transmission lines generating EMFs. Because the lines would be
17 located in sparsely populated areas and would be within 300 feet of only one potential new sensitive
18 receptor, the proposed temporary and permanent transmission lines would not substantially
19 increase people's exposure to EMFs, and there would be no adverse effect on public health.

20 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
21 transmission lines would be located in rights-of-way of existing transmission lines or in sparsely
22 populated areas generally away from existing sensitive receptors. One sensitive receptor, Stone
23 Lakes National Wildlife Refuge, would be within 300 feet of a proposed temporary 69 kV
24 transmission line. Because visitors to this area generally come for walks, water recreation, and
25 hunting, it is unlikely that large groups of people would be staying in the area within 300 feet of this
26 proposed transmission line, so any EMF exposure would be limited. Further, this line would be
27 removed when construction of the water conveyance facility features near this area is completed, so
28 there would be no potential permanent effects. Therefore, this temporary transmission line would
29 not substantially increase people's exposure to EMFs. Design and implementation of new temporary
30 or permanent transmission lines not within the right-of-way of existing transmission lines would
31 follow CPUC's EMF Design Guidelines for Electrical Facilities and would implement shielding,
32 cancellation, or distance measures to reduce EMF exposure. Because construction and operation of
33 Alternative 7 would not expose substantially more people to transmission lines that provide new
34 sources of EMFs, impacts on public health would be less than significant, and no mitigation is
35 required.

36 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 37 **and CM11**

38 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
39 under Alternative 7 would be similar to that described above for Alternative 1A. However, under
40 Alternative 7 there would be an additional 10,000 acres of seasonally inundated floodplain (CM5).
41 Although there would be an increase in restored and enhanced aquatic habitat in the study area as
42 a result of implementing Alternative 7, implementation of environmental commitments such as
43 coordination with MVCDs and implementation of BMPs under MMPs (as described under Impact
44 PH-1 for Alternative 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) reduce
45 the potential for an increase in mosquito breeding habitat, and a substantial increase in vector-

1 borne diseases is unlikely to result. Furthermore, habitat would be restored in areas where
 2 potentially suitable habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats,
 3 spiders) would likely increase as a result of restoration and enhancement, which would keep
 4 mosquito populations in check. Therefore, effects would be the same under Alternative 7 as under
 5 Alternative 1A and there would not be a substantial increase in the public's risk of exposure to
 6 vector-borne diseases with implementation of CM2-CM7, CM10 and CM11. Accordingly, there would
 7 be no adverse effect.

8 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 9 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described in Alternative
 10 1A, Alternative 7 would require environmental commitments, such as coordination with MVCDs and
 11 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 12 Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help control mosquitoes and
 13 reduce the potential for an increase in mosquito breeding habitat. Furthermore, habitat would be
 14 restored where potentially suitable vector habitat already exists and habitat restoration and
 15 enhancement would likely increase the number of mosquito predators. Therefore, as described for
 16 Alternative 1A, implementation CM2-CM7, CM10 and CM11 under Alternative 7 would not
 17 substantially increase the public's risk of exposure to vector-borne diseases beyond what currently
 18 exists. Accordingly, this impact would be less than significant and no mitigation is required.

19 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 20 **Implementing the Restoration Conservation Measures**

21 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 22 under Alternative 7 would be the similar to that described above for Alternative 1A. However, under
 23 Alternative 7 there would be an additional 10,000 acres of seasonally inundated floodplain (CM5).
 24 Implementation of the restoration conservation measures would support habitat types, such as
 25 wetlands and agricultural areas, that produce pathogens as a result of the biological productivity in
 26 these areas (e.g., migrating birds, application of fertilizers, waste products of animals). As
 27 exemplified by the Pathogen Conceptual Model, any potential increase in pathogens associated with
 28 the habitat restoration would be localized and within the vicinity of the actual restoration. This
 29 would be similar for lands protected for agricultural uses. Depending on the level of recreational
 30 access granted by management plans, habitat restoration could increase or decrease opportunities
 31 for recreationists within the Delta region. However, effects associated with pathogens would be the
 32 same under Alternative 7 as under Alternative 1A. Recreationists would not experience a substantial
 33 increase in exposure to pathogens as a result of the restoration and no adverse effect on public
 34 health would result.

35 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 7
 36 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 37 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 38 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 39 off of some types of pathogens once released into water bodies would generally prevent substantial
 40 pathogen exposure to recreationists. Accordingly, impacts on public health would be less than
 41 significant and no mitigation is required.

1 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 2 **as a Result of Implementing CM2, CM4, CM5, and CM10**

3 **NEPA Effects:** The amount of habitat restoration under Alternative 7 would be similar to Alternative
 4 1A. However, under Alternative 7 there would be an additional 10,000 acres of seasonally inundated
 5 floodplain (CM5). The primary concern with habitat restoration regarding constituents known to
 6 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 7 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the pesticide-
 8 bearing sediments would not be transported very far from the source area and would settle out with
 9 suspended particulates and be deposited close to the ROA. Further, CM2–CM21 do not include the
 10 use of pesticides known to be bioaccumulative in animals or humans.

11 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 12 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 13 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 14 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 15 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 16 bioaccumulation of methylmercury in the study area's aquatic systems (i.e., fish and water) during
 17 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
 18 reduce the public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,
 19 and CM10 under Alternative 7 is not expected to result in an adverse effect on public health with
 20 respect to pesticides or methylmercury.

21 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 22 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 23 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 24 sediments would be transported very far from the source area and they would likely settle out with
 25 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 26 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 27 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
 28 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
 29 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10 of
 30 Alternative 7 would not substantially mobilize or substantially increase the public's exposure to
 31 constituents known to bioaccumulate and this impact would be less than significant. No mitigation is
 32 required.

33 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water**
 34 **Conveyance Facilities**

35 **NEPA Effects:** Because factors that affect *Microcystis* abundance in waters upstream of the Delta, in
 36 the Delta, and in the SWP/CVP Export Services Areas under Alternative 1A would similarly change
 37 under Alternative 7, *Microcystis* abundance, and thus microcystins concentrations, in water bodies
 38 of the affected environment under Alternative 7 would be very similar to those discussed for
 39 Alternative 1A.

40 As described in Chapter 8, *Water Quality*, although *Microcystis* blooms have not occurred in the
 41 Export Service Areas, conditions in the Export Service Areas under Alternative 7 may become more
 42 conducive to *Microcystis* bloom formation because water temperatures will increase in the Export
 43 Service Areas due to the expected increase in ambient air temperatures resulting from climate
 44 change, but not from operation of the water conveyance facilities. Under Alternative 7, relative to No

1 Action Alternative, water exported to the SWP/CVP Export Service Area will be a mixture of
2 *Microcystis*-affected source water from the south Delta intakes and unaffected source water from the
3 Sacramento River, diverted at the north Delta intakes. It cannot be determined whether operations
4 and maintenance under Alternative 7 will result in increased or decreased levels of *Microcystis* and
5 microcystins in the mixture of source waters exported from Banks and Jones pumping plants.

6 Like Alternative 1A, elevated ambient water temperatures would occur in the Delta under
7 Alternative 7, which could lead to earlier occurrences of *Microcystis* blooms in the Delta, and
8 increase the overall duration and magnitude of blooms. However, as described in Chapter 8, *Water*
9 *Quality*, the increase in Delta water temperatures, and consequent potential increase in *Microcystis*
10 blooms, would be driven entirely by climate change, not by operation of water conveyance facilities.
11 There would be differences in the direction and magnitude of water residence time changes during
12 the *Microcystis* bloom period due to operation of the water conveyance facilities under Alternative 7
13 compared to Alternative 1A, relative to the No Action Alternative. As a result, *Microcystis* blooms,
14 and therefore microcystin, could increase in surface waters throughout the Delta. Therefore, impacts
15 on beneficial uses, including drinking water and recreational waters, could occur and public health
16 could be affected. Accordingly, this would be considered an adverse effect.

17 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
18 quality in the Delta. Although there is uncertainty regarding this impact, the effects on *Microcystis*
19 from implementing CM1 is determined to be adverse.

20 **CEQA Conclusion:** Under Alternative 7, operation of the water conveyance facilities is not expected
21 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
22 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
23 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
24 Residence times in the Export Service Area would not be affected by operations of CM1, and
25 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.
26 Water exported from the Delta to the Export Service Area is expected to be a mixture of *Microcystis*-
27 affected source water from the south Delta intakes and unaffected source water from the
28 Sacramento River. Because of this, it cannot be determined whether operations and maintenance
29 under Alternative 7 would result in increased or decreased levels of *Microcystis* and microcystins in
30 the mixture of source waters exported from Banks and Jones pumping plants.

31 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
32 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
33 water temperature increases in the Delta would be due to climate change and not due to operation
34 of the water conveyance facilities. Increases in Delta residence times would be due in small part to
35 climate change and sea level rise, but due to a greater degree to operation of the water conveyance
36 facilities and hydrodynamic impacts of restoration included in CM2 and CM4. Consequently, it is
37 possible that increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms in
38 the Delta would occur due to the operations and maintenance of the water conveyance facilities and
39 the hydrodynamic impacts of restoration under CM2 and CM4. Accordingly, beneficial uses including
40 drinking water and recreational waters would be impacted and, as a result, public health. Therefore,
41 this impact would be significant.

42 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
43 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
44 considerations be incorporated into restoration area site design for CM2 and CM4 using the best

1 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 2 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 3 to determine whether increases in abundance are significant. This mitigation measure also requires
 4 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 5 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
 6 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 7 measures for reducing water quality effects, and therefore potential public health effects, is
 8 uncertain, this impact would be significant and unavoidable.

9 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 10 ***Microcystis* Blooms**

11 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 12 in Chapter 8, *Water Quality*.

13 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 14 **Water Residence Time**

15 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 16 in Chapter 8, *Water Quality*.

17 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 18 **CM4**

19 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 20 under Alternative 7 would be the same as that described under Alternative 1A. Restoration activities
 21 implemented under CM2 and CM4 that would create shallow backwater areas could result in local
 22 increases in water temperature that may encourage *Microcystis* growth during the summer bloom
 23 season. This would result in further degradation of water quality beyond the hydrodynamic effects
 24 of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis* blooms
 25 with implementation of CM2 and CM4 could potentially result in adverse effects on public health
 26 through exposure via drinking water quality and recreational waters. Mitigation Measures WQ-32a
 27 and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 28 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 29 feasible measures for reducing water quality effects related to *Microcystis* is uncertain. This would
 30 be an adverse effect.

31 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 7 are the same as
 32 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
 33 create shallow backwater areas could result in local increases in water temperature conducive to
 34 *Microcystis* growth during summer bloom season. This could compound the water quality
 35 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 36 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 37 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 38 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 39 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 40 increased local water temperatures and water residence time. The effectiveness of these mitigation
 41 measures to result in feasible measures for reducing water quality effects, and therefore potential
 42 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

1 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 2 ***Microcystis* Blooms**

3 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 4 in Chapter 8, *Water Quality*.

5 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 6 **Water Residence Time**

7 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 8 in Chapter 8, *Water Quality*.

9 **25.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**
 10 **3, and 5, and Increased Delta Outflow (9,000 cfs; Operational**
 11 **Scenario F)**

12 Alternative 8 water conveyance facilities would be structurally identical to those in Alternative 7,
 13 but the operational guidelines under Operational Scenario F would ensure a greater Delta outflow.
 14 The amount and location of habitat restoration and enhancement that would occur under
 15 Alternative 8 would generally be the same as that described above for Alternative 1A. However, it
 16 may result in different acreages of restored, protected and enhanced habitat, as described in Chapter
 17 3, *Description of Alternatives*, Section 3.5.15. The location of these areas would be similar to those
 18 described in 1A throughout the 11 different conservation zones and expanding on existing channel
 19 margin habitat and floodplain locations.

20 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 21 **the Water Conveyance Facilities**

22 **NEPA Effects:** Alternative 8 would involve CM1 construction and operation of three intakes, up to
 23 nine solids lagoons, three sedimentation basins, Byron Tract Forebay, and an intermediate forebay
 24 and associated 350-acre inundation area. Alternative 8 would have two fewer intakes than
 25 Alternative 1A would have. Accordingly, there would be fewer solids lagoons and sedimentation
 26 basins.

27 Sedimentation basins, solids lagoons, Byron Tract Forebay, and the intermediate forebay and
 28 inundation area have the potential to provide habitat for vectors that transmit diseases (e.g.,
 29 mosquitoes) because of the large volumes of water that would be held within these areas. The depth,
 30 design, and operation of the sedimentation basins and solids lagoons would prevent the
 31 development of suitable mosquito habitat (Figure 25-1). Specifically, the basins would be too deep
 32 and the constant movement of water would prevent mosquitoes from breeding and multiplying.
 33 Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons
 34 would be 165 feet long by 86 feet wide by 10 feet deep. Furthermore, use of the inundation area
 35 adjacent to the intermediate forebay would be limited to forebay emergency overflow situations and
 36 water would be pumped back to the intermediate forebay, creating circulation such that the
 37 inundation area would have a low potential for creating suitable vector habitat. Similarly, water in
 38 the Byron Tract Forebay would be circulated regularly and, with the exception of shallower areas
 39 around the periphery, would be too deep to provide suitable mosquito habitat. The shallower edges
 40 of the forebay could provide suitable mosquito breeding habitat if emergent vegetation or other
 41 aquatic plants (e.g., pond weed) were allowed to grow.

1 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 2 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 3 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 4 control mosquitoes (see Impact PH-1 under Alternative 1A). These BMPs would be consistent with
 5 practices presented in *Best Management Practices for Mosquito Control in California* (California
 6 Department of Public Health 2012). Implementation of these BMPs would reduce the likelihood that
 7 BDCP operations would require an increase in abatement activities by the local MVCs. Therefore,
 8 construction and operation of the intakes, solids lagoons, and/or sedimentation basins under
 9 Alternative 8 would not substantially increase suitable vector habitat, and would not substantially
 10 increase vector-borne diseases. Accordingly, no adverse effects would result.

11 **CEQA Conclusion:** As described for Alternative 7 and Alternative 1A, implementation of CM1 under
 12 Alternative 8 would involve construction and operation of solids lagoons, sedimentation basins,
 13 Byron Tract Forebay, and an intermediate forebay and associated 350-acre inundation area. While
 14 these facilities could provide suitable habitat for vectors (e.g., mosquitoes), water depth and
 15 circulation would prevent the areas from substantially increasing suitable vector habitat. The
 16 inundation area would only be used during emergency overflow situations and water would be
 17 pumped back into the intermediate forebay, creating circulation that would discourage mosquito
 18 breeding. The shallower periphery of the intermediate forebay and Bryon Tract Forebay could
 19 provide suitable mosquito breeding habitat.

20 To minimize the potential for impacts related to increasing suitable vector habitat within the study
 21 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 22 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 23 control mosquitoes. These BMPs would be consistent with practices presented in *Best Management
 24 Practices for Mosquito Control in California* (California Department of Public Health 2012). See
 25 Impact PH-1 under Alternative 1A. Therefore, construction and operation of the water conveyance
 26 facilities under Alternative 8 would not result in a substantial increase in vector-borne diseases and
 27 the impact on public health would be less than significant. No mitigation is required.

28 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 29 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 30 **Facilities**

31 **NEPA Effects:**

32 **Disinfection Byproducts**

33 Under Alternative 8, the geographic extent of effects pertaining to long-term average DOC
 34 concentrations and, by extension, DBPs in the study area would be similar to that described for
 35 Alternative 1A. However, the magnitude of predicted long-term increase and relative frequency of
 36 concentration threshold exceedances would be substantially greater for Alternative 8. Exceedances
 37 of water quality objectives would conflict with the Basin Plan because it would exceed Basin Plan
 38 requirements. Modeled effects would be greatest at Franks Tract, Rock Slough, and Contra Costa
 39 Pumping Plant #1 relative to the No Action Alternative. The increases in long-term average DOC
 40 concentrations ($\leq 27\%$) estimated to occur at Franks Tract, Rock Slough, and Contra Costa
 41 Pumping Plant #1 are considered substantial and could potentially trigger significant changes in
 42 drinking water treatment plant design or operations. In particular, assessment locations at Rock
 43 Slough and Contra Costa Pumping Plant No. 1 represent municipal intakes servicing existing

1 drinking water treatment plants. Under Alternative 8, drinking water treatment plants obtaining
2 water from these interior Delta locations would likely need to upgrade existing treatment systems in
3 order to achieve EPA Stage 1 Disinfectants and Disinfection Byproduct Rule action thresholds.

4 Relative to the No Action Alternative, Alternative 6A would result in increases in long-term average
5 bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at Barker
6 Slough. Increases would be greatest at Staten Island (33%; 30% during the drought period) and at
7 Barker Slough (8%; 50% during the drought period). The long-term average increase predicted for
8 Barker Slough could necessitate changes in water treatment plant operations or require treatment
9 plant upgrades in order to maintain DBP compliance. Operation and maintenance activities, the
10 increases in bromide concentrations at Barker Slough, source of the North Bay Aqueduct, would
11 cause substantial degradation to water quality; resultant substantial change in long-term average
12 bromide at Barker Slough could necessitate changes in water treatment plant operations or require
13 treatment plant upgrades to maintain DBP compliance.

14 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
15 implementation of such technologies would likely require substantial investment in new or modified
16 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
17 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
18 DOC and bromide concentrations in drinking water sources would represent an increased risk for
19 adverse effects on public health from DBPs. Mitigation Measure WQ-17 is available to partially
20 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
21 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
22 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
23 effects of increased bromide in drinking water sources at Barker Slough. Implementation of this
24 measure along with a separate other commitment as set forth in EIR/EIS Appendix 3B,
25 *Environmental Commitments, AMMs, and CMs*, relating to the potential increased treatment costs
26 associated with bromide-related changes would reduce these effects. Further, as described for
27 Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at
28 Barker Slough may be further minimized by implementation of the AIP. However, the overall effect
29 on public health related to potential increases in DBPs (resulting from DOC and bromide increases)
30 at the aforementioned Delta locations would still be considered adverse.

31 **Trace Metals**

32 Under Alternative 8, throughout much of the south Delta, San Joaquin River water would replace
33 Sacramento River water, with the future trace metals profile largely reflecting that of the San
34 Joaquin River. Trace metal concentration profiles between the San Joaquin and Sacramento Rivers
35 are very similar and currently meet Basin Plan objectives and CTR criteria. While the change in trace
36 metal concentrations in the south Delta relative to the No Action Alternative would likely be
37 measurable under Alternative 8, it would not be expected to substantially increase the frequency
38 with which applicable Basin Plan objectives or CTR criteria would be exceeded in the Delta, or
39 substantially degrade the quality of Delta waters with regard to trace metals. Accordingly, no
40 adverse effect on public health related to the trace metals arsenic, iron, or manganese from drinking
41 water sources is anticipated.

42 **Pesticides**

43 Under Alternative 8, the distribution and mixing of Delta source waters would change. Relative to
44 the No Action Alternative, the change in source water (e.g., more San Joaquin River water)

1 associated with Alternative 8 would be sufficient in magnitude to increase the existing pesticide
2 concentrations in the Delta, resulting in an increased risk of toxicity to aquatic life in certain areas
3 (Franks Tract, Rock Slough, and Contra Costa Pumping Plant #1) during certain times of the year. A
4 conclusion regarding the risk to human health at these locations, based on the predicted adverse
5 effects from pesticides on aquatic life, cannot be made. The prediction of adverse effects of
6 pesticides fundamentally assumes that the present pattern of pesticide incidence in surface water
7 would continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon
8 pesticides, the two pesticides that serve as the basis for concluding a substantially increased San
9 Joaquin River source water fraction, is on the decline with their replacement by pyrethroids on the
10 rise. Furthermore, water treatment plants are required to meet drinking water requirements set
11 forth in the California Safe Drinking Water Act and the regulations adopted by CDPH. Therefore, it is
12 not anticipated that there would be adverse effects on public health from pesticides in drinking
13 water sources.

14 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
15 operation of the water conveyance facilities under Alternative 8 would be of sufficient magnitude to
16 increase the existing pesticide concentrations in the Delta, according to water quality modeling
17 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
18 the study area (Franks Tract, Rock Slough, and Contra Costa Pumping Plant #1) during certain times
19 of the year relative to Existing Conditions. A conclusion regarding the risk to human health at these
20 locations, based on the predicted adverse effects from pesticides on aquatic life, cannot be made.
21 However, the prediction of adverse effects of pesticides relative to Existing Conditions
22 fundamentally assumes that the present pattern of pesticide incidence in surface water would
23 continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon pesticides,
24 the two pesticides that serve as the basis for concluding a substantially increased San Joaquin River
25 source water fraction, is on the decline with their replacement by pyrethroids on the rise.
26 Furthermore, water treatment plants are required to meet drinking water requirements set forth in
27 the California Safe Drinking Water Act and the regulations adopted by CDPH. Thus, these potential
28 increases in pesticide concentrations would not significantly impact public health. The change in
29 source water would not alter trace metal concentrations in the study area to the degree that there
30 would be a beneficial use impairment. Finally, under Alternative 8, modeled long-term average
31 bromide concentrations would increase at Staten Island (29%; 26% during the drought period) and
32 Barker Slough (4%; 50% during the drought period) relative to Existing Conditions. Modeled long-
33 term average DOC concentrations would increase by $\leq 32\%$ at Franks Tract, Rock Slough and Contra
34 Costa Pumping Plant #1 relative to Existing Conditions. These increases in bromide and DOC at
35 these locations may be substantial enough to necessitate water treatment plant upgrades or changes
36 in plant operations in order to maintain DBP compliance. Should treatment plant upgrades not be
37 undertaken for the affected Delta locations, a change of such magnitude in long-term average DOC
38 and bromide concentrations in drinking water sources would represent an increased risk for effects
39 on public health from DBPs, which would be a significant impact.

40 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
41 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
42 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
43 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
44 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
45 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
46 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain

1 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
 2 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
 3 less-than-significant level.

4 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
 5 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
 6 separate other commitment to address the potential increased water treatment costs that could
 7 result from bromide-related concentration effects on municipal water purveyor operations.
 8 Potential options for making use of this financial commitment include funding or providing other
 9 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
 10 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
 11 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
 12 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
 13 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
 14 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
 15 treatment entities will be fully funded or implemented successfully prior to the project's
 16 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
 17 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
 18 or implemented before the project's contribution to the impact is made, a significant impact in the
 19 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
 20 significant and unavoidable. If, however, all financial contributions, technical contributions, or
 21 partnerships required to avoid significant impacts prove to be feasible and any necessary
 22 agreements are completed before the project's contribution to the effect is made, impacts would be
 23 less than significant.

24 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 25 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 26 **Slough**

27 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

28 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 29 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

30 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

31 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 32 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

33 **NEPA Effects:** As described under Alternative 1A, sediment-disturbing activities during construction
 34 and maintenance of the water conveyance facilities under Alternative 8 could result in the
 35 disturbance of existing constituents, such as legacy pesticides or methylmercury, in sediment.
 36 Therefore, the public health effects associated with pesticides and methylmercury under Alternative
 37 8 would be similar to, although slightly less than, those associated with Alternative 1A. Intermittent
 38 and/or short-term construction-related activities (as would occur for in-river construction) would
 39 not be anticipated to result in contaminant discharges of sufficient magnitude or duration to
 40 contribute to long-term bioaccumulation processes, or cause measureable long-term degradation, as
 41 described under Alternative 1A. Legacy organochlorine pesticides typically bond to particulates, and
 42 do not mobilize easily. Construction and maintenance of Alternative 8 would not cause legacy

1 organochlorine pesticides to be transported far from the source or to partition into the water
2 column, as described for Alternative 1A. Water supply operations under any BDCP action alternative
3 would not be expected to change total suspended solids or turbidity levels (highs, lows, typical
4 conditions) to any substantial degree. Changes in the magnitude, frequency, and geographic
5 distribution of legacy pesticides in water bodies of the affected environment that would result in
6 new or more severe adverse effects on beneficial uses, relative to the No Action Alternative, would
7 not be expected to occur.

8 Water quality modeling results indicate that the percentage change in assimilative capacity of
9 waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark for this alternative
10 showed the greatest decrease (6.9%) at the Contra Costa Pumping Plant relative to the No Action
11 Alternative. These changes are not expected to result in adverse effects on beneficial uses. Similarly,
12 changes in methylmercury concentration are expected to be relatively small.

13 Fish tissue estimates showed a substantial increase concentration and exceedance quotients at the
14 North Bay Aqueduct pump site at Barker Slough relative to the No Action Alternative (221–224%).
15 The Sacramento River at Emmaton site also shows a relatively large percentage increase (122–
16 124%) in tissue mercury concentrations over conditions under the No Action Alternative. Thus,
17 relative to the No Action Alternative, body burdens of mercury in fish would be measurably higher,
18 and could thereby substantially increase the health risks to people consuming those fish.
19 Accordingly, the potential for Alternative 8 to create a public health effect from bioaccumulation of
20 mercury would exist and this is considered an adverse effect.

21 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
22 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
23 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
24 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
25 area of disturbance, as described under Alternative 1A for Impact PH-3. Additionally, OEHHA
26 standards would continue to be implemented for the consumption of study area fish and thus would
27 serve to protect people against the overconsumption of fish with increased body burdens of
28 mercury.

29 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative 8
30 would not cause legacy organochlorine pesticides to be transported far from the source or to
31 partition into the water column based on the chemical properties of the pesticides. Therefore,
32 construction and maintenance of Alternative 8 water conveyance facilities would not cause
33 increased exposure of the public to these pesticides. As environmental commitments, DWR would
34 develop and implement Erosion and Sediment Control Plans and SWPPPs (Appendix 3B,
35 *Environmental Commitments, AMMs, and CMs*). BMPs implemented under the Erosion and Sediment
36 Control Plans and the SWPPPs would help reduce turbidity and keep sediment that may contain
37 legacy organochlorine pesticides and methylmercury within the area of disturbance.

38 Based on water quality modeling results, changes in water concentrations of mercury and
39 methylmercury would occur at some locations relative to Existing Conditions as a result of
40 operations under Alternative 8. Specifically, the analysis of percentage change in assimilative
41 capacity of waterborne total mercury of Alternative 8 relative to the 25 ng/L ecological risk
42 benchmark as compared to Existing Conditions showed the greatest decrease of 7% for the Contra
43 Costa Pumping Plant. Similarly, changes in methylmercury concentrations are expected to be
44 relatively small. Beneficial uses of waters in the study area would not be adversely affected due to

1 these changes. However, relative to Existing Conditions, modeling results indicate that body burdens
 2 of mercury in fish would be measurably higher at the North Bay Aqueduct pump site at Barker
 3 Slough (221–224%) and the Sacramento River at Emmaton (122–124%). This could increase the
 4 health risks to people consuming those fish. Accordingly, the potential for this alternative to create a
 5 public health effect from bioaccumulation of mercury would exist and this is considered a significant
 6 and unavoidable impact. The estimated increases of mercury body burdens in fish are based on the
 7 changes expected from the modeled blending of source waters that define CM1 for Alternative 8 and
 8 are therefore inherent to the Alternative. OEHHA standards would continue to be implemented for
 9 the consumption of study area fish and thus would serve to protect people against the
 10 overconsumption of fish with increased body burdens of mercury.

11 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
 12 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
 13 **Facilities**

14 **NEPA Effects:** As described in Table 25-9, a total of 24.71 miles of new temporary 69 kV
 15 transmission lines; 7.03 miles of new permanent 69 kV transmission lines; and 42.68 miles of new
 16 permanent 230 kV transmission lines would be required for this alternative. New temporary and
 17 permanent transmission lines needed for Alternative 8 would be the same as those for Alternative 7.
 18 Any new temporary and permanent transmission lines needed for Alternative 8 would be located in
 19 rights-of-way of existing transmission lines or in areas that are not densely populated and,
 20 therefore, would not expose substantially more people to transmission lines (Figure 25-2).
 21 Furthermore, the majority of sensitive receptors that would be within 300 feet of a new
 22 transmission line are already located within 300 feet of an existing transmission line. However, as
 23 indicated in Table 25-9, Stone Lakes National Wildlife Refuge would be within 300 feet of a
 24 proposed temporary 69 kV transmission line. Visitors to this area generally come for walks, water
 25 recreation, and hunting, and as such, it is unlikely that large groups of people would be staying in the
 26 area within 300 feet of this proposed transmission line, so any EMF exposure would be limited.
 27 Further, this line would be removed when construction of the water conveyance facility features
 28 near this area is completed, so there would be no potential permanent effects. Therefore, this
 29 temporary transmission line would not substantially increase people's exposure to EMFs. While the
 30 current scientific evidence does not show conclusively that EMF exposure can increase health risks,
 31 the location and design of the new transmission lines would be conducted in accordance with
 32 CPUC's EMF Design Guidelines for Electrical Facilities to minimize health risks associated with
 33 power lines. Therefore, operation of the transmission line corridors would not expose substantially
 34 more people to transmission lines generating EMFs. Because the lines would be located in sparsely
 35 populated areas and would be within 300 feet of only one potential new sensitive receptor, the
 36 proposed temporary and permanent transmission lines would not substantially increase people's
 37 exposure to EMFs, and there would be no adverse effect on public health.

38 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
 39 transmission lines would be located in rights-of-way of existing transmission lines or in sparsely
 40 populated areas generally away from existing sensitive receptors. However, one sensitive receptor,
 41 Stone Lakes National Wildlife Refuge, would be within 300 feet of a proposed temporary 69 kV
 42 transmission line. Because visitors to this area generally come for walks, water recreation, and
 43 hunting, it is unlikely that large groups of people would be staying in the area within 300 feet of this
 44 proposed transmission line, so any EMF exposure would be limited. Further, this line would be
 45 removed when construction of the water conveyance facility features near this area is completed, so
 46 there would be no potential permanent effects. Therefore, this temporary transmission line would

1 not substantially increase people's exposure to EMFs. Design and implementation of new temporary
 2 or permanent transmission lines not within the right-of-way of existing transmission lines would
 3 follow CPUC's EMF Design Guidelines for Electrical Facilities and would implement shielding,
 4 canceling, or distance measures to reduce EMF exposure. Because construction and operation of
 5 Alternative 8 would not expose substantially more people to transmission lines that provide new
 6 sources of EMFs, impacts would be less than significant, and no mitigation is required.

7 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
 8 **and CM11**

9 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 10 under Alternative 8 would be similar to that described for Alternative 1A. Although there would be
 11 an increase in restored and enhanced habitat in the study area as a result of implementing
 12 Alternative 8, implementation of environmental commitments such as coordination with MVCDs and
 13 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 14 Appendix 3B, *Environmental Commitments, AMMs, and CMs*) would reduce the potential for an
 15 increase in mosquito breeding habitat, and a substantial increase in vector-borne diseases is
 16 unlikely to result. Furthermore, habitat would be restored in areas where potentially suitable
 17 habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would likely
 18 increase as a result of restoration and enhancement, which would keep mosquito populations in
 19 check. Therefore, effects would be the same under Alternative 8 as under Alternative 1A and there
 20 would not be a substantial increase in the public's risk of exposure to vector-borne diseases with
 21 implementation of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

22 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 23 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described in Alternative
 24 1A, Alternative 8 would require environmental commitments, such as coordination with MVCDs and
 25 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 26 Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help control mosquitoes and
 27 reduce the potential for an increase in mosquito breeding habitat. Furthermore, habitat would be
 28 restored where potentially suitable vector habitat already exists and habitat restoration and
 29 enhancement would likely increase the number of mosquito predators. Therefore, as described for
 30 Alternative 1A, implementation of CM2-CM7, CM10 and CM11 under Alternative 8 would not
 31 substantially increase the public's risk of exposure to vector-borne diseases beyond what currently
 32 exists. Accordingly, this impact would be less than significant and no mitigation is required.

33 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 34 **Implementing the Restoration Conservation Measures**

35 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 36 under Alternative 8 would be the similar to that described above for Alternative 1A. Implementation
 37 of the restoration conservation measures would support habitat types, such as wetlands and
 38 agricultural areas, that produce pathogens as a result of the biological productivity in these areas
 39 (e.g., migrating birds, application of fertilizers, waste products of animals). As exemplified by the
 40 Pathogen Conceptual Model, any potential increase in pathogens associated with the habitat
 41 restoration would be localized and within the vicinity of the actual restoration. This would be
 42 similar for lands protected for agricultural uses. Depending on the level of recreational access
 43 granted by management plans, habitat restoration could increase or decrease opportunities for
 44 recreationists within the Delta region. However, effects associated with pathogens would be the

1 same under Alternative 8 as under Alternative 1A. Recreationists would not experience a substantial
 2 increase in exposure to pathogens as a result of the restoration and no adverse effect on public
 3 health would result.

4 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 8
 5 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 6 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 7 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 8 off of some types of pathogens once released into water bodies would generally prevent substantial
 9 pathogen exposure to recreationists. Accordingly, impacts on public health would be less than
 10 significant and no mitigation is required.

11 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 12 **as a Result of Implementing CM2, CM4, CM5, and CM10**

13 **NEPA Effects:** The amount of habitat restoration under Alternative 8 would be the same as
 14 Alternative 1A. The primary concern with habitat restoration regarding constituents known to
 15 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 16 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the pesticide-
 17 bearing sediments would not be transported very far from the source area and would settle out with
 18 suspended particulates and be deposited close to the ROA. Further, CM2–CM21 do not include the
 19 use of pesticides known to be bioaccumulative in animals or humans.

20 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 21 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 22 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 23 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 24 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 25 bioaccumulation of methylmercury in the study area's aquatic systems (e.g., fish and water) during
 26 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
 27 reduce the public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,
 28 and CM10 under Alternative 8 is not expected to result in an adverse effect on public health with
 29 respect to pesticides or methylmercury.

30 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 31 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 32 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 33 sediments would be transported very far from the source area and they would likely settle out with
 34 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 35 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 36 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
 37 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
 38 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10
 39 under Alternative 8 would not substantially mobilize or substantially increase the public's exposure
 40 to constituents known to bioaccumulate and this impact would be less than significant. No
 41 mitigation is required.

1 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water**
2 **Conveyance Facilities**

3 **NEPA Effects:** Because factors that affect *Microcystis* abundance in waters upstream of the Delta, in
4 the Delta, and in the SWP/CVP Export Services Areas under Alternative 1A would similarly change
5 under Alternative 8, *Microcystis* abundance, and thus microcystins concentrations, in water bodies
6 of the affected environment under Alternative 8 would be very similar to those discussed for
7 Alternative 1A.

8 As described in Chapter 8, *Water Quality*, although *Microcystis* blooms have not occurred in the
9 Export Service Areas, conditions in the Export Service Areas under Alternative 8 may become more
10 conducive to *Microcystis* bloom formation because water temperatures will increase in the Export
11 Service Areas due to the expected increase in ambient air temperatures resulting from climate
12 change, but not from operation of the water conveyance facilities. Under Alternative 8, relative to No
13 Action Alternative, water exported to the SWP/CVP Export Service Area will be a mixture of
14 *Microcystis*-affected source water from the south Delta intakes and unaffected source water from the
15 Sacramento River, diverted at the north Delta intakes. It cannot be determined whether operations
16 and maintenance under Alternative 8 will result in increased or decreased levels of *Microcystis* and
17 microcystins in the mixture of source waters exported from Banks and Jones pumping plants.

18 Like Alternative 1A, elevated ambient water temperatures would occur in the Delta under
19 Alternative 8, which could lead to earlier occurrences of *Microcystis* blooms in the Delta, and
20 increase the overall duration and magnitude of blooms. However, as described in Chapter 8, *Water*
21 *Quality*, the increase in Delta water temperatures, and consequent potential increase in *Microcystis*
22 blooms, would be driven entirely by climate change, not by operation of water conveyance facilities.
23 There would be differences in the direction and magnitude of water residence time changes during
24 the *Microcystis* bloom period due to operation of the water conveyance facilities under Alternative 8
25 compared to Alternative 1A, relative to the No Action Alternative. As a result, *Microcystis* blooms,
26 and therefore microcystin, could increase in surface waters throughout the Delta. Therefore, impacts
27 on beneficial uses, including drinking water and recreational waters, could occur and public health
28 could be affected. Accordingly, this would be considered an adverse effect.

29 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
30 quality in the Delta. Although there is uncertainty regarding this impact, the effects on *Microcystis*
31 from implementing CM1 is determined to be adverse.

32 **CEQA Conclusion:** Under Alternative 8, operation of the water conveyance facilities is not expected
33 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
34 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
35 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
36 residence times in the Export Service Area would not be affected by operations of CM1, and
37 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.
38 Water exported from the Delta to the Export Service Area is expected to be a mixture of *Microcystis*-
39 affected source water from the south Delta intakes and unaffected source water from the
40 Sacramento River. Because of this, it cannot be determined whether operations and maintenance
41 under Alternative 8 would result in increased or decreased levels of *Microcystis* and microcystins in
42 the mixture of source waters exported from Banks and Jones pumping plants.

43 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
44 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the

1 water temperature increases in the Delta would be due to climate change and not due to operation
 2 of the water conveyance facilities. Increases in Delta residence times would be due in small part to
 3 climate change and sea level rise, but due to a greater degree to operation of the water conveyance
 4 facilities and hydrodynamic impacts of restoration included in CM2 and CM4. Consequently, it is
 5 possible that increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms in
 6 the Delta would occur due to the operations and maintenance of the water conveyance facilities and
 7 the hydrodynamic impacts of restoration under CM2 and CM4. Accordingly, beneficial uses including
 8 drinking water and recreational waters would be impacted and, as a result, public health. Therefore,
 9 this impact would be significant.

10 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 11 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 12 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 13 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 14 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 15 to determine whether increases in abundance are significant. This mitigation measure also requires
 16 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 17 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
 18 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 19 measures for reducing water quality effects is uncertain, and therefore potential public health
 20 effects, this impact would be significant and unavoidable.

21 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 22 ***Microcystis* Blooms**

23 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 24 in Chapter 8, *Water Quality*.

25 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 26 **Water Residence Time**

27 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 28 in Chapter 8, *Water Quality*.

29 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 30 **CM4**

31 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 32 under Alternative 8 would be the same as that described under Alternative 1A. Restoration activities
 33 implemented under CM2 and CM4 that would create shallow backwater areas could result in local
 34 increases in water temperature that may encourage *Microcystis* growth during the summer bloom
 35 season. This would result in further degradation of water quality beyond the hydrodynamic effects
 36 of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase in *Microcystis* blooms
 37 with implementation of CM2 and CM4 could potentially result in adverse effects on public health
 38 through exposure via drinking water quality and recreational waters. Mitigation Measures WQ-32a
 39 and WQ-32b may reduce the combined effect on *Microcystis* from increased local water
 40 temperatures and water residence time. The effectiveness of these mitigation measures to result in
 41 feasible measures for reducing water quality effects related to *Microcystis* is uncertain. This would
 42 be an adverse effect.

1 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 8 are the same as
 2 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
 3 create shallow backwater areas could result in local increases in water temperature conducive to
 4 *Microcystis* growth during summer bloom season. This could compound the water quality
 5 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 6 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 7 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 8 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 9 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 10 increased local water temperatures and water residence time. The effectiveness of these mitigation
 11 measures to result in feasible measures for reducing water quality effects, and therefore potential
 12 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

13 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 14 ***Microcystis* Blooms**

15 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 16 in Chapter 8, *Water Quality*.

17 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 18 **Water Residence Time**

19 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 20 in Chapter 8, *Water Quality*.

21 **25.3.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs;**
 22 **Operational Scenario G)**

23 While operation of Alternative 9 would be very similar to Alternative 1A with respect to water
 24 exports, Alternative 9 does not involve construction of major new water conveyance facilities.
 25 Rather, there would be four basic corridors utilizing existing channels, two dedicated to water
 26 conveyance and two to fish migration: (1) the north Delta separate water supply corridor that
 27 conveys water from the Sacramento River to Middle River; (2) the south Delta separate water
 28 supply corridor along Middle River and Victoria Canal that conveys water from San Joaquin River to
 29 Clifton Court Forebay; (3) the San Joaquin separate fish movement corridor that provides for fish
 30 migration from upper San Joaquin River to the lower San Joaquin River downstream of Franks Tract;
 31 and (4) the Mokelumne separate fish movement corridor that diverts from the Mokelumne River
 32 through Lost Slough and Meadows Slough to the Sacramento River. Alternative 9 includes
 33 construction of two new fish-screened intakes without pumping plants, operable barriers (several
 34 with boat locks), approximately 2 miles of canals, and approximately 1 mile of new levees.
 35 Temporary cofferdams would be needed during construction. A detailed description of the
 36 alternative is provided in Chapter 3, *Description of the Alternatives*, Section 3.5.16; a depiction of the
 37 physical components is provided in Mapbook Figure M3-5 in Chapter 3.

38 With respect to public health, there are three main differences between Alternative 9 and
 39 Alternative 1A.

- 40 • Conveyance facilities would consist of operable barriers in existing channels, and channel
 41 enlargement.

- One intake would be located at Delta Cross Channel, and one intake at Georgiana Slough.
- There would be potentially different amounts and types of restoration to accommodate the proposed operable barriers and channel enlargements.

The amount and location of habitat restoration and enhancement that would occur under Alternative 9 would generally be the same as that described under Alternative 1A. However, under Alternative 9, changes in the south Delta would be made to accommodate the modified corridors. The location of these habitat restoration and enhancement areas would be similar to those described in 1A throughout the 11 different conservation zones and would expand on existing channel margin habitat and floodplain locations.

Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water Conveyance Facilities

NEPA Effects: Alternative 9 would not have solids lagoons or sedimentation basins. Should construction activities create temporary areas of standing water that could provide suitable habitat for mosquitoes to breed, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes (see Impact PH-1 under Alternative 1A). These BMPs would be consistent with practices presented in *Best Management Practices for Mosquito Control in California* (California Department of Public Health 2012). Activities would include, but not be limited to: testing for mosquito larvae during the high mosquito season (June through September); introducing biological controls such as mosquitofish if mosquitoes are present; reducing or eliminating emergent vegetation; and introducing physical controls (e.g., discharging water more frequently or increasing circulation) if mosquitoes are present. Therefore, Alternative 9 would not significantly increase the public's risk of exposure to vector-borne diseases. Accordingly, adverse effects on public health would not result.

CEQA Conclusion: Because solid lagoons or sedimentation basins would not be constructed or operated, there would be no impacts. If necessary, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes (see Impact PH-1 under Alternative 1A). These BMPs would be consistent with practices presented in CDPH's *Best Management Practices for Mosquito Control in California*. Therefore, construction and operation of the water conveyance facilities under Alternative 9 would not result in a substantial increase in vector-borne diseases and the impact on public health would be less than significant. No mitigation is required.

Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance Facilities

NEPA Effects:

Disinfection Byproducts

Under Alternative 9, the geographic extent of effects pertaining to long-term average DOC and bromide concentrations and, by extension, DBPs in the study area would be similar to that described

1 for Alternative 1A. However, the magnitude of predicted long-term increase and relative frequency
2 of concentration threshold exceedances would be substantially greater. Modeled effects would be
3 greatest at Franks Tract, Rock Slough, and Contra Costa Pumping Plant #1 for Alternative 9 relative
4 to the No Action Alternative. Maximum net increases would be $\leq 24\%$ at these locations relative to
5 the No Action Alternative. Exceedances of water quality objectives would conflict with the Basin
6 Plan because it would exceed Basin Plan requirements. Drinking water treatment plants obtaining
7 water from these interior Delta locations would likely need to upgrade existing treatment systems in
8 order to achieve EPA Stage 1 Disinfectants and Disinfection Byproduct Rule action thresholds.

9 In addition, relative to the No Action Alternative, Alternative 9 would result in increases in long-
10 term average bromide concentrations at Buckley Cove (during the drought period only), Emmaton,
11 and Barker Slough (Chapter 8, *Water Quality*, Section 8.3.3.16). The increase in long-term average
12 bromide concentrations at Barker Slough (23%; 87% increase during the drought period) would be
13 substantial enough to potentially necessitate changes in water treatment plant operations or require
14 treatment plant upgrades in order to maintain DBP compliance.

15 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
16 implementation of such technologies would likely require substantial investment in new or modified
17 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
18 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
19 DOC and bromide concentrations in drinking water sources would represent an increased risk for
20 adverse effects on public health from DBPs. While Mitigation Measure WQ-17 is available to partially
21 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
22 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
23 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
24 effects of increased bromide in drinking water sources at Barker Slough. Implementation of this
25 measure along with a separate other commitment as set forth in EIR/EIS Appendix 3B,
26 *Environmental Commitments, AMMs, and CMs*, relating to the potential increased treatment costs
27 associated with bromide-related changes would reduce these effects. Further, as described for
28 Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at
29 Barker Slough may be further minimized by implementation of the AIP. However, the overall effect
30 on public health related to potential increases in DBPs (resulting from DOC and bromide increases)
31 at the aforementioned Delta locations would still be considered adverse.

32 **Trace Metals**

33 Alternative 9 would not result in substantial increases in trace metal concentrations in the Delta
34 relative to the No Action Alternative. However, substantial changes in source water fraction would
35 occur in the south Delta. Throughout much of the south Delta, San Joaquin River water would
36 replace Sacramento River water, with the future trace metals profile largely reflecting that of the San
37 Joaquin River. Alternative 9 would not be expected to substantially increase the frequency with
38 which applicable Basin Plan objectives or CTR criteria would be exceeded in the Delta or
39 substantially degrade the quality of Delta waters with regard to trace metals. Therefore, adverse
40 effects on public health would not result.

41 **Pesticides**

42 Locations in the Delta that would receive a substantially greater fraction of San Joaquin River water
43 under Alternative 9, such as Franks Tract, Rock Slough and Contra Costa Pumping Plant #1, would
44 change considerably over the calendar year. As a result, the long-term risk of pesticide-related

1 toxicity to aquatic life at these locations during certain times of the year could substantially increase
2 relative to the No Action Alternative (Chapter 8, *Water Quality*, Section 8.3.3.16). Additionally, the
3 potential for increased incidence of pesticide-related toxicity could include pesticides such as
4 chlorpyrifos and diazinon for which 303(d) listings exist for the Delta, and, thus, existing beneficial
5 use impairment could be made discernibly worse. The prediction of adverse effects of pesticides
6 relative to the No Action Alternative fundamentally assumes that the present pattern of pesticide
7 incidence in surface water would continue at similar levels into the future. In reality the makeup and
8 character of the pesticide use market during the late long-term would not be exactly as it is today.
9 Use of chlorpyrifos and diazinon is on the decline with their replacement by pyrethroids on the rise.
10 Yet, in this assessment it is the apparent greater incidence of diazinon and chlorpyrifos in the San
11 Joaquin River that serves as the basis for concluding that substantially increased San Joaquin River
12 source water fraction would correspond to an increased risk of pesticide-related toxicity to aquatic
13 life. However, water treatment plants are required to meet drinking water requirements set forth in
14 the California Safe Drinking Water Act and the regulations adopted by CDPH. Therefore, it is not
15 anticipated that there would be adverse effects on public health from pesticides.

16 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
17 operation of the water conveyance facilities under Alternative 9 would be of sufficient magnitude to
18 increase the existing pesticide concentrations in the Delta, according to water quality modeling
19 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
20 the study area (Franks Tract, Rock Slough, and Contra Costa Pumping Plant #1) during certain times
21 of the year relative to Existing Conditions. A conclusion regarding the risk to human health at these
22 locations, based on the predicted adverse effects from pesticides on aquatic life, cannot be made.
23 However, the prediction of adverse effects of pesticides relative to Existing Conditions
24 fundamentally assumes that the present pattern of pesticide incidence in surface water would
25 continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon pesticides,
26 the two pesticides that serve as the basis for concluding a substantially increased San Joaquin River
27 source water fraction, is on the decline with their replacement by pyrethroids on the rise.
28 Furthermore, water treatment plants are required to meet drinking water requirements set forth in
29 the California Safe Drinking Water Act and the regulations adopted by CDPH. Thus, these potential
30 increases in pesticide concentrations would not significantly impact public health. The change in
31 source water would not alter trace metal concentrations in the study area to the degree that there
32 would be a beneficial use impairment. Finally, under Alternative 9, modeled average long-term
33 bromide concentrations would increase at Buckley Cove (during the drought period only [21%]),
34 Emmaton ($\leq 30\%$), and Barker Slough (19%; 88% during the drought period) relative to Existing
35 Conditions. Modeled long-term DOC concentrations would increase to the greatest extent at Franks
36 Tract, Rock Slough, and Contra Costa Pumping Plant #1 ($\leq 28\%$ net increase). These increases in
37 bromide and DOC at these locations may be substantial enough to necessitate water treatment plant
38 upgrades or changes in plant operations in order to maintain DBP compliance. Should treatment
39 plant upgrades not be undertaken for the affected Delta locations, a change of such magnitude in
40 long-term average DOC and bromide concentrations in drinking water sources would represent an
41 increased risk for effects on public health from DBPs, which would be a significant impact.

42 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
43 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
44 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
45 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
46 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial

1 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
 2 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
 3 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
 4 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
 5 less-than-significant level.

6 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
 7 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments, AMMs, and CMs*, a
 8 separate other commitment to address the potential increased water treatment costs that could
 9 result from bromide-related concentration effects on municipal water purveyor operations.

10 Potential options for making use of this financial commitment include funding or providing other
 11 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
 12 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
 13 water supply diversion facilities. Please refer to Appendix 3B for the full list of potential actions that
 14 could be taken pursuant to this commitment in order to reduce the water quality treatment costs
 15 associated with water quality effects relating to chloride, electrical conductivity, and bromide.
 16 Because the BDCP proponents cannot ensure that the results of coordinated actions with water
 17 treatment entities will be fully funded or implemented successfully prior to the project's
 18 contribution to the impact, the ability to fully mitigate this impact is uncertain. If a solution that is
 19 identified by the BDCP proponents and an affected water purveyor is not fully funded, constructed,
 20 or implemented before the project's contribution to the impact is made, a significant impact in the
 21 form of increased DBP in drinking water sources could occur. Accordingly, this impact would be
 22 significant and unavoidable. If, however, all financial contributions, technical contributions, or
 23 partnerships required to avoid significant impacts prove to be feasible and any necessary
 24 agreements are completed before the project's contribution to the effect is made, impacts would be
 25 less than significant.

26 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 27 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 28 **Slough**

29 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

30 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 31 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

32 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

33 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 34 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

35 **NEPA Effects:** Under Alternative 9, intermittent and/or short-term construction-related activities
 36 (as would occur for in-river construction) would not be anticipated to result in contaminant
 37 discharges of sufficient magnitude or duration to contribute to long-term bioaccumulation
 38 processes, or cause measurable long-term degradation, as described under Alternative 1A. Legacy
 39 organochlorine pesticides typically bond to particulates, and do not mobilize easily. Construction
 40 and maintenance of Alternative 5 would not cause legacy organochlorine pesticides to be
 41 transported far from the source or to partition into the water column as described for Alternative
 42 1A. Water supply operations under any BDCP action alternative would not be expected to change

1 total suspended solids or turbidity levels (highs, lows, typical conditions) to any substantial degree.
2 Changes in the magnitude, frequency, and geographic distribution of legacy pesticides in water
3 bodies of the affected environment that would result in new or more severe adverse effects on
4 beneficial uses, relative to the No Action Alternative, would not be expected to occur.

5 Furthermore, based on water quality modeling results presented in Chapter 8, *Water Quality*,
6 Section 8.3.3.16, operation of water conveyance facilities under Alternative 9 would not
7 substantially alter mercury or methylmercury concentrations in the Sacramento River or San
8 Joaquin River. The analysis of percentage change in assimilative capacity of waterborne total
9 mercury of Alternative 9 relative to the 25 ng/L Ecological Risk Benchmark Conditions showed the
10 greatest decrease (10.1%) at Old River at Rock Slough, relative to the No Action Alternative.
11 Similarly, increases in long term annual average methylmercury concentration are expected to be
12 greatest at the Contra Costa Pumping Plant relative to the No Action Alternative.

13 Fish tissue mercury estimates show some substantial percentage increases in concentration and
14 exceedance quotients at some Delta locations; the greatest change (59% increase) would be at Old
15 River at Rock Slough relative to the No Action Alternative. Similar, but changes are predicted at the
16 Contra Costa Pumping Plant. Therefore, body burdens of mercury in fish would be measurably
17 higher, and could thereby substantially increase the health risks to people consuming those fish.
18 Accordingly, the potential for Alternative 9 to create a public health effect from bioaccumulation of
19 mercury would exist and this is considered an adverse effect.

20 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative 9
21 would not cause legacy organochlorine pesticides to be transported far from the source or to
22 partition into the water column based on the chemical properties of the pesticides. Therefore,
23 construction and maintenance of Alternative 9 water conveyance facilities would not cause
24 increased exposure of the public to these pesticides as a result of construction and maintenance. As
25 environmental commitments, DWR would develop and implement Erosion and Sediment Control
26 Plans and SWPPPs (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). BMPs implemented
27 under the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and
28 keep sediment that may contain legacy organochlorine pesticides and methylmercury within the
29 area of disturbance.

30 Based on water quality modeling results, changes in water concentrations of mercury and
31 methylmercury would occur at some locations relative to Existing Conditions as a result of
32 operations under Alternative 9. Specifically, the analysis of percentage change in assimilative
33 capacity of waterborne total mercury of Alternative 9 relative to the 25 ng/L Ecological Risk
34 Benchmark as compared to Existing Conditions showed the greatest decrease of 10.2% at Old River
35 at Rock Slough. This change would not alter beneficial uses of waters in the study area. However,
36 relative to Existing Conditions, modeling results indicate that body burdens of mercury in fish would
37 be measurably higher at Old River at Rock Slough (66% increase) and at the Contra Costa Pumping
38 Plant (62% increase). This could increase the health risks to people consuming those fish.
39 Accordingly, the potential for Alternative 9 to create a public health effect from bioaccumulation of
40 mercury would exist and this is considered a significant and unavoidable impact. The estimated
41 increases of mercury body burdens in fish are based on the changes expected from the modeled
42 blending of source waters that define CM1 for Alternative 9 and are therefore inherent to the
43 alternative. OEHHA standards would continue to be implemented for the consumption of study area
44 fish and thus would serve to protect people against the overconsumption of fish with increased body
45 burdens of mercury.

1 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New**
2 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance**
3 **Facilities**

4 **NEPA Effects:** As described in Table 25-9, Alternative 9 would not require the construction of any
5 new 69 kV or 230 kV transmission lines. Therefore, substantially more people would not be exposed
6 to transmission lines generating new sources of EMFs under this alternative. There would be no
7 effects.

8 **CEQA Conclusion:** Since Alternative 9 does not require the construction of new temporary or
9 permanent transmission lines, there would be no impacts on public health from new sources of
10 EMFs, and no mitigation is required.

11 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10**
12 **and CM11**

13 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
14 under Alternative 9 would be similar to that described for Alternative 1A. Although there would be
15 an increase in restored and enhanced aquatic habitat in the study area as a result of implementing
16 Alternative 9, implementation of environmental commitments such as coordination with MVCDs and
17 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
18 Appendix 3B, *Environmental Commitments, AMMs, and CMs*) would reduce the potential for an
19 increase in mosquito breeding habitat, and a substantial increase in vector-borne diseases is
20 unlikely to result. Furthermore, habitat would be restored in areas where potentially suitable
21 habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders, etc.) would
22 likely increase as a result of restoration and enhancement, which would keep mosquito populations
23 in check. Therefore, effects would be the same under Alternative 9 as under Alternative 1A there
24 would not be a substantial increase in the public's risk of exposure to vector-borne diseases with
25 implementation of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

26 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
27 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described above in
28 Alternative 1A, Alternative 9 would require environmental commitments such as coordination with
29 MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative
30 1A and in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that would help control
31 mosquitoes and reduce the potential for an increase in mosquito breeding habitat. Furthermore,
32 habitat would be restored where potentially suitable vector habitat already exists and habitat
33 restoration and enhancement would likely increase the number of mosquito predators. Therefore,
34 as described under Alternative 1A, implementation of CM2-CM7, CM10 and CM11 under Alternative
35 9 would not substantially increase the public's risk of exposure to vector-borne diseases beyond
36 what currently exists. Accordingly, this impact would be less than significant and no mitigation is
37 required.

38 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
39 **Implementing the Restoration Conservation Measures**

40 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
41 under Alternative 9 would be the similar to that described above for Alternative 1A. Implementation
42 of the restoration conservation measures would support habitat types, such as wetlands and
43 agricultural areas, that produce pathogens as a result of the biological productivity in these areas

1 (e.g., migrating birds, application of fertilizers, waste products of animals). As exemplified by the
 2 Pathogen Conceptual Model, any potential increase in pathogens associated with the habitat
 3 restoration would be localized and within the vicinity of the actual restoration. This would be
 4 similar for lands protected for agricultural uses. Depending on the level of recreational access
 5 granted by management plans, habitat restoration could increase or decrease opportunities for
 6 recreationists within the Delta region. However, effects associated with pathogens would be the
 7 same under Alternative 9 as under Alternative 1A. Recreationists would not experience a substantial
 8 increase of exposure to pathogens as a result of the restoration and no adverse effect on public
 9 health would result.

10 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 9
 11 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 12 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 13 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 14 off of some types of pathogens once released into water bodies would generally prevent substantial
 15 pathogen exposure to recreationists. Therefore, impacts would be less than significant and no
 16 mitigation is required.

17 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
 18 **as a Result of Implementing CM2, CM4, CM5, and CM10**

19 **NEPA Effects:** The amount of habitat restoration under Alternative 9 would be the same as
 20 Alternative 1A. However, it is expected that different locations for restoration or enhancement
 21 activities could be chosen in the south Delta based on the creation of separate corridors with
 22 differing purposes. The primary concern with habitat restoration regarding constituents known to
 23 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 24 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the pesticide-
 25 bearing sediments would not be transported very far from the source area and would settle out with
 26 suspended particulates and be deposited close to the ROA. Further, CM2–CM21 do not include the
 27 use of pesticides known to be bioaccumulative in animals or humans.

28 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 29 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 30 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 31 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 32 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 33 bioaccumulation of methylmercury in the study area's aquatic systems (i.e., fish and water) during
 34 the near-term, *CM12 Methylmercury Management* and existing OEHHA standards would serve to
 35 reduce the public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,
 36 and CM10 under Alternative 9 is not expected to result in an adverse effect on public health with
 37 respect to pesticides or methylmercury.

38 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 39 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 40 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 41 sediments would be transported very far from the source area and they would likely settle out with
 42 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 43 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 44 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented

1 under *CM12 Methylmercury Management*, and existing OEHHA standards would serve to reduce the
2 public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5, and CM10 of
3 Alternative 9 would not substantially mobilize or substantially increase the public's exposure to
4 constituents known to bioaccumulate and this impact would be less than significant. No mitigation is
5 required.

6 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 7 **Conveyance Facilities**

8 **NEPA Effects:** Because factors that affect *Microcystis* abundance in waters upstream of the Delta, in
9 the Delta, and in the SWP/CVP Export Services Areas under Alternative 1A would similarly change
10 under Alternative 8, *Microcystis* abundance, and thus microcystins concentrations, in water bodies
11 of the affected environment under Alternative 9 would be very similar to those discussed for
12 Alternative 1A.

13 As described in Chapter 8, *Water Quality*, although *Microcystis* blooms have not occurred in the
14 Export Service Areas, conditions in the Export Service Areas under Alternative 9 may become more
15 conducive to *Microcystis* bloom formation because water temperatures will increase in the Export
16 Service Areas due to the expected increase in ambient air temperatures resulting from climate
17 change, but not from operation of the water conveyance facilities. Under Alternative 9, relative to No
18 Action Alternative, water exported to the SWP/CVP Export Service Area would be a mixture of
19 *Microcystis*-affected source water from the south Delta intakes and unaffected source water from the
20 Sacramento River, diverted at the north Delta intakes. It cannot be determined whether operations
21 and maintenance under Alternative 9 will result in increased or decreased levels of *Microcystis* and
22 microcystins in the mixture of source waters exported from Banks and Jones pumping plants.

23 Like Alternative 1A, elevated ambient water temperatures relative would occur in the Delta under
24 Alternative 9, which could lead to earlier occurrences of *Microcystis* blooms in the Delta, and
25 increase the overall duration and magnitude of blooms. However, as described in Chapter 8, *Water*
26 *Quality*, the increase in Delta water temperatures, and consequent potential increase in *Microcystis*
27 blooms, would be driven entirely by climate change, not by operation of water conveyance facilities.
28 There would be differences in the direction and magnitude of water residence time changes during
29 the *Microcystis* bloom period due to operation of the water conveyance facilities under Alternative 9
30 compared to Alternative 1A, relative to the No Action Alternative. As a result, *Microcystis* blooms,
31 and therefore microcystin, could increase in surface waters throughout the Delta. Therefore, impacts
32 on beneficial uses, including drinking water and recreational waters, could occur and public health
33 could be affected. Accordingly, this would be considered an adverse effect.

34 Mitigation Measure WQ-32a and WQ-32b are available to reduce the effects of degraded water
35 quality in the Delta. Although there is uncertainty regarding this impact, the effects on *Microcystis*
36 from implementing CM1 is determined to be adverse.

37 **CEQA Conclusion:** Under Alternative 9, operation of the water conveyance facilities is not expected
38 to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta.
39 *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures
40 resulting from climate change, but not due to water conveyance facility operations. Hydraulic
41 residence times in the Export Service Area would not be affected by operations of CM1, and
42 therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation.
43 Water exported from the Delta to the Export Service Area is expected to be a mixture of *Microcystis*-
44 affected source water from the south Delta intakes and unaffected source water from the

1 Sacramento River. Because of this, it cannot be determined whether operations and maintenance
 2 under Alternative 9 would result in increased or decreased levels of *Microcystis* and microcystins in
 3 the mixture of source waters exported from Banks and Jones pumping plants.

4 Water temperatures and hydraulic residence times in the Delta are expected to increase, which
 5 could result in an increase in *Microcystis* blooms and therefore microcystin levels. However, the
 6 water temperature increases in the Delta would be due to climate change and not due to operation
 7 of the water conveyance facilities. Increases in Delta residence times would be due in small part to
 8 climate change and sea level rise, but due to a greater degree to operation of the water conveyance
 9 facilities and hydrodynamic impacts of restoration included in CM2 and CM4. Consequently, it is
 10 possible that increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms in
 11 the Delta would occur due to the operations and maintenance of the water conveyance facilities and
 12 the hydrodynamic impacts of restoration under CM2 and CM4. Accordingly, beneficial uses including
 13 drinking water and recreational waters would be impacted and, as a result, public health. Therefore,
 14 this impact would be significant.

15 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 16 quality due to *Microcystis*. Mitigation Measure WQ-32a requires that hydraulic residence time
 17 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 18 available science at the time of design. Mitigation Measure WQ-32b requires that the project
 19 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 20 to determine whether increases in abundance are significant. This mitigation measure also requires
 21 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 22 investigate and evaluate measures that could be taken to reduce residence time in the affected areas
 23 of the Delta. However, because the effectiveness of these mitigation measures to result in feasible
 24 measures for reducing water quality effects, and therefore potential public health effects, is
 25 uncertain, this impact would be significant and unavoidable.

26 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 27 ***Microcystis* Blooms**

28 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 29 in Chapter 8, *Water Quality*.

30 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 31 **Water Residence Time**

32 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 33 in Chapter 8, *Water Quality*.

34 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing CM2 and**
 35 **CM4**

36 **NEPA Effects:** The amount of habitat restoration and enhancement that would occur under
 37 Alternative 9 would be the same as that described under Alternative 1A. However, different
 38 locations for restoration or enhancement activities could be chosen in the south Delta based on the
 39 creation of separate corridors with differing purposes.

40 Restoration activities implemented under CM2 and CM4 that would create shallow backwater areas
 41 could result in local increases in water temperature that may encourage *Microcystis* growth during

1 the summer bloom season. This would result in further degradation of water quality beyond the
 2 hydrodynamic effects of CM2 and CM4 on *Microcystis* blooms identified in Impact PH-8. An increase
 3 in *Microcystis* blooms with implementation of CM2 and CM4 could potentially result in adverse
 4 effects on public health through exposure via drinking water quality and recreational waters.
 5 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 6 increased local water temperatures and water residence time. The effectiveness of these mitigation
 7 measures to result in feasible measures for reducing water quality effects related to *Microcystis* is
 8 uncertain. This would be an adverse effect.

9 **CEQA Conclusion:** The effects of CM2 and CM4 on *Microcystis* under Alternative 9 are the same as
 10 those discussed for Alternative 1A. Restoration activities implemented under CM2 and CM4 that
 11 create shallow backwater areas could result in local increases in water temperature conducive to
 12 *Microcystis* growth during summer bloom season. This could compound the water quality
 13 degradation that may result from the hydrodynamic impacts from CM2 and CM4 discussed in Impact
 14 PH-8 and result in additional water quality degradation such that beneficial uses are affected. An
 15 increase in *Microcystis* blooms could potentially result in impacts on public health through exposure
 16 via drinking water quality and recreational waters. Therefore, this impact would be significant.
 17 Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from
 18 increased local water temperatures and water residence time. The effectiveness of these mitigation
 19 measures to result in feasible measures for reducing water quality effects, and therefore potential
 20 public health effects, is uncertain. Therefore, this impact would be significant and unavoidable.

21 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 22 ***Microcystis* Blooms**

23 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 24 in Chapter 8, *Water Quality*.

25 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 26 **Water Residence Time**

27 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
 28 in Chapter 8, *Water Quality*.

29 **25.3.4 Effects and Mitigation Approaches—Alternatives 4A,**
 30 **2D, and 5A**

31 **25.3.4.1 No Action Alternative Early Long-Term**

32 The effects of the No Action Alternative (ELT) as considered for the purposes of Alternatives 4A, 2D,
 33 and 5A would be expected to be similar to those effects described for the No Action Alternative Late
 34 Long-Term (LLT) in Section 25.3.3.1.

35 New water supply facilities would be constructed under the No Action Alternative (ELT) as listed in
 36 Table 25-10; therefore, there could be a disruption to existing sources of methylmercury associated
 37 with this type of construction. Water supply operations under the No Action Alternative (ELT) likely
 38 would not involve the operation of solids lagoons or sedimentation basins; therefore, there would be
 39 no increase in the public's risk of exposure to vector-borne diseases. Under the No Action
 40 Alternative (ELT), there would be a change in various source waters throughout the Delta (i.e.,

1 upstream water, Bay water, agricultural return flow), due to potential changes in inflows,
2 particularly from the Sacramento River watershed because of increased water demands or changes
3 to climate and precipitation levels. Water supply operations under the No Action Alternative (ELT)
4 would continue to use the existing source(s) of drinking water from the study area. These sources
5 generally meet regulatory standards for most constituents. However, under the No Action
6 Alternative (ELT), existing exceedances would not increase above baseline conditions (see Chapter
7 8, *Water Quality*) to levels that adversely affect any beneficial uses or substantially degrade water
8 quality. Furthermore, drinking water from the study area would continue to be treated prior to
9 distribution into the drinking water system.

10 Any modified reservoir operations under the No Action Alternative (ELT) are not expected to
11 promote *Microcystis* production upstream of the Delta since large reservoirs upstream of the Delta
12 are typically low in nutrient concentrations and phytoplankton outcompete cyanobacteria, including
13 *Microcystis*. As described in Chapter 8, *Water Quality*, hydrodynamic changes due to enhancements
14 to the Yolo Bypass and 8,000 acres of tidal habitat would increase hydraulic residence times in the
15 Delta, which would create conditions conducive to the formation of *Microcystis* blooms. Projected
16 future water temperature changes in the Delta under the No Action Alternative (ELT) indicate that
17 water temperatures would increase due to climate change. These temperature increases could lead
18 to earlier attainment of the water temperature threshold of 19°C required to initiate *Microcystis*
19 bloom formation, and thus earlier occurrences of *Microcystis* blooms in the Delta.

20 Therefore, the combination of increased water residence times in the Delta, due to assumed
21 restoration activities, and increased water temperatures, due to climate change could result in
22 increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms in the Delta
23 under the No Action Alternative (ELT). As such, impacts on beneficial uses, including drinking water
24 and recreational waters, could occur and public health could be affected. Accordingly, this would be
25 considered an adverse effect.

26 The No Action Alternative (ELT) may involve the operation of new transmission lines should
27 additional sources of electricity be needed by either the water supply projects or as part of a general
28 plan buildout. It is likely that with population growth projected by various general plans and
29 regional plans would also result in an additional need for electricity and the construction and
30 operation of new transmission lines. Furthermore, as more renewable energy sources such as solar
31 power are developed, new transmission lines will likely be needed to convey power from the
32 renewable energy source to users. Although, it is unknown where new transmission lines would be
33 and if they would be located within close proximity to sensitive receptors (e.g., hospitals, schools,
34 parks), it is likely some of them would be within close proximity to sensitive receptors and present
35 new sources of EMFs. However, the utilities will implement the CPUC design criteria and guidelines
36 regarding EMFs, and CPUC reviews proposals for transmission lines if feasible. Investor-owned
37 utilities are required to obtain a permit from CPUC for construction of certain specified
38 infrastructure (including transmission lines) listed under Public Utilities Code Section 1001
39 (California Public Utilities Commission 2011). CPUC reviews permit applications under two
40 concurrent processes: (1) an environmental review pursuant to CEQA, and (2) the review of project
41 need and costs pursuant to Public Utilities Code Sections 1001 et seq. and General Order 131-D
42 (CPCN or PTC) (California Public Utilities Commission 2011). Therefore, the No Action Alternative
43 (ELT) is not likely to result in adverse effects on public health with respect to EMFs.

44 Habitat restoration activities in the study area already approved, such as those associated with the
45 Suisun Marsh Habitat Management, Preservation, and Restoration Plan, could be implemented

1 under the No Action Alternative (ELT) timeframe. These habitat restoration activities would
2 generally be located in areas that are already potential sources of vectors, such as existing channels
3 or agricultural areas. Furthermore, activities would be designed to maximize water exchange and
4 flow, thereby minimize stagnant water and the production of mosquitoes. Finally, all of the
5 restoration activities would occur in consultation with existing MVCDS. Therefore, it is not expected
6 that habitat restoration under the No Action Alternative (ELT) would result in a substantial increase
7 in the public's risk of exposure to vector-borne diseases.

8 Under the No Action Alternative (ELT), as described in Appendix 3D, *Defining Existing Conditions, No*
9 *Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, there would be some
10 change in inflows from the Sacramento River due to climate change-related changes in precipitation
11 patterns; therefore, the amount of Delta waters consisting of agricultural return flow would increase
12 slightly. Approximately 5% of the in-Delta agricultural use is livestock, the primary type of
13 agricultural use that generates pathogens. The relatively small increase in the percentage of Delta
14 waters consisting of agricultural return flow is not expected to cause a measureable change in the
15 pathogen concentrations in the Delta waters because livestock is a small percentage of the overall
16 agricultural use and none of the assumed No Action Alternative (ELT) conditions would
17 substantially change the amount of livestock in the study area. Therefore, under the No Action
18 Alternative (ELT), the concentrations of pathogens would remain relatively similar to existing
19 concentrations and recreationists would not experience a substantial increase in exposure.

20 Construction of habitat restoration projects that are reasonably foreseeable or approved and/or
21 under construction under the No Action Alternative (ELT) would likely temporarily mobilize
22 existing constituents within sediments known to bioaccumulate, such as methylmercury or
23 pesticides. This potential effect is expected in varying degrees depending on the location of
24 restoration projects because the study area is generally known to be out of compliance with
25 methylmercury levels. Construction effects would not be adverse because the mobilization would
26 occur during a limited time and would be localized around the area of construction. Once
27 operational, other habitat restoration projects could result in an increase of methylmercury as a
28 result of biogeochemical processes and sediment conditions established in tidal wetlands. However,
29 it is expected these projects either have, or would evaluate the potential for, methylmercury
30 production and would implement measures to monitor and adaptively manage methylmercury
31 production. For example, the Suisun Marsh Plan EIS/EIR evaluated the potential for methylmercury
32 production due to tidal restoration and determined it would result in less than significant impacts
33 and that monitoring and other measures would be incorporated into the adaptive management plan
34 to manage methylmercury concerns. Therefore, the habitat restoration projects that would occur
35 under the No Action Alternative (ELT) are not likely to adversely affect public health.

36 **CEQA Conclusion:** It is expected that implementation of existing plans, or existing and reasonably
37 foreseeable habitat restoration projects, would not result in a substantial increase in the public's
38 risk of exposure to vector-borne diseases because of the location of existing vector habitat,
39 restoration design, and consultation with MVCDS. This is because habitat restoration would be
40 located in areas that are already potential sources of vectors, such as existing channels or
41 agricultural areas. Furthermore, activities would be designed to maximize water exchange and flow,
42 thereby minimizing stagnant water and the production of mosquitoes. Finally, all of the restoration
43 activities would occur in consultation with existing MVCDS. Therefore, it is not expected that habitat
44 restoration under the No Action Alternative (ELT) would result in a substantial increase in the
45 public's risk of exposure to vector-borne diseases. As such, this impact is less than significant.

1 Construction impacts associated with No Action Alternative (ELT) habitat restoration projects
 2 would be less than significant because the mobilization of existing sediment-bound contaminants
 3 (e.g., methylmercury) would occur during a limited time and would be localized around the area of
 4 construction. Once operational, other habitat restoration projects could result in an increase of
 5 methylmercury as a result of biogeochemical processes and sediment conditions established in tidal
 6 wetlands. However, it is expected these projects either have, or would evaluate the potential for,
 7 methylmercury production and would implement measures to monitor and adaptively manage
 8 methylmercury production.

9 Water supply operations under the No Action Alternative (ELT) would continue to use the existing
 10 source(s) of drinking water from the study area. These sources generally meet regulatory standards
 11 for most constituents or experience some exceedances for constituents such as arsenic (see Chapter
 12 8, *Water Quality*). Under the No Action Alternative (ELT), existing exceedances would not increase
 13 above baseline conditions and, therefore, this impact would be less than significant.

14 It is unknown where new transmission lines would be in the ELT period and whether they would be
 15 located in close proximity to sensitive receptors (e.g., hospitals, schools, parks); however, it is likely
 16 some of them would be within close proximity to sensitive receptors and present new sources of
 17 EMFs. Utilities will implement the CPUC design criteria and guidelines regarding EMFs, and CPUC
 18 reviews proposals for transmission lines if feasible. Accordingly, this impact would be less than
 19 significant

20 Because it is possible that under the No Action Alternative (ELT) increases in the frequency,
 21 magnitude, and geographic extent of *Microcystis* blooms in the Delta would occur due to increased
 22 water temperatures associated with climate change, as well as increased water residence times
 23 related to restoration activities, long-term water quality degradation may occur in the Delta and
 24 water exported from the Delta to the SWP/CVP Export Service Areas. Thus, impacts on beneficial
 25 uses could occur, and therefore this impact would be significant.

26 **25.3.4.2 Alternative 4A—Dual Conveyance with Modified** 27 **Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational** 28 **Scenario H)**

29 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 30 **the Water Conveyance Facilities**

31 **NEPA Effects:** The potential for Alternative 4A construction and operation to increase vector-borne
 32 diseases would be the same as described for Alternative 4 because all aspects of the water
 33 conveyance facility design, construction, and operation (excluding water supply operations) and
 34 maintenance of Alt 4A would be identical to Alt 4. Although the proposed conveyance facilities will
 35 increase surface water within the study area at the intakes, intermediate forebay, and Clifton Court
 36 Forebay, it is unlikely that these water bodies would provide suitable breeding habitat for
 37 mosquitoes given that the water in these forebays would not be stagnant and would generally be too
 38 deep to support substantial mosquito habitat. Shallow edges of the forebays could provide some
 39 suitable mosquito breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed)
 40 were allowed to grow. However, as part of the regular maintenance of these forebay areas, floating
 41 vegetation such as pond weed would be harvested to maintain flow and forebay capacity. To further
 42 minimize the potential for impacts related to increasing suitable vector habitat within the study
 43 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County

1 MVCDs and prepare and implement MMPs, as necessary, to control mosquitoes and reduce the
 2 likelihood that construction and operation of the water conveyance facilities would require an
 3 increase in mosquito abatement activities by the local MVCDs (Appendix 3B, *Environmental*
 4 *Commitments, AMMs, and CMs*). BMP activities would be consistent with the CDPH's *Best*
 5 *Management Practices for Mosquito Control in California* (California Department of Public Health
 6 2012). Accordingly, Alternative 4A would not substantially increase suitable vector habitat, and
 7 would not substantially increase vector-borne diseases. No adverse effects on public health would
 8 result because conditions for mosquito breeding at conveyance facilities would be minimized and
 9 standard practices to control mosquitos would be implemented.

10 **CEQA Conclusion:** The potential for construction and operation of conveyance facilities under
 11 Alternative 4A to result in an increase in exposure of people to vector-borne diseases would be
 12 identical to the impacts described for Alternative 4. Alternative 4A conveyance facilities that could
 13 create new water bodies at the intakes, intermediate forebay, and Clifton Court Forebay have the
 14 potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of the large
 15 volumes of water that would be held within these areas. However, during operations, the depth,
 16 design, and operation of conveyance facilities would prevent the development of suitable mosquito
 17 habitat. Specifically, the water bodies would be too deep and the constant movement of water would
 18 prevent mosquitoes from breeding and multiplying. To minimize the potential for impacts related to
 19 increasing suitable vector habitat within the study area, DWR would consult and coordinate with
 20 San Joaquin County and Sacramento-Yolo County MVCDs and prepare and implement MMPs. BMPs
 21 to be implemented as part of the MMPs would help control mosquitoes during construction and
 22 operation of the sedimentation basins, solids lagoons, the expanded Clifton Court Forebay, the
 23 intermediate forebay, and the intermediate forebay inundation area. These BMPs would be
 24 consistent with practices presented in *Best Management Practices for Mosquito Control in California*
 25 (California Department of Public Health 2012). Therefore, construction and operation of Alternative
 26 4 would not result in a substantial increase in vector-borne diseases. This impact is considered to be
 27 less than significant because conditions for mosquito breeding at conveyance facilities would be
 28 minimized and standard practices to control mosquitos would be implemented. No mitigation is
 29 required.

30 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 31 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 32 **Facilities**

33 As described in Chapter 8, *Water Quality*, water quality changes described for Alternative 4A are
 34 most notably affected by the extent of habitat restoration to be implemented. As described Chapter
 35 3, *Description of Alternatives*, Alternative 4A does not include the full suite of conservation actions
 36 included in Alternative 4. Environmental Commitment 4 under Alternative 4A would restore
 37 approximately 295 acres of tidal wetlands, as opposed to the 65,000 acres contemplated under CM4
 38 under Alternative 4. The modeling of Alternative 4A and the No Action Alternative (ELT) included
 39 Yolo Bypass Improvements, but no tidal habitat restoration. Therefore, comparison of modeling
 40 results for Alternative 4A to No Action Alternative (ELT) results allows for isolating and identifying
 41 effects solely due to implementation of Alternative 4A in the ELT.

42 Modeling for Alternative 4A was conducted for Operational Scenario H3+, a point that generally falls
 43 between Scenario H3 and H4 operations, as the initial conveyance facilities operational scenario. As
 44 specified in Chapter 3, *Description of Alternatives*, Section 3.6.4, the Delta outflow criteria under
 45 Scenario H for Alternative 4A would be determined by the ESA and California Endangered Species

1 Act Section 2081 permits, and operations to obtain such outflow would likely be between Scenarios
2 H3 and H4. Modeling results for Scenarios H3 and H4 using the 2010 CALSIM II model are shown in
3 Appendix 5E, *Supplemental Modeling Requested by the State Water Resources Control Board Related*
4 *to Increased Delta Outflows*, Attachment 1. In addition, following the initial operations, the adaptive
5 management and monitoring program could be used to make long-term changes in initial operations
6 criteria to address uncertainties about spring outflow for longfin smelt and fall outflow for delta
7 smelt, among other species.

8 Future conveyance facilities operational changes may also be made as a result of adaptive
9 management to respond to advances in science and understanding on how operations affect species.
10 Conveyance facilities would be operated under an adaptive management range represented by
11 Boundary 1 and Boundary 2 (see Section 5E.2 of Appendix 5E for additional information on
12 Boundary 1 and Boundary 2). Impacts as a result of operations within this range would be
13 consistent with the impacts discussed for the range of alternatives considered in this EIR/EIS. As
14 shown in Appendix 5F, water supply modeling results for H3+ are within the range of results for
15 Scenarios H3 and H4, and are consistent with the impacts discussed in the RDEIR/SDEIS. The
16 following analysis of Alternative 4A impacts reflects modeling results of Operational Scenario H3+.

17 **NEPA Effects:**

18 **Disinfection Byproducts**

19 The effects on long-term average DOC concentrations in the Delta under Alternative 4A would be
20 similar to Alternative 4.

21 The geographic extent of effects related to long-term average DOC concentrations within Delta
22 waters would be similar to that described for Alternative 4 but the magnitude of predicted change
23 and relative frequency of concentration exceedances would be lower. Relative to the No Action
24 Alternative (ELT), operations and maintenance of the water conveyance facilities under Alternative
25 4A would result in small increases (up to 0.2 mg/L) in long-term average DOC concentrations for the
26 modeled 16-year period and drought period at the South Fork Mokelumne River at Staten Island,
27 Franks Tract, Old River at Rock Slough, and Contra Costa Pumping Plant #1. The increases in
28 average DOC concentrations would correspond to more frequent concentration threshold
29 exceedances, with the greatest change occurring at Contra Costa Pumping Plant #1. The change in
30 frequency of threshold concentration exceedances at other assessment locations would be similar or
31 lower. In general, a substantial change in ambient DOC concentrations would need to occur before
32 significant changes in drinking water treatment plant design or operations are triggered. The
33 increases in long-term average DOC concentrations estimated to occur at various Delta locations
34 under Alternative 4A are of sufficiently small magnitude that they would not require existing
35 drinking water treatment plants to substantially upgrade treatment for DOC removal above levels
36 currently employed.

37 In the LLT, the Delta source water fractions may be different from those occurring in the ELT due to
38 changes in upstream hydrology and Delta hydrodynamics from climate change and sea level rise.
39 These effects would occur regardless of the implementation of Alternative 4A. Therefore, in the LLT,
40 the effects of the alternative on DOC are expected to be similar to those described above. In addition,
41 modeling results for Alternative 4A indicate that there would be predicted improvements in long-
42 term average DOC concentrations at Barker Slough relative to the No Action Alternative (ELT and
43 LLT) (see Chapter 8, *Water Quality*). Therefore, changes in DOC concentrations in the Delta resulting

1 from operation of the water conveyance facilities under Alternative 4A are not anticipated to
2 contribute to increases in disinfection byproducts (DBPs).

3 As described in Chapter 8, *Water Quality*, operations and maintenance of the water conveyance
4 facilities under Alternative 4A, relative to the No Action Alternative (ELT), would result in an
5 increased frequency of exceedance of the 50 µg/L and 100 µg/L bromide thresholds for protecting
6 against the formation of disinfection byproducts in treated drinking water. At the South Fork
7 Mokelumne River at Staten Island, Franks Tract, San Joaquin River at Antioch, and Sacramento River
8 at Emmaton there would be small increases (1 – 5% in non-drought years) in exceedances of the 50
9 µg/L threshold. The greatest increase in frequency of exceedance of the 50 µg/L threshold would
10 occur in the North Bay Aqueduct at Barker Slough, as described in Chapter 8. The 100 µg/L bromide
11 threshold would be exceeded at South Fork Mokelumne River at Staten Island, Franks Tract, San
12 Joaquin River at Antioch, Sacramento River at Mallard Island, Old River at Rock Slough, and at the
13 Contra Costa Pumping Plant #1 (Appendix 8E, *Bromide*, Table 22) by 2% or less. The greatest
14 increase in frequency of exceedance of 100 µg/L would occur at Sacramento River at Mallard Island
15 and Franks Tract.

16 Long-term average bromide concentrations in the San Joaquin River at Buckley Cove and the North
17 Bay Aqueduct at Barker Slough would increase under Alternative 4A, although the increases would
18 be relatively small (<1%).

19 The magnitude of bromide concentration increases at Mallard Slough and in the San Joaquin River at
20 Antioch during their historical months of use, relative to the No Action Alternative (ELT) would be
21 generally similar to those described for Alternative 4 (Appendix 8E, *Bromide*, Table 25), and the
22 frequency of exceedance of bromide thresholds would be similar (Appendix 8E, *Bromide*, Table 22).
23 As described for Alternative 4, the use of seasonal intakes at these locations is largely driven by
24 acceptable water quality, and thus has historically been opportunistic. Opportunity to use these
25 intakes would remain, and the predicted increases in bromide concentrations at Antioch and
26 Mallard Slough would not be expected to adversely affect MUN beneficial uses, or any other
27 beneficial use, at these locations.

28 Thus, these increased bromide concentrations are not expected to result in adverse effects to MUN
29 beneficial uses, or any other beneficial use, at these locations, and are not anticipated to contribute
30 to increases in DBPs.

31 **Trace Metals**

32 The changes in modeled trace metal concentrations of primarily human health and drinking water
33 concern (arsenic, iron, manganese) in the Delta would be similar to those described for Alternative
34 4 (see Chapter 8, *Water Quality*, Section 8.3.3.9).

35 The arsenic criterion was established to protect human health from the effects of long-term chronic
36 exposure, while secondary MCLs for iron and manganese were established as reasonable federal
37 regulatory goals for drinking water quality, and enforceable standards in California. Average
38 concentrations for arsenic, iron, and manganese in the primary source water (Sacramento River, San
39 Joaquin River, and the bay at Martinez) are below these criteria. No mixing of these three source
40 waters could result in a metal concentration greater than the highest source water concentration,
41 and, given that the modeled average water concentrations for arsenic, iron, and manganese do not
42 exceed water quality criteria, more frequent exceedances of drinking water criteria in the Delta
43 would not be an expected result under this alternative. Accordingly, no adverse effect on public

1 health related to the trace metals arsenic, iron, or manganese from drinking water sources is
2 anticipated.

3 **Pesticides**

4 The changes in modeled pesticide concentrations in the Delta under Alternative 4A would be similar
5 to those described for Alternative 4 because the changes in average winter and summer flow rates
6 relative to the No Action Alternative (ELT and LLT) are expected to be similar to or less than
7 changes in flow rates under Alternative 4 in the Sacramento River at Freeport, American River at
8 Nimbus, Feather River at Thermalito and the San Joaquin River at Vernalis. The modeled changes in
9 the source water fractions of Sacramento River, San Joaquin River, and Delta agriculture water
10 under Alternative 4A would not be of sufficient magnitude to substantially affect beneficial uses of
11 the Delta. Based on the general observation that San Joaquin River, in comparison to the Sacramento
12 River, is a greater contributor of organophosphate insecticides in terms of greater frequency of
13 incidence and presence at concentrations exceeding water quality benchmarks, modeled increases
14 in Sacramento River fraction at Banks and Jones would generally represent an improvement in
15 export water quality respective to pesticides. Similarly, the flow changes in the LLT under
16 Alternative 4A would not be expected to result in effects on beneficial uses of water in the Delta due
17 to pesticides.

18 Therefore, it is not anticipated that there would be adverse effects on public health related to
19 pesticides from drinking water sources.

20 Because there would be no increases in DBPs due to increases in bromide or DOC in Delta surface
21 waters, and because the modeled changes in pesticide concentrations would not increase
22 substantially in magnitude or frequency in the Delta, there would be no adverse effect on public
23 health as a result of operation of the water conveyance facilities.

24 **CEQA Conclusion:** Under Alternative 4A, modeled long-term average pesticide levels in the Delta
25 would be similar to or slightly less than described under Alternative 4 and would not be expected to
26 increase substantially such that beneficial use impairments are made measurably worse. Average
27 concentrations of trace metals in the Delta are not expected to increase substantially under
28 Alternative 4A in the primary source water.

29 There would be an increased frequency of exceedance of the 50 µg/L and 100 µg/L bromide
30 thresholds for protecting against the formation of disinfection byproducts in treated drinking water.
31 Exceedances of the 50 µg/L threshold would occur at South Fork Mokelumne River at Staten Island,
32 Franks Tract, Old River at Rock Slough, Sacramento River at Emmaton, San Joaquin River at Antioch,
33 and Sacramento River at Mallard Island. The greatest increase in frequency of exceedance of the
34 CALFED Drinking Water Program long-term goal of 50 µg/L would occur in the S. Fork Mokelumne
35 River (7% increase) and Sacramento River at Emmaton (4% increase). As described for Alternative
36 4, the use of seasonal intakes at Mallard Slough and in the San Joaquin River at Antioch is largely
37 driven by acceptable water quality, and thus has historically been opportunistic. Opportunity to use
38 these intakes would remain, and the predicted increases in bromide concentrations at Antioch and
39 Mallard Slough would not be expected to adversely affect MUN beneficial uses, or any other
40 beneficial use, at these locations. South Fork Mokelumne River at Staten Island, Franks Tract, Old
41 River at Rock Slough, Sacramento River at Emmaton, San Joaquin River at Antioch, Sacramento River
42 at Mallard Island, and the Contra Costa Pumping Plant #1 would have an increased frequency of
43 exceedance of 100 µg/L, which is the concentration believed to be sufficient to meet currently
44 established drinking water criteria for disinfection byproducts (Appendix 8E, *Bromide*, Table 22).

1 The greatest increase in frequency of exceedance of 100 µg/L would occur at Sacramento River at
2 Emmaton (5% increase) and San Joaquin River at Antioch and Franks Tract (4% increase).

3 The long-term average bromide concentration relative to Existing Conditions would increase in the
4 South Fork Mokelumne River at Staten Island and decrease at all other assessment locations.

5 Therefore, Alternative 4A would not cause exceedance of applicable state or federal numeric or
6 narrative water quality objectives/criteria because none exist for bromide. Alternative 4A would not
7 result in any substantial change in long-term average bromide concentration or exceed 50 and 100
8 µg/L assessment threshold concentrations by frequency, magnitude, and geographic extent that
9 would result in adverse effects on any beneficial uses within affected water bodies. Accordingly, any
10 increases in bromide would not be expected to contribute substantially to DBP formation.

11 Relative to Existing Conditions, operations and maintenance activities under Alternative 4A would
12 not cause a substantial long-term change in DOC concentrations in the Delta, although there would
13 be relatively small increases in long-term average DOC concentrations at South Fork Mokelumne
14 River at Staten Island, Franks Tract, Old River at Rock Slough, and Contra Costa Pumping Plant #1
15 (Appendix 8K, *Organic Carbon*, Table DOC-11). The increases in average DOC concentrations would
16 correspond to more frequent concentration threshold exceedances, with the greatest change
17 occurring at the Contra Costa Pumping Plant #1 location for the modeled 16-year period). However,
18 the increases are of sufficiently small magnitude that they would not require existing drinking water
19 treatment plants to substantially upgrade treatment for DOC above levels currently employed, and
20 therefore these increases would not be expected to contribute substantially to DBP formation.
21 Further, there would be predicted improvements in long-term average DOC concentrations at
22 Barker Slough relative to Existing Conditions.

23 Because there would be no increases in DBPs due to increases in bromide or DOC in Delta surface
24 waters, and because the modeled changes in trace metals and pesticide concentrations would not
25 increase substantially in magnitude or frequency in the Delta, there would be no significant impact
26 on public health as a result of operation of the water conveyance facilities.

27 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 28 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

29 **NEPA Effects:** As described in Chapter 8, *Water Quality*, modeling scenarios included assumptions
30 regarding how certain habitat restoration activities (CM2 and CM4) would affect Delta
31 hydrodynamics. The amount of tidal habitat restoration completed under Alternative 4A
32 (Environmental Commitment 4) would be substantially less than under Alternative 4 CM4. To the
33 extent that restoration actions alter hydrodynamics within the Delta region, which affects mixing of
34 source waters, these effects are included in this assessment of operations-related water quality
35 changes due to operation of the water conveyance facilities.

36 Three intakes would be constructed and operated under Alternative 4A. Sediment-disturbing
37 activities during construction and maintenance of these intakes and other water conveyance
38 facilities proposed near or in surface waters under this alternative could result in the disturbance of
39 existing constituents in sediment, such as pesticides or methylmercury. In-channel construction
40 activities, such as pile driving during the construction of cofferdams at the intakes and pier
41 construction at the barge unloading facilities, which would occur over a period of 5 months, would
42 result in the localized disturbance of river sediment. In addition, maintenance of the three proposed
43 north Delta intakes and the intermediate forebay would entail periodic dredging for sediment

1 removal at these locations. Sediment accumulation in both the northern and southern portion of the
2 expanded Clifton Court Forebay is expected to be minimal in the ELT period as the need for dredging
3 is anticipated to be every 50 years given the design. However, it is anticipated that there may be
4 some sediment accumulation at the inlet structure of the northern portion of Clifton Court Forebay.
5 Therefore, while overall sediment accumulation in this forebay is not expected to be substantial,
6 some dredging may be required at the inlet structure to maintain an even flow path.

7 **Pesticides**

8 Legacy pesticides, such as organochlorines, have low water solubility; they do not readily volatilize
9 and have a tendency to bond to particulates (e.g., soil and sediment), settle out into the sediment,
10 and not be transported far from the source. If present in sediment within in-water construction
11 areas, legacy pesticides would be disturbed locally and would not be expected to partition into the
12 water column to any substantial degree. Therefore, no significant adverse effect on public health
13 would result from construction.

14 Numerous pesticides are currently used throughout the affected environment. While some of these
15 pesticides may be bioaccumulative, those present-use pesticides for which there is sufficient
16 evidence of their presence in waters affected by SWP and CVP operations (i.e., organophosphate
17 pesticides, such as diazinon, chlorpyrifos, diuron, and pyrethroids) are not considered
18 bioaccumulative. Thus, changes in their concentrations would not directly cause bioaccumulative
19 problems in aquatic life or humans. The effects of Alternative 4A on pesticide levels in surface Delta
20 surface water relative to Existing Conditions and the No Action Alternative (ELT and LLT) would be
21 similar to or slightly less than those described for the Alternative 4. Alternative 4A would not result
22 in increased tributary flows that would mobilize organochlorine pesticides in sediments. Thus, the
23 change in source water in the Delta associated with the change in water supply operations is not
24 expected to adversely affect public health with respect to bioaccumulation of pesticides.

25 **Methylmercury**

26 If mercury is sequestered in sediments at water facility construction sites, it could become
27 suspended in the water column during construction activities, opening up a new pathway into the
28 food chain. Construction activities (e.g., pile driving and cofferdam installation) at intake sites or
29 barge landing locations would result in a localized, short-term resuspension of sediment and an
30 increase in turbidity that may contain elemental or methylated forms of mercury. Please see Chapter
31 8, Section 8.1.3.9, *Mercury*, for a discussion of methylmercury concentrations in sediments.

32 Changes in methylmercury concentrations under Alternative 4A are expected to be small. The
33 greatest annual average methylmercury concentration for drought conditions would be 0.166 ng/L
34 for the San Joaquin River at Buckley Cove, which was slightly lower than the No Action Alternative
35 (ELT) (0.168 ng/L). All methylmercury concentrations in water were estimated to exceed the TMDL
36 guidance objective of 0.06 ng/L under Existing Conditions and, therefore, no assimilative capacity
37 exists.

38 Fish tissue estimates show small or no increases in mercury concentrations under Alternative 4A
39 relative to the No Action Alternative (ELT) based on long-term annual average concentrations for
40 mercury (Appendix 8I, *Mercury*, Tables I-20a and I-20b). As indicated in Chapter 8, *Water Quality*, in
41 the LLT, the Delta source water fractions may be different from those occurring in the ELT due to
42 changes in upstream hydrology and Delta hydrodynamics from additional climate change and sea

1 level rise. These effects would occur independent of the alternative and, thus, the alternative-specific
2 effects on mercury in the LLT are expected to be similar to those described above.

3 Because any changes in methylmercury concentrations in water and fish tissue under Alternative 4A
4 would not be substantially different from the No Action Alternative (ELT and LLT), there would be
5 no adverse effect on public health related to mercury.

6 In summary, operation of the water conveyance facilities under Alternative 4A would not alter
7 bioaccumulative pesticide concentrations or mercury concentrations in the Delta such that there
8 was an effect on public health. As such, there would be no adverse effect.

9 **CEQA Conclusion:** Operation of the water conveyance facilities under Alternative 4A is not expected
10 to cause additional exceedance of applicable water quality objectives/criteria by frequency,
11 magnitude, and geographic extent that would cause adverse effects on any beneficial uses of waters
12 in the affected environment. Methylmercury concentrations exceed criteria at all locations in the
13 Delta and no assimilative capacity exists. However, monthly average waterborne concentrations of
14 methylmercury, over the period of record under Alternative 4A would be very similar to Existing
15 Conditions. Similarly, estimates of fish tissue mercury concentrations show small differences would
16 occur among sites for Alternative 4A as compared to Existing Conditions for Delta locations modeled
17 (see Chapter 8, *Water Quality*). Because any changes in methylmercury concentrations are not likely
18 to be measurable, changes in mercury concentrations or fish tissue mercury concentrations would
19 not make any existing mercury-related impairment measurably worse.

20 The effects of Alternative 4A on bioaccumulative pesticide levels in the Delta would be similar to or
21 slightly less than those described for the Alternative 4. Alternative 4A would not result in increased
22 tributary flows that would mobilize organochlorine pesticides in sediments. Thus, the change in
23 source water in the Delta associated with the change in water supply operations is not expected to
24 adversely affect public health with respect to bioaccumulation of pesticides. If present in sediment
25 within in-water construction areas, legacy pesticides would be disturbed locally and would not be
26 expected to partition into the water column to any substantial degree.

27 For these reasons, there would be no significant impact on public health due to mercury or
28 bioaccumulative pesticides as a result of construction of or operation of the water conveyance
29 facilities under Alternative 4A.

30 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 31 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 32 **Facilities**

33 **NEPA Effects:** The potential for Alternative 4A transmission line construction and operation to
34 expose people to new sources of EMFs would be identical to impacts described under Alternative 4.
35 As described in Table 25-9, a total of 6.08 miles of new temporary 69 kV transmission lines; 14.96
36 miles of new permanent 230 kV transmission lines; 18.72 miles of new temporary 230 kV
37 transmission lines; 1.00 mile of new permanent 230 kV/34.5 kV (underbuild) transmission lines;
38 11.28 miles of new permanent 230 kV/34.5 kV (underbuild) transmission lines; and the relocation
39 of 1.19 miles of existing 500 kV transmission line would be required for this alternative. Four
40 potential new sensitive receptors (Stone Lakes National Wildlife Refuge, Courtland Fire Station 92,
41 Cosumnes River Ecological Reserve, and Clifton Court Forebay) associated with the pipeline/tunnel
42 alignment that are not currently within 300 feet of an existing transmission line; the majority of
43 sensitive receptors are already located within 300 feet of an existing 69 kV or 230 kV transmission

1 line. Accordingly, new temporary or new permanent transmission lines would not expose
2 substantially more potential sensitive receptors or substantially more people to EMFs than they are
3 not already experiencing. Stone Lakes National Wildlife Refuge and Cosumnes River Ecological
4 Reserve would be within 300 feet of a proposed temporary 230 kV transmission line and Clifton
5 Court Forebay would be within 300 feet of a proposed permanent 230 kV transmission line and a
6 230 kV/34.5 kV (underbuild) transmission line. Visitors to these areas generally come for walks,
7 water recreation, fishing and hunting, and as such, it is unlikely that large groups of people would be
8 staying in the area within 300 feet of this proposed transmission line, so any EMF exposure would
9 be limited. Courtland Fire Station 92 would be within 300 feet of a temporary 69 kV transmission
10 line. These temporary transmission lines would be removed following completion of construction of
11 the water conveyance facility features near this area so there would be no potential permanent
12 effects. CPUC's EMF design guidelines would be implemented for any new temporary or new
13 permanent transmission lines constructed and operated under Alternative 4A.

14 **CEQA Conclusion:** The potential for Alternative 4A transmission line construction and operation to
15 expose people to new sources of EMFs would be identical to impacts described under Alternative 4.
16 Under Alternative 4A, the majority of proposed new temporary (69 kV and 230 kV) and new
17 permanent (230 kV and 230 kV/34.5 kV) transmission lines, and the permanent relocation of an
18 existing 500 kV transmission line would be located within the rights-of-way of existing transmission
19 lines; any new temporary or permanent transmission lines not within the right-of-way of existing
20 transmission lines would, for the most part, be located in sparsely populated areas generally away
21 from existing sensitive receptors. Four potential new sensitive receptors (Stone Lakes National
22 Wildlife Refuge, Courtland Fire Station 92, Cosumnes River Ecological Reserve, and Clifton Court
23 Forebay) associated with the pipeline/tunnel alignment that are not currently within 300 feet of an
24 existing transmission line; the majority of sensitive receptors are already located within 300 feet of
25 an existing 69 kV or 230 kV transmission line. Accordingly, new temporary or new permanent
26 transmission lines would not expose substantially more potential sensitive receptors or
27 substantially more people to EMFs that they are not already experiencing. Stone Lakes National
28 Wildlife Refuge and Cosumnes River Ecological Reserve would be within 300 feet of a proposed
29 temporary 230 kV transmission line and Clifton Court Forebay would be within 300 feet of a
30 proposed permanent 230 kV transmission line and a 230 kV/34.5 kV (underbuild) transmission line.
31 Visitors to these areas generally come for walks, water recreation, and hunting, and as such, it is
32 unlikely that large groups of people would be staying in the area within 300 feet of this proposed
33 transmission line, so any EMF exposure would be limited. Courtland Fire Station 92 would be within
34 300 feet of a temporary 69 kV transmission line. These temporary transmission lines would be
35 removed following completion of construction of the water conveyance facility features near this
36 area so there would be no potential permanent effects. The temporary transmission lines would be
37 removed when construction of the water conveyance facility features is completed, so there would
38 be no potential permanent effects. Therefore, these transmission lines would not substantially
39 increase people's exposure to EMFs. This impact is considered to be less than significant because
40 transmission lines would generally not be located in populated areas or within 300 feet of sensitive
41 receptors and CPUC's EMF design guidelines would be implemented for any new temporary or
42 permanent transmission lines constructed and operated under Alternative 4A. No mitigation is
43 required.

1 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing Environmental**
 2 **Commitments 3, 4, 7-10**

3 Effects of Alternative 4A related to the potential for increase in vector-borne diseases from
 4 implementing these Environmental Commitments would be similar to those described for
 5 Alternative 4. However, as described in Chapter 3, *Description of Alternatives*, Alternative 4A would
 6 restore up to 15,836 acres of habitat under Environmental Commitments 3, 4, and 7-10 as
 7 compared with approximately 83,800 acres under Alternative 4. Conservation Measures 2 and 5
 8 would not be implemented as part of this alternative. Therefore, the potential for vector-borne
 9 disease effects under Alternative 4A would likely be substantially less than the potential associated
 10 with Alternative 4.

11 **NEPA Effects:** Implementation of portions of Environmental Commitments 3, 4, and 7-10 under
 12 Alternative 4A would involve protecting and restoring aquatic habitat that could potentially increase
 13 suitable mosquito habitat within the study area. This potential effect would not be adverse because
 14 the total acreage of aquatic habitat restored under Alternative 4A would be substantially less than
 15 under Alternative 4, habitat creation would generally not be located near densely populated areas,
 16 and management plans under Environmental Commitment 11, *Natural Communities Enhancement*
 17 *and Management*, would be performed in consultation with the appropriate MVCs to ensure MMPs
 18 are implemented to reduce mosquito breeding. Additionally, BMPs from the guidelines outlined in
 19 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, would be incorporated into Alternative
 20 4A and executed to maintain proper water circulation and flooding during appropriate times of the
 21 year (e.g., fall) to prevent stagnant water and habitat for mosquitoes. This consultation would occur
 22 when specific restoration and enhancement projects and locations are identified.

23 **CEQA Conclusion:** The potential for impacts related to increases of vector-borne disease from
 24 mosquitos during construction, operation, and maintenance of portions of Environmental
 25 Commitment 3, 4, and 7-10 is considered less than significant because the total acreage of aquatic
 26 habitat restored under Alternative 4A would be substantially less than under Alternative 4, habitat
 27 creation would generally not be located near densely populated areas, and management plans under
 28 Environmental Commitment 11 *Natural Communities Enhancement and Management*, would be
 29 performed in consultation with the appropriate MVCs to ensure MMPs are implemented to reduce
 30 mosquito breeding. Additionally, BMPs from the guidelines outlined in Appendix 3B, *Environmental*
 31 *Commitments, AMMs, and CMs*, would be incorporated into Alternative 4A and executed to maintain
 32 proper water circulation and flooding during appropriate times of the year (e.g., fall) to prevent
 33 stagnant water and habitat for mosquitoes. No mitigation is required.

34 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
 35 **Implementing the Restoration Environmental Commitments**

36 Effects of Alternative 4A related to the potential for increase in recreationists' exposure to
 37 pathogens from implementing portions of the habitat restoration Environmental Commitments
 38 would be similar to those described for Alternative 4. However, as described in Chapter 3,
 39 *Description of Alternatives*, Alternative 4A would restore up to 15,836 acres of habitat under
 40 Environmental Commitments 3, 4, and 7-10 as compared with 83,800 acres under Alternative 4.
 41 Conservation Measures 2 and 5 would not be implemented as part of this alternative. Therefore, the
 42 potential for exposure of recreationists to pathogens under Alternative 4A would likely be
 43 substantially less than the potential associated with Alternative 4.

1 **NEPA Effects:** The study area currently supports habitat types, such as tidal habitat, upland
2 wetlands, and agricultural lands that produce pathogens as a result of the biological productivity in
3 these areas (e.g., migrating birds, application of fertilizers, waste products of animals). The study
4 area, with the exception of the CWA Section 303(d) listing for the Stockton Deep Water Ship
5 Channel, does not currently have pathogen concentrations that rise to the level of adversely
6 affecting beneficial uses of recreation. Specific locations of restoration areas for this alternative have
7 not yet been established. However, most low-lying land suitable for restoration is unsuitable for
8 livestock. Therefore, it is likely that the majority of land to be converted to wetlands would be crop-
9 based agriculture or fallow/idle land. However, as described for Alternative 4, any potential increase
10 in pathogens associated with the proposed habitat restoration and enhancement would be localized
11 and within the vicinity of the actual restoration. This localized increase is not expected to be of
12 sufficient magnitude and duration to result in adverse effects on recreationists because these areas
13 would generally not support livestock and most areas would not have public access.

14 **CEQA Conclusion:** The potential for an increase in recreationists' exposure to pathogens under
15 Alternative 4A is considered less than significant because of the reduced amount of restored habitat
16 conducive to pathogens that would be implemented under this alternative compared to Alternative
17 4 and the localized nature of pathogens (i.e., pathogen concentrations are greatly influenced by
18 proximity to the source), and because the rapid die-off of some types of pathogens in water would
19 not create sufficient magnitudes of pathogen generation that could affect recreational beneficial
20 uses. No mitigation is required.

21 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 22 **as a Result of Implementing Environmental Commitments 3, 4, and 10**

23 Effects of Alternative 4A related to the potential to mobilize contaminants known to bioaccumulate
24 (pesticides and methylmercury) from implementing portions of the restoration Environmental
25 Commitments would be similar to those described for Alternative 4. However, as described in
26 Chapter 3, *Description of Alternatives*, Alternative 4A would restore up to 14,467 acres of habitat
27 under Environmental Commitments 3, 4 and 10 as compared with 66,200 acres under Alternative 4
28 (CM4 and CM10). Therefore, the potential for mobilization of contaminants under Alternative 4A
29 would likely be substantially less than the potential associated with Alternative 4.

30 **NEPA Effects:** The primary concern with habitat restoration regarding constituents known to
31 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
32 inundated floodplains and marshes. The mobilization depends on the presence of the constituent
33 and the biogeochemical behavior of the constituent to determine whether it could re-enter the
34 water column or be reintroduced into the food chain. Habitat restoration under Alternative 4A may
35 occur on lands in the Delta formerly used for irrigated agriculture. The proposed habitat restoration
36 has the potential to increase water residence times and increase accumulation of organic sediments
37 that are known to enhance methylmercury bioaccumulation in biota in the vicinity of the restored
38 habitat areas. Environmental Commitment 12, which requires development of site-specific mercury
39 management plans as restoration actions are implemented, would guide the design of restoration
40 sites. This potential effect would not be adverse because the total tidal and nontidal habitat
41 restoration acreage implemented under Alternative 4A would be substantially less than under
42 Alternative 4; bioaccumulation of pesticides and/or methylmercury in the tidal and nontidal
43 restoration areas are not expected to substantially affect public health because of the limited extent
44 of restored habitat under Alternative 4A; the localized nature of pesticide bioaccumulation; and
45 because current OEHHA standards would continue to be implemented for the consumption of study

1 area fish and thus would serve to protect people against the overconsumption of fish with increased
 2 body burdens of mercury. Environmental Commitment 12, *Methylmercury Management*, would be
 3 implemented to reduce methylmercury production in restored habitats.

4 **CEQA Conclusion:** Although the potential for public health impacts related to mobilization of
 5 pesticides and methylmercury would be lower than under Alternative 4 because there would be
 6 fewer acres of habitat restored under Alternative 4A, relative to Existing Conditions, due to the small
 7 amount of tidal restoration areas proposed, in the Delta uptake of mercury from water and/or
 8 methylation of inorganic mercury may increase in localized areas as part of the creation of new,
 9 marshy, shallow, or organic-rich restoration areas. Water-borne mercury or methylmercury that
 10 could occur in some areas in the Delta could bioaccumulate to somewhat greater levels in aquatic
 11 organisms and would, in turn, pose potential health risks. However, design of restoration sites
 12 would be guided by Environmental Commitment 12, *Methylmercury Management*, which would
 13 require development of site-specific mercury management plans for implementation of restoration.
 14 Additionally, existing OEHHA standards would serve to reduce the public's exposure to
 15 contaminated fish. The potential for public health impacts related to mobilization of pesticides and
 16 methylmercury in habitat restoration areas related to Environmental Commitments 4 and 10 is
 17 considered less than significant because the total wetland restoration acreage implemented under
 18 Alternative 4A would be substantially less than under Alternative 4. Bioaccumulation of pesticides
 19 and/or methylmercury in the tidal and nontidal restoration areas are not expected to substantially
 20 affect public health because of the limited extent of restored habitat under Alternative 4A; the
 21 localized nature of pesticide bioaccumulation; and because current OEHHA standards would be
 22 enforced. Environmental Commitment 12, *Methylmercury Management*, would be implemented to
 23 reduce methylmercury production in restored habitats. No mitigation is required.

24 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 25 **Conveyance Facilities**

26 **NEPA Effects:** Any modified reservoir operations under Alternative 4A are not expected to promote
 27 *Microcystis* production upstream of the Delta relative to the No Action Alternative (ELT and LLT)
 28 since large reservoirs upstream of the Delta are typically low in nutrient concentrations and
 29 phytoplankton outcompete cyanobacteria, including *Microcystis*. Further, in the rivers and streams
 30 of the Sacramento River watershed, watersheds of the eastern tributaries (Cosumnes, Mokelumne,
 31 and Calaveras Rivers), and the San Joaquin River upstream of the Delta, bloom development would
 32 be limited by high water velocity and low hydraulic residence times. These conditions would not be
 33 expected to change under Alternative 4A relative to the No Action Alternative (ELT and LLT)

34 Conditions in the Export Service Areas with implementation of water supply operations under
 35 Alternative 4A are not expected to become more conducive to *Microcystis* bloom formation relative
 36 to the No Action Alternative (ELT and LLT) because the fraction of water flowing through the Delta
 37 that would reach the existing south Delta intakes is not expected to be adversely affected by
 38 *Microcystis* blooms.

39 Under Alternative 4A, a portion of the Sacramento River water which would be conveyed through
 40 the Delta to the south Delta intakes under the No Action Alternative (ELT and LLT) would be
 41 replaced at various locations throughout the Delta by other source water due to diversion of
 42 Sacramento River water at the north Delta intake. The change in flow paths of water through the
 43 Delta that would occur due to facilities operations and maintenance of Alternative 4A could result in
 44 localized increases in residence time in various Delta sub-regions, and decreases in residence time

1 in other areas. As indicated in Chapter 8, *Water Quality*, in addition to the effects of operations and
2 maintenance of Alternative 4A, increases in water residence times are expected occur due to
3 separate factors and actions concurrent with the alternative, including habitat restoration (8,000
4 acres of tidal habitat and enhancements to the Yolo Bypass) and sea level rise due to climate change.

5 Residence times in 19 Delta sub-regions during the *Microcystis* bloom season of July through
6 October was modeled for the Biological Assessment for the California WaterFix (ICF 2016). The
7 Proposed Action modeled in the Biological Assessment is Alternative 4A. Modeling results show
8 varying levels of change in residence time, depending on sub-region, month and water year type
9 (Tables 6.6-5 through 6.6-25 [ICF 2016]). The largest increases in residence time were modeled for
10 the sub-regions of Mildred Island, Holland Cut, Rock Slough and Discovery Bay, Old River, Middle
11 River and Victoria Canal, located in the south Delta and the middle to upper portions of the
12 west/central Delta. Depending on month (July through October) and water year type, modeled
13 residence times at some locations indicated substantial residence time changes could occur
14 compared to the No Action Alternative (ELT). As explained in Chapter 8, the changes in residence
15 time are driven by a number of factors accounted for in the modeling, including diversion of
16 Sacramento River water at the proposed north Delta intake facilities, which does not account for the
17 flexibility of operations of the north and south Delta intakes or real-time management of reservoir
18 releases.

19 Water flow through Delta channels would be managed through real-time operations to ensure
20 project operations do not create increased *Microcystis* blooms in the Delta. The north and south
21 Delta intakes would be operated with increased reliance on the south Delta pumps when Delta
22 channels exhibit conditions favorable to the formation of *Microcystis* blooms. By operating the south
23 Delta pumps more frequently during periods conducive to increased *Microcystis* blooms, residence
24 times would be substantially reduced from those modeled for Alternative 4A. Reducing residence
25 times would decrease the potential for blooms to develop, and thus decrease potential microcystin
26 increases due to project operations. As such, effects of Alternative 4A on *Microcystis* levels, and thus
27 microcystin concentrations in the Delta, would not be made more adverse relative to the No Action
28 Alternative (ELT and LLT).

29 **CEQA Conclusion:** Relative to Existing Conditions, operation of the water conveyance facilities under
30 Alternative 4A is not expected to promote *Microcystis* bloom formation in the reservoirs and
31 watersheds upstream of the Delta because large reservoirs upstream are typically low in nutrient
32 concentrations and phytoplankton outcompete cyanobacteria, including *Microcystis*, and high water
33 velocity and low hydraulic residence times in the upstream area limit the development of
34 *Microcystis* blooms.

35 Source waters to the south Delta intakes could be affected by *Microcystis* due to an increase in Delta
36 water temperatures associated with climate change and from an increase in water residence times.
37 The impacts from increased water residence times in the Delta would be mostly related to habitat
38 restoration, as well as to climate change and sea level rise. The combined effect of these factors on
39 increasing *Microcystis* in source waters to the south Delta intakes would likely be a greater influence
40 than that of Alternative 4A operations.

41 Increased frequency and magnitude of *Microcystis* blooms may occur in the Delta in the future,
42 relative to Existing Conditions, due to increased residence times resulting from restoration activities
43 unrelated to the project alternative, as well as climate change and sea level rise that are expected to
44 increase Delta water temperatures. Such increases in residence time and water temperatures would

1 not be caused by implementation of Alternative 4A. Operations and maintenance of Alternative 4A,
2 including the use of real-time operations, is not expected to result in flow and temperature
3 conditions in the Delta, including at the Banks and Jones pumping plants, that would cause
4 substantial increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms.

5 *Microcystis* and microcystins are not CWA Section 303(d) listed within the affected environment and
6 thus any increases that could occur in some areas of the Delta would not make any existing
7 *Microcystis* impairment measurably worse because no such impairments currently exist.
8 *Microcystis* is bioaccumulative in the Delta Foodweb (Lehman 2010). Thus, potential increases in
9 *Microcystis* occurrences due to climate change and sea level rise may lead to increased microcystin
10 presence in the Delta, relative to Existing Conditions. This has potential to cause microcystins to
11 bioaccumulate to greater levels in aquatic organisms that would, in turn, pose public health risks.
12 While long-term water quality degradation related to microcystin levels may occur and, thus,
13 impacts on beneficial uses could occur, these impacts are not related to implementation of
14 Alternative 4A. Although there is uncertainty regarding this impact, the effects on public health
15 related to *Microcystis* from implementing water conveyance facilities are determined to be less than
16 significant. No mitigation is required.

17 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing** 18 **Environmental Commitment 4**

19 **NEPA Effects:** Under Alternative 4A, Yolo Bypass Fisheries Enhancement would not occur, unlike
20 under Alternative 4. However, improvements in the Yolo Bypass, as well as restoration of 8,000
21 acres of tidal habitat in the ELT, would be implemented under a plan separate and distinct from
22 Alternative 4A under the No Action Alternative (see Chapter 3, *Description of Alternatives*). These
23 activities would create shallow backwater areas that could result in local warmer water and
24 increased water residence time of magnitude and extent that would result in measurable changes on
25 *Microcystis* levels in the Delta. Similar to Alternative 4 (under CM 4), there would be tidal habitat
26 restoration in the Delta under Alternative 4A with implementation of Environmental Commitment 4.
27 However, the 295 acres of tidal habitat restored under this alternative would be substantially fewer
28 than under Alternative 4. As discussed in Chapter 8, *Water Quality*, implementation of
29 Environmental Commitment 4 under Alternative 4A would have negligible effects in terms of the
30 potential for creating conditions conducive to *Microcystis* bloom in the Delta relative to what could
31 result from the development of 8,000 acres of tidal habitat and improvements in the Yolo Bypass in
32 the ELT. Therefore, implementation of Environmental Commitment 4 under Alternative 4A would
33 not be adverse because it would not increase *Microcystis* bloom formation.

34 **CEQA Conclusion:** Implementation of Environmental Commitment 4: Tidal Natural Communities
35 Restoration under Alternative 4A would result in 295 acres of tidal restoration within the Delta. This
36 would have a negligible effect on creating conditions conducive to *Microcystis* bloom formation,
37 particularly relative to the development of 8,000 acres of tidal habitat and improvements to the Yolo
38 Bypass in the ELT—activities separate and distinct from Alternative 4A. These activities would
39 create shallow backwater areas that could result in a measureable increase in water temperatures
40 and water residence times in the Delta, and therefore *Microcystis*, relative to Existing Conditions.
41 Thus, implementation of Environmental Commitment 4 under Alternative 4A would be less than
42 significant. No mitigation is required.

1 **25.3.4.3 Alternative 2D—Dual Conveyance with Modified**
 2 **Pipeline/Tunnel and Intakes 1, 2, 3, 4, and 5 (15,000 cfs;**
 3 **Operational Scenario B)**

4 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 5 **the Water Conveyance Facilities**

6 **NEPA Effects:** The potential for Alternative 2D construction and operation of the water conveyance
 7 facilities to increase vector-borne diseases would be similar to that for Alternative 4. Like
 8 Alternative 4, Alternative 2D will increase surface water within the study area at an intermediate
 9 forebay on Glannvale Tract, and at an expanded Clifton Court Forebay; however, unlike Alternative
 10 4, Alternative 2D has five intakes rather than three intakes (Intakes 2, 3, and 5). Therefore, there
 11 would be a greater number of sedimentation basins and solids lagoons under Alternative 2D relative
 12 to Alternative 4. These features could provide breeding habitat for mosquitos. However, as
 13 described for Alternative 4, the depth, design, and operation of the sedimentation basin and solids
 14 lagoons would prevent the development of suitable mosquito habitat. Specifically, the basins would
 15 be too deep and the constant movement/circulation of water would prevent mosquitoes from
 16 breeding and multiplying. It is unlikely that forebays would provide suitable breeding habitat for
 17 mosquitoes given that the water in the forebays would not be stagnant and would generally be too
 18 deep to support substantial mosquito habitat. Shallow edges of the forebays could provide some
 19 suitable mosquito breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed)
 20 were allowed to grow. However, as part of the regular maintenance of these forebay areas, floating
 21 vegetation such as pond weed would be harvested to maintain flow and forebay capacity. To further
 22 minimize the potential for impacts related to increasing suitable vector habitat within the study
 23 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 24 MVCs and prepare and implement MMPs, as necessary, to control mosquitoes and reduce the
 25 likelihood that construction and operation of the water conveyance facilities would require an
 26 increase in mosquito abatement activities by the local MVCs (Appendix 3B, *Environmental*
 27 *Commitments, AMMs, and CMs*). BMP activities would be consistent with the CDPH's *Best*
 28 *Management Practices for Mosquito Control in California* (California Department of Public Health
 29 2012). Accordingly, Alternative 2D would not substantially increase suitable vector habitat, and
 30 would not substantially increase vector-borne diseases. No adverse effects on public health would
 31 result because conditions for mosquito breeding at conveyance facilities would be minimized and
 32 standard practices to control mosquitos would be implemented.

33 **CEQA Conclusion:** The potential for construction and operation of conveyance facilities under
 34 Alternative 2D to result in an increase in exposure of people to vector-borne diseases would be
 35 similar in nature to the impacts described for Alternative 4. However, because Alternative 2D has 2
 36 more intakes and a greater number of associated sedimentation basins and solids lagoons than
 37 Alternative 4, there would be more surface water created under this alternative relative to
 38 Alternative 4. Alternative 2D conveyance facilities could create new and increased surface water
 39 areas (relative to baseline) at the intakes, intermediate forebay, and the expanded Clifton Court
 40 Forebay, and these areas have the potential to provide habitat for vectors that transmit diseases
 41 (e.g., mosquitoes) because of the large volumes of water that would be held there. However, during
 42 operations, the depth, design, and operation of conveyance facilities would prevent the development
 43 of suitable mosquito habitat. Specifically, the water bodies would be too deep to provide suitable
 44 mosquito habitat, and the constant movement of water would prevent mosquitoes from breeding
 45 and multiplying. To minimize the potential for impacts related to increasing suitable vector habitat

1 within the study area, DWR would consult and coordinate with San Joaquin County and Sacramento-
 2 Yolo County MVEDs and prepare and implement MMPs. BMPs to be implemented as part of the
 3 MMPs would help control mosquitoes during construction and operation of the sedimentation
 4 basins, solids lagoons, the expanded Clifton Court Forebay, the intermediate forebay, and the
 5 intermediate forebay inundation area. These BMPs would be consistent with practices presented in
 6 *Best Management Practices for Mosquito Control in California* (California Department of Public
 7 Health 2012). Therefore, construction and operation of Alternative 2D would not result in a
 8 substantial increase in vector-borne diseases in the study area. This impact is considered to be less
 9 than significant because conditions for mosquito breeding at conveyance facilities would be
 10 minimized and standard practices to control mosquitos would be implemented. No mitigation is
 11 required.

12 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 13 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 14 **Facilities**

15 *NEPA Effects:*

16 **Disinfection Byproducts**

17 The geographic extent of effects related to long-term average DOC concentrations within Delta
 18 waters with water supply operations under Alternative 2D would be less extensive than Alternative
 19 4 and the magnitude of predicted long-term change and relative frequency of DOC concentration
 20 exceedances would be lower than Alternative 4. Relative to the No Action Alternative (ELT),
 21 Alternative 2D would result in small increases in long-term average DOC concentrations for the
 22 modeled 16-year period and drought period at the South Fork Mokelumne River at Staten Island,
 23 Franks Tract, Old River at Rock Slough, and Contra Costa Pumping Plant #1. The increases in
 24 average DOC concentrations would correspond to more frequent concentration threshold
 25 exceedances, with the greatest change occurring at Contra Costa Pumping Plant #1 associated with
 26 the 0.3 mg/L threshold, as discussed in Chapter 8, *Water Quality*.

27 While Alternative 2D would lead to slightly higher long-term average DOC concentrations at some
 28 municipal water intakes and Delta interior locations, the predicted change would not be expected to
 29 adversely affect MUN beneficial uses, or any other beneficial use. The change in frequency of
 30 threshold concentration exceedances at other assessment locations would be similar or lower. In
 31 general, substantial change in ambient DOC concentrations would need to occur before significant
 32 changes in drinking water treatment plant design or operations are triggered. The increases in long-
 33 term average DOC concentrations estimated to occur at various Delta locations under Alternative 2D
 34 are of sufficiently small magnitude that they would not require existing drinking water treatment
 35 plants to substantially upgrade treatment for DOC removal above levels currently employed.

36 In the LLT, the primary difference will be changes in the Delta source water fractions due to
 37 hydrologic effects from climate change and higher water demands. These effects would occur
 38 regardless of the implementation of the alternative and, thus, at the LLT the effects of the alternative
 39 on DOC are expected to be similar to those described above. Therefore, changes in DOC
 40 concentrations in the Delta resulting from operation of the water conveyance facilities under
 41 Alternative 2D are not anticipated to contribute to increases in disinfection byproducts (DBPs).

42 As described in Chapter 8, *Water Quality*, operations and maintenance of the water conveyance
 43 facilities under Alternative 2D, relative to the No Action Alternative (ELT and LLT), would result in

1 increases in long-term average bromide concentrations in the South Fork Mokelumne River at
2 Staten Island, North Bay Aqueduct at Barker Slough, and San Joaquin River at Buckley Cove; long-
3 term average bromide concentrations at the other assessment locations would be the same or
4 decrease. However, at South Fork Mokelumne River at Staten Island, Franks Tract, Old River at Rock
5 Slough, Sacramento River at Emmaton, San Joaquin River at Antioch, Sacramento River at Mallard
6 Island, and North Bay Aqueduct at Barker Slough there would be an increased frequency of
7 exceedance of the 50 µg/L and 100 µg/L bromide threshold (for protecting against the formation of
8 DBPs in treated drinking water. As described for Alternative 4, the use of seasonal intakes at Antioch
9 and Mallard Slough is largely driven by acceptable water quality, and thus has historically been
10 opportunistic. Opportunity to use these intakes would remain, and the predicted increases in
11 bromide concentrations at Antioch and Mallard Slough would not be expected to adversely affect
12 MUN beneficial uses, or any other beneficial use, at these locations. These changes in bromide
13 concentrations are not expected to result in adverse effects to any beneficial uses at these locations
14 and, therefore, changes in bromide concentrations in the Delta resulting from operation of the water
15 conveyance facilities under Alternative 2D are not anticipated to contribute to increases in DBPs.

16 **Trace Metals**

17 The changes in modeled trace metal concentrations of primarily human health and drinking water
18 concern (arsenic, iron, manganese) in the Delta under Alternative 2D would be similar to those
19 described for Alternative 4A because the factors that would affect trace metal concentrations in
20 Delta waters would be the same in the ELT and LLT. Alternative 2D would not result in substantial
21 increases in trace metal concentrations in the water exported from the Delta or diverted from the
22 Sacramento River through the proposed conveyance facilities. No mixing of Delta source waters
23 could result in a metal concentration greater than the highest source water concentration, and given
24 that the average water concentrations for arsenic, iron, and manganese do not exceed water quality
25 criteria, more frequent exceedances of drinking water criteria in the Delta would not be expected to
26 occur.

27 In the LLT, the primary difference will be changes in the Delta source water fractions due to
28 hydrologic effects from climate change and sea level rise. These effects would occur regardless of the
29 implementation of the alternative and, thus, at the LLT the effects of the alternative on trace metals
30 are expected to be similar to those described above.

31 The arsenic criterion was established to protect human health from the effects of long-term chronic
32 exposure, while secondary MCLs for iron and manganese were established as reasonable federal
33 regulatory goals for drinking water quality, and enforceable standards in California. Average
34 concentrations for arsenic, iron, and manganese in the primary source water (Sacramento River, San
35 Joaquin River, and the bay at Martinez) are below these criteria. No mixing of these three source
36 waters could result in a metal concentration greater than the highest source water concentration,
37 and, given that the modeled average water concentrations for arsenic, iron, and manganese do not
38 exceed water quality criteria, more frequent exceedances of drinking water criteria in the Delta
39 would not be an expected result under this alternative. Accordingly, no adverse effect on public
40 health related to the trace metals arsenic, iron, or manganese from drinking water sources is
41 anticipated.

42 **Pesticides**

43 The changes in modeled pesticide concentrations in the Delta under Alternative 2D would be similar
44 to those described for Alternative 4. The average winter and summer flow rates, relative to the No

1 Action Alternative (ELT) are expected to be similar to or less than changes in flow rates under
2 Alternative 4 in the Sacramento River at Freeport, American River at Nimbus, Feather River at
3 Thermalito and the San Joaquin River at Vernalis. The main factor influencing pesticide
4 concentrations in Delta waters (i.e., changes in San Joaquin River, Sacramento River and Delta
5 agriculture source water fractions at various Delta locations) is expected to change by a similar
6 degree. As described in Chapter 84, *Water Quality*, the percent change in monthly average source
7 water fractions under Alternative 2D would be similar to changes expected under Alternative 4.
8 Modeled changes in the source water fractions of Sacramento River, San Joaquin River, and Delta
9 agriculture water under Alternative 2D would not be of sufficient magnitude to substantially alter
10 beneficial uses of the Delta. Therefore, it is not anticipated that there would be adverse effects on
11 public health related to pesticides from drinking water sources.

12 The flow changes in the LLT would be expected in the ranges similar to those in the ELT relative to
13 the No Action Alternative (ELT), and to that described for Alternative 4 relative to the No Action
14 Alternative (LLT). Accordingly, the flow changes that would occur in the LLT under Alternative 2D,
15 relative to the No Action Alternative (LLT), would not be expected to result in changes in dilution of
16 pesticides of sufficient magnitude to adversely affect beneficial uses in the Delta.

17 Because there would be no increases in DBPs due to increases in bromide or DOC in Delta surface
18 waters, and because the modeled changes in trace metals and pesticide concentrations would not
19 increase substantially in magnitude or frequency in the Delta under Alternative 2D relative to the No
20 Action Alternative (ELT and LLT), there would be no adverse effect on public health as a result of
21 operation of the water conveyance facilities.

22 **CEQA Conclusion:** Under Alternative 2D, modeled long-term average pesticide levels in the Delta
23 would be similar to or slightly less than that described under Alternative 4 and would not be expected to
24 increase substantially, relative to Existing Conditions, such that beneficial use impairments are
25 made measurably worse. Long-term average bromide concentrations would increase in the South
26 Fork Mokelumne River at Staten Island and decrease at all other assessment locations relative to
27 Existing Conditions. The long-term bromide concentration in the South Fork Mokelumne River at
28 Staten Island would be less than the 100 µg/L believed to be sufficient to meet currently established
29 drinking water criteria for disinfection byproducts. There would be an increased frequency of
30 exceedance of the 50 µg/L and 100 µg/L bromide thresholds for protecting against the formation of
31 DBPs in treated drinking water at the South Fork Mokelumne River at Staten Island, Franks Tract,
32 Old River at Rock Slough, Sacramento River at Emmaton, San Joaquin River at Antioch, and
33 Sacramento River at Mallard Island. The North Bay Aqueduct at Barker Slough would have an
34 increased exceedance of the 100 µg/L threshold. The effects of Alternative 2D in the LLT in the Delta
35 relative to Existing Conditions would be expected to be similar. There may be higher bromide
36 concentrations in the LLT in the western Delta, but this would be associated with sea level rise, not
37 the project alternative, because the primary source of bromide to the Delta is sea water intrusion.
38 The use of seasonal intakes at Antioch and Mallard Island is largely driven by acceptable water
39 quality, and therefore has historically been opportunistic, and the opportunity to use these intakes
40 would remain. Thus, the increased bromide concentrations would not be expected to adversely
41 affect municipal beneficial uses, or any other beneficial use, at these locations, and therefore would
42 not be expected to contribute substantially to DBP formation. Operations and maintenance activities
43 under Alternative 2D would not cause a substantial long-term change in DOC concentrations in the
44 Delta, although there would be relatively small increases in long-term average DOC concentrations
45 at some interior Delta locations. However, the increases are of sufficiently small magnitude that they
46 would not require existing drinking water treatment plants to substantially upgrade treatment for

1 DOC above levels currently employed, and therefore these increases would not be expected to
2 contribute substantially to DBP formation. Further, there would be predicted improvements in long-
3 term average DOC concentrations at Barker Slough relative to Existing Conditions. Average
4 concentrations of trace metals are not expected to increase substantially under Alternative 2D in the
5 primary source water. Therefore, this alternative is not expected to cause additional exceedances of
6 applicable water quality objectives by frequency, magnitude, and geographic extent that would
7 cause significant impacts on any beneficial uses of waters in the affected environment.

8 Because there would be no increases in DBPs due to increases in bromide or DOC in Delta surface
9 waters, and because the modeled changes in trace metals and pesticide concentrations would not
10 increase substantially in magnitude or frequency in the Delta with implementation of water supply
11 operations under Alternative 2D relative to Existing Conditions, there would be no significant
12 impact on public health as a result of operation of the water conveyance facilities. No mitigation is
13 required.

14 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 15 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

16 *NEPA Effects:* As described in Chapter 8, *Water Quality*, modeling scenarios included assumptions
17 regarding how certain habitat restoration activities would affect Delta hydrodynamics. The amount
18 of habitat restoration completed under Alternative 2D would be substantially less than under
19 Alternative 4. To the extent that restoration actions would alter hydrodynamics within the Delta
20 region, which affects mixing of source waters, these effects are included in this assessment of water
21 quality changes due to water conveyance facilities operations and maintenance.

22 Five intakes would be constructed and operated under Alternative 2D. Sediment-disturbing
23 activities during construction and maintenance of these intakes and other water conveyance
24 facilities proposed near or in surface waters under this alternative could result in the disturbance of
25 existing constituents in sediment, such as pesticides or methylmercury. In-channel construction
26 activities, such as pile driving during the construction of cofferdams at the intakes and pier
27 construction at the barge unloading facilities, which would occur over a period of 5 months, would
28 result in the localized disturbance of river sediment. In addition, maintenance of the five proposed
29 north Delta intakes and the intermediate forebay would entail periodic dredging for sediment
30 removal at these locations. Sediment accumulation in both the northern and southern portion of the
31 expanded Clifton Court Forebay is expected to be minimal in the ELT period as the need for dredging
32 is anticipated to be every 50 years given the design. However, it is anticipated that there may be
33 some sediment accumulation at the inlet structure of the northern portion of Clifton Court Forebay.
34 Therefore, while overall sediment accumulation in this forebay is not expected to be substantial,
35 some dredging may be required at the inlet structure to maintain an even flow path.

36 **Pesticides**

37 Legacy pesticides, such as organochlorines, have low water solubility; they do not readily volatilize
38 and have a tendency to bond to particulates (e.g., soil and sediment), settle out into the sediment,
39 and not be transported far from the source. If present in sediment within in-water construction
40 areas, legacy pesticides would be disturbed locally and would not be expected to partition into the
41 water column to any substantial degree. Therefore, no significant adverse effect on public health
42 would result from construction.

1 Numerous pesticides are currently used throughout the affected environment. While some of these
 2 pesticides may be bioaccumulative, those present-use pesticides for which there is sufficient
 3 evidence of their presence in waters affected by SWP and CVP operations (i.e., organophosphate
 4 pesticides, such as diazinon, chlorpyrifos, diuron, and pyrethroids) are not considered
 5 bioaccumulative. Thus, changes in their concentrations would not directly cause bioaccumulative
 6 problems in aquatic life or humans. The effects of Alternative 2D on pesticide levels in surface
 7 waters upstream of the Delta, in the Delta, and in the SWP/CVP Export Service Areas relative to
 8 Existing Conditions and the No Action Alternative (ELT) would be similar to or slightly less than
 9 those described for the Alternative 4. Alternative 2D would not result in increased tributary flows
 10 that would mobilize organochlorine pesticides in sediments. Thus, the change in source water in the
 11 Delta associated with the change in water supply operations is not expected to adversely affect
 12 public health with respect to bioaccumulation of pesticides.

13 **Methylmercury**

14 If mercury is sequestered in sediments at water facility construction sites, it could become
 15 suspended in the water column during construction activities, opening up a new pathway into the
 16 food chain. Construction activities (e.g., pile driving and cofferdam installation) at intake sites or
 17 barge landing locations would result in a localized, short-term resuspension of sediment and an
 18 increase in turbidity that may contain elemental or methylated forms of mercury. Please see Chapter
 19 8, Section 8.1.3.9, *Mercury*, for a discussion of methylmercury concentrations in sediments.

20 Changes in methylmercury concentrations under Alternative 2D are expected to be small. As
 21 described in Chapter 8, *Water Quality*, the greatest annual average methylmercury concentration for
 22 drought conditions under Alternative 2D would be 0.166 ng/L for the San Joaquin River at Buckley
 23 Cove, which would be slightly lower than the No Action Alternative (ELT) (0.168 ng/L). Fish tissue
 24 estimates show only small or no increases for mercury concentrations relative to the No Action
 25 Alternative (ELT) based on long-term annual average concentrations in the Delta. Mercury
 26 concentrations in fish tissue expected for Alternative 2D (with Equation 1—see Chapter 8, *Water*
 27 *Quality*, Section 8.3.1 for details), show increases of 7 percent or less, relative to the No Action
 28 Alternative (ELT), in all modeled years. Mercury concentrations in fish tissue expected for
 29 Alternative 2D (with Equation 2—see Chapter 8, *Water Quality*, Section 8.3.1 for details), are
 30 estimated to increase of 10 percent or less relative to the No Action Alternative (ELT), in all modeled
 31 years. Because these increases are relatively small, and because it is not apparent that substantive
 32 increases are expected throughout the Delta, these estimated changes in mercury concentrations in
 33 fish tissue under Alternative 2D are expected to be within the uncertainty inherent in the modeling
 34 approach and would not likely be measureable in the environment. See Appendix 8I, *Mercury*, for a
 35 discussion of the uncertainty associated with fish tissue estimates of mercury. Therefore, modeled
 36 changes in mercury in the Delta and in fish tissues due to operation of Alternative 2D would not be
 37 expected to adversely affect public health.

38 In summary, operation of the water conveyance facilities under Alternative 2D would not alter
 39 bioaccumulative pesticide concentrations or mercury concentrations in the Delta such that there
 40 would be an effect on public health. As such, there would be no adverse effect.

41 **CEQA Conclusion:** Relative to Existing Conditions, operation of the water conveyance facilities under
 42 Alternative 2D is not expected to cause additional exceedance of applicable water quality
 43 objectives/criteria by frequency, magnitude, and geographic extent that would cause adverse effects
 44 on any beneficial uses of waters in the affected environment. Because mercury concentrations are

1 not expected to increase substantially relative to the Existing Conditions, no long-term water quality
 2 degradation is expected to occur and, thus, no adverse effects to beneficial uses would occur. As
 3 described in Chapter 8, *Water Quality*, concentrations of mercury in fish tissue using Equation 1
 4 under Alternative 2D, would increase 7 percent or less in all years relative to the Existing
 5 Conditions. Using Equation 2, there would be increases from 10 percent or less relative to Existing
 6 Conditions in all years. Because these increases are relatively small, and because it is not apparent
 7 that substantive increases are expected throughout the Delta, these estimated changes in mercury
 8 concentrations in fish tissue under Alternative 2D are expected to be within the uncertainty
 9 inherent in the modeling approach and would not likely be measureable in the environment.
 10 Construction activities (e.g., pile driving and cofferdam installation) at intake sites or barge landing
 11 locations would result in a localized, short-term resuspension of sediment and an increase in
 12 turbidity that may contain elemental or methylated forms of mercury.

13 The effects of Alternative 2D on bioaccumulative pesticide levels in the Delta would be similar to or
 14 slightly less than those described for the Alternative 4. Alternative 2D would not result in increased
 15 tributary flows that would mobilize organochlorine pesticides in sediments. Thus, the change in
 16 source water in the Delta associated with the change in water supply operations is not expected to
 17 adversely affect public health with respect to bioaccumulation of pesticides. If present in sediment
 18 within in-water construction areas, legacy pesticides would be disturbed locally and would not be
 19 expected to partition into the water column to any substantial degree.

20 For these reasons, there would be no significant impact on public health due to mercury or
 21 bioaccumulative pesticides as a result of construction of or operation of the water conveyance
 22 facilities under Alternative 2D. No mitigation is required.

23 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 24 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 25 **Facilities**

26 **NEPA Effects:** The potential for Alternative 2D transmission line construction and operation to
 27 expose people to new sources of EMFs would be similar to Alternative 4, although there would be
 28 nearly 5 miles of new permanent 69 kV transmission line under this alternative, whereas there
 29 would be no new permanent 69 kV transmission line under Alternative 4. As described in Table 25-
 30 9, a total of 4.97 miles of new permanent 69 kV transmission lines; 3.13 miles of new temporary 69
 31 kV transmission lines; 14.96 miles of new permanent 230 kV transmission lines; 18.72 miles of new
 32 temporary 230 kV transmission line; 1.00 mile of new permanent 230 kV/34.5 kV (underbuild)
 33 transmission lines; 11.28 miles of new permanent 230 kV/34.5 kV (underbuild) transmission lines;
 34 and the relocation of 1.19 miles of existing 500 kV transmission line would be required for this
 35 alternative. As described for Alternative 4, this effect would not be adverse because transmission
 36 lines would generally not be located in populated areas or within 300 feet of sensitive receptors and
 37 CPUC's EMF design guidelines would be implemented for any new temporary or new permanent
 38 transmission lines constructed and operated under Alternative 2D.

39 **CEQA Conclusion:** The potential for Alternative 2D transmission line construction and operation to
 40 expose people to new sources of EMFs would be somewhat larger relative to Alternative 4 because
 41 there would be more facilities requiring power (i.e., intakes) under Alternative 2D. Under this
 42 alternative the majority of proposed new temporary (69 kV and 230 kV) and new permanent (69 kV,
 43 230 kV, and 230 kV/34.5 kV) transmission lines would be located within the rights-of-way of
 44 existing transmission lines; any new temporary or permanent transmission lines not within the

1 right-of-way of existing transmission lines would, for the most part, be located in sparsely populated
2 areas generally away from existing sensitive receptors. None of the proposed temporary or
3 permanent transmission lines would be within 300 feet of sensitive receptors. Further, the
4 temporary transmission lines would be removed when construction of the water conveyance facility
5 features is completed, so there would be no potential permanent effects. Therefore, these
6 transmission lines would not substantially increase people's exposure to EMFs. This impact is
7 considered to be less than significant because transmission lines would generally not be located in
8 populated areas or within 300 feet of sensitive receptors and CPUC's EMF design guidelines would
9 be implemented for any new temporary or permanent transmission lines constructed and operated
10 under Alternative 2D. No mitigation is required.

11 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing Environmental**
12 **Commitments 3, 4, 7, and 10**

13 Effects of Alternative 2D related to the potential for increase in vector-borne diseases from
14 implementing Environmental Commitments 3, 4, 7, and 10 would be slightly greater than described
15 for Alternative 4A. As described in Chapter 3, *Description of Alternatives*, Alternative 2D would
16 restore more habitat under these Environmental Commitments relative to Alternative 4A and,
17 therefore, the potential for vector-borne disease effects under Alternative 2D would likely be greater
18 than the potential associated with Alternative 4A.

19 **NEPA Effects:** Implementation of portions of Environmental Commitments 3, 4, 7 and 10 under
20 Alternative 2D would involve protecting and restoring wetland and other surface water habitat that
21 could potentially increase suitable mosquito habitat within the study area. This potential effect
22 would not be adverse because the total restoration acreage of these types of habitat implemented
23 under Alternative 2D would generally not be located near densely populated areas, and
24 management plans under Environmental Commitment 11: Natural Communities Enhancement and
25 Management would be implemented in consultation with the appropriate MVCDs to ensure MMPs
26 are implemented to reduce mosquito breeding. Additionally, BMPs from the guidelines outlined in
27 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, would be incorporated into Alternative
28 2D and executed to maintain proper water circulation and flooding during appropriate times of the
29 year (e.g., fall) to prevent stagnant water and habitat for mosquitoes. This consultation would occur
30 when specific restoration and enhancement projects and locations are identified.

31 **CEQA Conclusion:** The potential for impacts related to increases of vector-borne disease from
32 mosquitos during construction, operation, and maintenance of portions of Environmental
33 Commitment 3, 4, 7 and 10 under Alternative 2D is considered less than significant because the total
34 restoration acreage of wetland and other surface water areas implemented under this alternative
35 would generally not be located near densely populated areas, and management plans under
36 Environmental Commitment 11: Natural Communities Enhancement and Management would be
37 implemented in consultation with the appropriate MVCDs to ensure MMPs are implemented to
38 reduce mosquito breeding. Additionally, BMPs from the guidelines outlined in Appendix 3B,
39 *Environmental Commitments, AMMs, and CMs*, would be incorporated and executed to maintain
40 proper water circulation and flooding during appropriate times of the year (e.g., fall) to prevent
41 stagnant water and habitat for mosquitoes. No mitigation is required.

1 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of**
2 **Implementing the Restoration Environmental Commitments**

3 Effects of Alternative 2D related to the potential for increase in recreationists' exposure to
4 pathogens from implementing portions of the restoration Environmental Commitments would be
5 slightly greater than those described for Alternative 4A. As described in Chapter 3, *Description of*
6 *Alternatives*, Alternative 2D would restore more acres of habitat under Environmental Commitments
7 3, 4, 6, 7, and 9–11 relative to Alternative 4A.

8 **NEPA Effects:** The study area currently supports habitat types, such as tidal habitat, upland
9 wetlands, and agricultural lands that produce pathogens as a result of the biological productivity in
10 these areas (e.g., migrating birds, application of fertilizers, waste products of animals). The study
11 area does not currently have pathogen concentrations that rise to the level of adversely affecting
12 beneficial uses of recreation. However, any potential increase in pathogens associated with the
13 proposed habitat restoration and enhancement Environmental Commitments under Alternative 2D
14 would be localized and within the vicinity of the actual restoration. This localized increase is not
15 expected to be of sufficient magnitude and duration to result in adverse effects on recreationists
16 because these areas would generally not support livestock and most areas would not have public
17 access.

18 **CEQA Conclusion:** The potential for an increase in recreationists' exposure to pathogens under
19 Alternative 2D is considered less than significant because of the localized nature of pathogens and
20 because the rapid die-off of some types of pathogens in water would not create sufficient
21 magnitudes of pathogen generation that could affect recreational beneficial uses. No mitigation is
22 required.

23 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
24 **as a Result of Implementing Environmental Commitments 3, 4, and 10**

25 Effects of Alternative 2D related to the potential to mobilize contaminants known to bioaccumulate
26 (pesticides and methylmercury) from implementing portions of the restoration Environmental
27 Commitments would be slightly greater than those described for Alternative 4A. As described in
28 Chapter 3, *Description of Alternatives*, Alternative 2D would restore more habitat under
29 Environmental Commitments 3, 4 and 10 relative to Alternative 4A. Therefore, the potential for
30 mobilization of contaminants under Alternative 2D would likely be greater than the potential
31 associated with Alternative 4A.

32 **NEPA Effects:** The primary concern with habitat restoration regarding constituents known to
33 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
34 inundated floodplains and marshes. The mobilization depends on the presence of the constituent
35 and the biogeochemical behavior of the constituent to determine whether it could re-enter the
36 water column or be reintroduced into the food chain. This potential effect would not be adverse
37 because the total tidal and nontidal habitat restoration acreage implemented under Alternative 2D
38 would be relatively small, bioaccumulation of pesticides and/or methylmercury in these restoration
39 areas is not expected to substantially affect public health because of the limited extent of this type of
40 restored habitat under Alternative 2D, the localized nature of pesticide bioaccumulation, and
41 because current OEHHA standards would be enforced. Environmental Commitment 12:
42 Methylmercury Management would be implemented to reduce methylmercury production in
43 restored habitats.

1 **CEQA Conclusion:** The potential for public health impacts related to mobilization of pesticides and
 2 methylmercury in habitat restoration areas related to Environmental Commitments 3, 4, and 10 is
 3 considered less than significant because the total tidal and nontidal restoration acreage
 4 implemented under Alternative 2D would be relatively small, bioaccumulation of pesticides and/or
 5 methylmercury in the these restoration areas is not expected to substantially affect public health
 6 because of the limited extent of restored habitat under Alternative 2D, the localized nature of
 7 pesticide bioaccumulation, and because current OEHHA standards would be enforced.
 8 Environmental Commitment 12: Methylmercury Management would be implemented to reduce
 9 methylmercury production in restored habitats. No mitigation is required.

10 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water**
 11 **Conveyance Facilities**

12 **NEPA Effects:** Any modified reservoir operations under Alternative 2D are not expected to promote
 13 *Microcystis* production upstream of the Delta relative to the No Action Alternative (ELT and LLT)
 14 since large reservoirs upstream of the Delta are typically low in nutrient concentrations, as
 15 described in Chapter 8, *Water Quality*. Further, in the rivers and streams of the Sacramento River
 16 watershed, watersheds of the eastern tributaries (Cosumnes, Mokelumne, and Calaveras Rivers),
 17 and the San Joaquin River upstream of the Delta, bloom development would be limited by high
 18 water velocity and low hydraulic residence times. These conditions would not be expected to change
 19 under Alternative 2D relative to the No Action Alternative (ELT and LLT)

20 With implementation of water supply operations under Alternative 2D, conditions in the Export
 21 Service Areas are not expected to become more conducive to *Microcystis* bloom formation relative to
 22 the No Action Alternative (ELT and LLT) because the fraction of water flowing through the Delta
 23 that would reach the existing south Delta intakes is not expected to be adversely affected by
 24 *Microcystis* blooms.

25 Operation of the water conveyance facilities under Alternative 2D could alter the source water flow
 26 paths through the Delta relative to the No Action Alternative (ELT and LLT), and this could result in
 27 localized increases in residence time in various Delta sub-regions, and decreases in residence time
 28 in other areas. Although there is uncertainty, because the only difference between operations and
 29 maintenance of Alternative 2D and the No Action Alternative is changes in flow paths and source
 30 water fractions in the Delta, water supply operations under Alternative 2D are not expected to
 31 increase water residence times or ambient water temperatures throughout the Delta, including
 32 Banks and Jones pumping plants, relative to the No Action Alternative (ELT and LLT), and therefore
 33 Delta waters are not expected to be adversely affected by *Microcystis* blooms.

34 **CEQA Conclusion:** Relative to Existing Conditions, operation of the water conveyance facilities under
 35 Alternative 2D is not expected to promote *Microcystis* bloom formation in the reservoirs and
 36 watersheds upstream of the Delta because large reservoirs upstream are typically low in nutrient
 37 concentrations, and high water velocity and low hydraulic residence times in the upstream area
 38 limit the development of *Microcystis* blooms.

39 Source waters to the south Delta intakes could be adversely affected relative to Existing Conditions
 40 by *Microcystis* both from an increase in Delta water temperatures associated with climate change
 41 and from an increase in water residence times. The impacts from increased water residence times in
 42 the Delta would be mostly related to tidal habitat restoration and improvements to the Yolo Bypass,
 43 which are assumed to occur separate from Alternative 2D, as well as to climate change and sea level
 44 rise. The combined effect of these factors on increasing *Microcystis* in source waters to the south

1 Delta intakes would likely be a greater influence than that of Alternative 2D operations. Increases in
 2 ambient air temperatures due to climate change relative to Existing Conditions are expected under
 3 this alternative. Increases in ambient air temperatures are expected to result in warmer ambient
 4 water temperatures, and thus conditions more suitable to *Microcystis* growth, in the water bodies of
 5 the SWP/CVP Export Service Areas.

6 Water supply operations under Alternative 2D could result in localized increases in Delta residence
 7 times in some locations and decreased residence times in other Delta locations. As indicated in
 8 Chapter 8, *Water Quality*, there is substantial uncertainty regarding the extent that Alternative 2D
 9 operations and maintenance would result in a net increase in water residence times relative to
 10 Existing Conditions. Regardless of this uncertainty, it is likely that these potential effects under
 11 Alternative 2D would be relatively small compared to the combined effects of tidal habitat
 12 restoration and Yolo Bypass improvements unrelated to Alternative 2D, and sea level rise and
 13 climate change. Climate change in the ELT is expected to result in a 1.3-2.5°F increase in ambient
 14 Delta water temperatures relative to Existing Conditions. The combined effects of restoration
 15 activities unrelated to Alternative 2D, climate change, and sea level rise on increased water
 16 residence time, as well as the effects of climate change on Delta water temperatures, it is possible
 17 that *Microcystis* blooms in the Delta would increase in frequency, magnitude, and geographic extent,
 18 relative to Existing Conditions. However, although there is considerable uncertainty regarding this
 19 impact, the effects on *Microcystis* due to operations under Alternative 2D would be less than
 20 significant. No mitigation is required.

21 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing** 22 **Environmental Commitment 4**

23 Effects related to *Microcystis* from implementation of Environmental Commitment 4 under
 24 Alternative 2D would be similar to those described for Alternative 4A because the acreages of tidal
 25 natural communities restored under this alternative (300 acres) is nearly the same compared to
 26 Alternative 4A (295 acres). However, there would be substantially fewer acres of tidal natural
 27 communities restored under Alternative 2D relative to Alternative 4 (65,000 acres).

28 **NEPA Effects:** Under Alternative 2D, Yolo Bypass Fisheries Enhancement would not occur, unlike
 29 under Alternative 4. However, improvements in the Yolo Bypass, as well as restoration of 8,000
 30 acres of tidal habitat, would be implemented under a plan separate and distinct from Alternative 2D
 31 (see Chapter 3, *Description of Alternatives*). These activities are assumed to occur under both
 32 Alternative 2D and the No Action Alternative. Similar to Alternative 4 (under CM 4), there would be
 33 tidal habitat restoration in the Delta under Alternative 2D with implementation of Environmental
 34 Commitment 4: Tidal Natural Communities Restoration. However, the 300 acres of tidal habitat
 35 restored under this alternative would be substantially fewer than under Alternative 4 (65,000
 36 acres). As discussed in Chapter 8, *Water Quality*, implementation of Environmental Commitment 4
 37 under Alternative 2D would have negligible effects in terms of the potential for creating conditions
 38 conducive to *Microcystis* bloom in the Delta relative to what could result from the development of
 39 8,000 acres of tidal habitat and improvements in the Yolo Bypass in the ELT, which could increase
 40 water temperatures and hydraulic residence times relative to the No Action Alternative (LLT).
 41 Therefore, implementation of Environmental Commitment 4 under Alternative 2D would not be
 42 adverse because it would not increase *Microcystis* bloom formation.

43 **CEQA Conclusion:** Implementation of Environmental Commitment 4: Tidal Natural Communities
 44 Restoration under Alternative 2D would result in 300 acres of tidal restoration within the Delta. This

1 would have a negligible effect on creating conditions conducive to *Microcystis* bloom formation,
 2 particularly relative to the development of 8,000 acres of tidal habitat and improvements to the Yolo
 3 Bypass in the ELT—activities separate and distinct from Alternative 2D. These activities would
 4 create shallow backwater areas that could result in a measureable increase in water temperatures
 5 and water residence times in the Delta, and therefore *Microcystis*, relative to Existing Conditions.
 6 Thus, implementation of Environmental Commitment 4 under Alternative 2D would be less than
 7 significant. No mitigation is required.

8 **25.3.4.4 Alternative 5A—Dual Conveyance with Modified** 9 **Pipeline/Tunnel and Intake 2 (3,000 cfs; Operational Scenario C)**

10 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 11 **the Water Conveyance Facilities**

12 **NEPA Effects:** The potential for Alternative 5A construction and operation to increase vector-borne
 13 diseases would be similar to that for Alternative 4. Like Alternative 4, Alternative 5A will increase
 14 surface water within the study area at an intermediate forebay on Glannvale Tract, and at an
 15 expanded Clifton Court Forebay; however, unlike Alternative 4, Alternative 5A has only one intake
 16 (Intake 2) rather than three intakes (Intakes 2, 3, and 5). Therefore, there would be fewer
 17 sedimentation basins and solids lagoons under Alternative 5A relative to Alternative 4. As described
 18 for Alternative 4, the depth, design, and operation of the sedimentation basin and solids lagoons
 19 would prevent the development of suitable mosquito habitat. Specifically, the basins would be too
 20 deep and the constant movement/circulation of water would prevent mosquitoes from breeding
 21 and multiplying. It is unlikely that forebays would provide suitable breeding habitat for mosquitoes
 22 given that the water in the forebays would not be stagnant and would generally be too deep to
 23 support substantial mosquito habitat. Shallow edges of the forebays could provide some suitable
 24 mosquito breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed) were
 25 allowed to grow. However, as part of the regular maintenance of these forebay areas, floating
 26 vegetation such as pond weed would be harvested to maintain flow and forebay capacity. To further
 27 minimize the potential for impacts related to increasing suitable vector habitat within the study
 28 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 29 MVCDs and prepare and implement MMPs, as necessary, to control mosquitoes and reduce the
 30 likelihood that construction and operation of the water conveyance facilities would require an
 31 increase in mosquito abatement activities by the local MVCDs (Appendix 3B, *Environmental*
 32 *Commitments, AMMs, and CMs*). BMP activities would be consistent with the CDPH's *Best*
 33 *Management Practices for Mosquito Control in California* (California Department of Public Health
 34 2012). Accordingly, Alternative 5A would not substantially increase suitable vector habitat, and
 35 would not substantially increase vector-borne diseases. No adverse effects on public health would
 36 result because conditions for mosquito breeding at conveyance facilities would be minimized and
 37 standard practices to control mosquitos would be implemented.

38 **CEQA Conclusion:** The potential for construction and operation of conveyance facilities under
 39 Alternative 5A to result in an increase in exposure of people to vector-borne diseases would be
 40 similar in nature to the impacts described for Alternative 4. However, because Alternative 5A has 2
 41 fewer intakes and fewer associated sedimentation basins and solids lagoons than Alternative 4,
 42 there would be less surface water created under this alternative relative to Alternative 4. Alternative
 43 5A conveyance facilities could create new and increased surface water areas (relative to baseline) at
 44 the intakes, intermediate forebay, and the expanded Clifton Court Forebay, and these areas have the

1 potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of the large
 2 volumes of water that would be held there. However, during operations, the depth, design, and
 3 operation of conveyance facilities would prevent the development of suitable mosquito habitat.
 4 Specifically, the water bodies would be too deep to provide suitable mosquito habitat, and the
 5 constant movement of water would prevent mosquitoes from breeding and multiplying. To
 6 minimize the potential for impacts related to increasing suitable vector habitat within the study
 7 area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 8 MVCDS and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 9 control mosquitoes during construction and operation of the sedimentation basins, solids lagoons,
 10 the expanded Clifton Court Forebay, the intermediate forebay, and the intermediate forebay
 11 inundation area. These BMPs would be consistent with practices presented in *Best Management
 12 Practices for Mosquito Control in California* (California Department of Public Health 2012).
 13 Therefore, construction and operation of Alternative 5A would not result in a substantial increase in
 14 vector-borne diseases in the study area. This impact is considered to be less than significant because
 15 conditions for mosquito breeding at conveyance facilities would be minimized and standard
 16 practices to control mosquitos would be implemented. No mitigation is required.

17 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That**
 18 **There is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance**
 19 **Facilities**

20 **NEPA Effects:**

21 **Disinfection Byproducts**

22 As described in Chapter 8, *Water Quality*, the effects on long-term average DOC concentrations in the
 23 Delta under Alternative 5A would be similar to Alternative 4. However, the geographic extent of
 24 effects related to long-term average DOC concentrations within Delta waters with water supply
 25 operations under Alternative 5A would be less extensive than Alternative 4 and the magnitude of
 26 predicted long-term change and relative frequency of DOC concentration exceedances would be
 27 lower than Alternative 4. Relative to the No Action Alternative (ELT), Alternative 5A would result in
 28 small increases in long-term average DOC concentrations for the modeled 16-year period and
 29 drought period at the Franks Tract, Old River at Rock Slough, and Contra Costa Pumping Plant #1.
 30 The increases in average DOC concentrations would correspond to more frequent concentration
 31 threshold exceedances, with the greatest change occurring at Contra Costa Pumping Plant #1.

32 While Alternative 5A would lead to slightly higher long-term average DOC concentrations at some
 33 municipal water intakes and Delta interior locations, the predicted change would not be expected to
 34 adversely affect MUN beneficial uses, or any other beneficial use. The change in frequency of
 35 threshold concentration exceedances at other assessment locations would be similar or lower. In
 36 general, substantial change in ambient DOC concentrations would need to occur before significant
 37 changes in drinking water treatment plant design or operations are triggered. The increases in long-
 38 term average DOC concentrations estimated to occur at various Delta locations under Alternative 5A
 39 are of sufficiently small magnitude that they would not require existing drinking water treatment
 40 plants to substantially upgrade treatment for DOC removal above levels currently employed.

41 In the LLT, the primary difference will be changes in the Delta source water fractions due to
 42 hydrologic effects from climate change and sea level rise. These effects would occur regardless of the
 43 implementation of the alternative and, thus, at the LLT the effects of the alternative on DOC are

1 expected to be similar to those described above. Therefore, changes in DOC concentrations in the
2 Delta resulting from operation of the water conveyance facilities under Alternative 5A are not
3 anticipated to contribute to increases in disinfection byproducts (DBPs).

4 As described in Chapter 8, *Water Quality*, operations and maintenance of the water conveyance
5 facilities under Alternative 5A, relative to the No Action Alternative (ELT), would result in increases
6 in long-term average bromide concentrations in the South Fork Mokelumne River at Staten Island
7 and Sacramento River at Emmaton, and decrease at all other assessment locations. The long-term
8 bromide concentration in the South Fork Mokelumne River at Staten Island would be less than the
9 concentration believed to be sufficient to meet currently established drinking water criteria for
10 disinfection byproducts, and the increase at Emmaton would be very small (<1%). At South Fork
11 Mokelumne River at Staten Island, Old River at Rock Slough, Sacramento River at Emmaton, San
12 Joaquin River at Antioch, and Sacramento River at Mallard Island there would be an increased
13 frequency of exceedance of the 50 µg/L bromide threshold (the CALFED Drinking Water Program
14 goal) for protecting against the formation of DBPs in treated drinking water. As described for
15 Alternative 4, the use of seasonal intakes at Antioch and Mallard Slough is largely driven by
16 acceptable water quality, and thus has historically been opportunistic. Opportunity to use these
17 intakes would remain, and the predicted increases in bromide concentrations at Antioch and
18 Mallard Slough would not be expected to adversely affect MUN beneficial uses, or any other
19 beneficial use, at these locations.

20 The greatest increase in frequency of exceedance of the 50 µg/L threshold would occur in the South
21 Fork Mokelumne River and Sacramento River at Emmaton. Other locations would experience
22 smaller increases in the frequency of exceedance of the 50 µg/L and 100 µg/L threshold relative to
23 these two locations. The 100 µg/L threshold is the concentration believed to be sufficient to meet
24 currently established drinking water criteria for DBPs. The frequency of exceedance of the 100 µg/L
25 threshold would increase at Contra Costa Pumping Plant #1 and, to a lesser degree at Franks Tract,
26 Old River at Rock Slough, and the San Joaquin River at Antioch.

27 As described for Alternative 4, the effects of Alternative 5A in the LLT in the Delta relative to the No
28 Action Alternative (LLT) would be expected to be similar to that described above. There may be
29 higher bromide concentrations in the LLT in the western Delta, but this would be associated with
30 sea level rise, not Alternative 5A, because the primary source of bromide to the Delta is sea water
31 intrusion. Therefore, changes in bromide concentrations in the Delta resulting from operation of the
32 water conveyance facilities under Alternative 5A are not anticipated to contribute to increases in
33 DBPs.

34 **Trace Metals**

35 The changes in modeled trace metal concentrations of primarily human health and drinking water
36 concern (arsenic, iron, manganese) in the Delta under Alternative 5A would be similar to those
37 described for Alternative 4A because the factors that would affect trace metal concentrations in
38 Delta waters would be the same in the ELT and LLT.

39 The arsenic criterion was established to protect human health from the effects of long-term chronic
40 exposure, while secondary MCLs for iron and manganese were established as reasonable federal
41 regulatory goals for drinking water quality, and enforceable standards in California. Average
42 concentrations for arsenic, iron, and manganese in the primary source water (Sacramento River, San
43 Joaquin River, and the bay at Martinez) are below these criteria. No mixing of these three source
44 waters could result in a metal concentration greater than the highest source water concentration,

1 and, given that the modeled average water concentrations for arsenic, iron, and manganese do not
2 exceed water quality criteria, more frequent exceedances of drinking water criteria in the Delta
3 would not be an expected result under this alternative. Accordingly, no adverse effect on public
4 health related to the trace metals arsenic, iron, or manganese from drinking water sources is
5 anticipated.

6 **Pesticides**

7 The changes in modeled pesticide concentrations in the Delta under Alternative 5A would be similar
8 to those described for Alternative 4. The average winter and summer flow rates relative to the No
9 Action Alternative (ELT) are expected to be similar to or less than changes in flow rates under
10 Alternative 4 in the Sacramento River at Freeport, American River at Nimbus, Feather River at
11 Thermalito and the San Joaquin River at Vernalis. The main factor influencing pesticide
12 concentrations in Delta waters (i.e., changes in San Joaquin River, Sacramento River and Delta
13 agriculture source water fractions at various Delta locations, including Banks and Jones pumping
14 plants) is expected to change by a similar degree. As described in Chapter 8, *Water Quality*, the
15 percent change in monthly average source water fractions would be similar to changes expected
16 under Alternative 4. Modeled changes in the source water fractions of Sacramento River, San
17 Joaquin River, and Delta agriculture water under Alternative 5A would not be of sufficient
18 magnitude to substantially alter beneficial uses of the Delta. Therefore, it is not anticipated that
19 there would be adverse effects on public health related to pesticides from drinking water sources.

20 Because there would be no increases in DBPs due to increases in bromide or DOC in Delta surface
21 waters, and because the modeled changes in trace metals and pesticide concentrations would not
22 increase substantially in magnitude or frequency in the Delta under Alternative 5A relative to the No
23 Action Alternative (ELT and LLT), there would be no adverse effect on public health as a result of
24 operation of the water conveyance facilities.

25 **CEQA Conclusion:** Under Alternative 5A, modeled long-term average pesticide levels in the Delta
26 would be similar to or slightly less than described under Alternative 4 and would not be expected to
27 increase substantially, relative to Existing Conditions, such that beneficial use impairments are
28 made measurably worse.

29 Long-term average bromide concentrations would increase in the South Fork Mokelumne River at
30 Staten Island and Sacramento River at Emmaton, and decrease at all other assessment locations
31 relative to Existing Conditions. The long-term average bromide concentration in the South Fork
32 Mokelumne River at Staten Island would be less than the 100 µg/L believed to be sufficient to meet
33 currently established drinking water criteria for disinfection byproducts, and the increase at
34 Sacramento River at Emmaton would be very small (<1%). There would be an increased frequency
35 of exceedance of both the CALFED Drinking Water Program long-term bromide goal of 50 µg/L at
36 the South Fork Mokelumne River at Staten Island, Franks Tract, Old River at Rock Slough,
37 Sacramento River at Emmaton, San Joaquin River at Antioch, and Sacramento River at Mallard
38 Island. Also, these locations (with the exception of the South Fork Mokelumne River), and Franks
39 Tract and Contra Costa Pumping Plant #1, would have an increased frequency of exceedance of 100
40 µg/L, which is the concentration believed to be sufficient to meet currently established drinking
41 water criteria for DBPs. The 100 bromide threshold would be exceeded at Franks Tract for the 16-
42 year period modeled. The long-term average bromide concentrations would increase only in the
43 South Fork Mokelumne River at Staten Island and Sacramento River at Emmaton and decrease at all
44 other assessment locations. The long-term average bromide concentration in the South Fork

1 Mokelumne River at Staten Island would be less than the 100 µg/L believed to be sufficient to meet
2 currently established drinking water criteria for disinfection byproducts, and the increase at
3 Sacramento River at Emmatton would be very small (<1%). The effects of Alternative 5A in the LLT
4 in the Delta relative to Existing Conditions would be expected to be similar. There may be higher
5 bromide concentrations in the LLT in the western Delta, but this would be associated with sea level
6 rise, not the project alternative, because the primary source of bromide to the Delta is sea water
7 intrusion. The use of seasonal intakes at Antioch and Mallard Island is largely driven by acceptable
8 water quality, and therefore has historically been opportunistic, and the opportunity to use these
9 intakes would remain. Thus, the increased bromide concentrations at these locations would not be
10 expected to adversely affect municipal beneficial uses, or any other beneficial use, and therefore
11 would not be expected to contribute substantially to DBP formation. Operations and maintenance
12 activities under Alternative 5A would not cause a substantial long-term change in DOC
13 concentrations in the Delta, although there would be relatively small increases in long-term average
14 DOC concentrations at some interior Delta locations (Franks Tract, Old River at Rock Slough, and
15 Contra Costa Pumping Plant #1). However, the increases are of sufficiently small magnitude that
16 they would not require existing drinking water treatment plants to substantially upgrade treatment
17 for DOC above levels currently employed, and therefore these increases would not be expected to
18 contribute substantially to DBP formation. Further, there would be predicted improvements in long-
19 term average DOC concentrations at Barker Slough relative to Existing Conditions. Average
20 concentrations of trace metals are not expected to increase substantially under Alternative 5A in the
21 primary source water. Therefore, this alternative is not expected to cause additional exceedances of
22 applicable water quality objectives by frequency, magnitude, and geographic extent that would
23 cause significant impacts on any beneficial uses of waters in the affected environment.

24 Because there would be no increases in DBPs due to increases in bromide or DOC in Delta surface
25 waters, and because the modeled changes in trace metals and pesticide concentrations would not
26 increase substantially in magnitude or frequency in the Delta with implementation of water supply
27 operations under Alternative 5A relative to Existing Conditions, there would be no significant
28 impact on public health as a result of operation of the water conveyance facilities. No mitigation is
29 required.

30 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 31 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

32 **NEPA Effects:** As described in Chapter 8, *Water Quality*, modeling scenarios included assumptions
33 regarding how certain habitat restoration activities would affect Delta hydrodynamics. The amount
34 of habitat restoration completed under Alternative 5A would be substantially less than under
35 Alternative 4. To the extent that restoration actions would alter hydrodynamics within the Delta
36 region, which affects mixing of source waters, these effects are included in this assessment of water
37 quality changes due to water conveyance facilities operations and maintenance.

38 One intake would be constructed and operated under Alternative 5A. Sediment-disturbing activities
39 during construction and maintenance of this intake and other water conveyance facilities proposed
40 near or in surface waters under this alternative could result in the disturbance of existing
41 constituents in sediment, such as pesticides or methylmercury. In-channel construction activities,
42 such as pile driving during the construction of cofferdams at the intakes and pier construction at the
43 barge unloading facilities, which would occur over a period of 5 months, would result in the
44 localized disturbance of river sediment. In addition, maintenance of the single proposed north Delta
45 intakes and the intermediate forebay would entail periodic dredging for sediment removal at these

1 locations. Sediment accumulation in both the northern and southern portion of the expanded Clifton
2 Court Forebay is expected to be minimal in the ELT period as the need for dredging is anticipated to
3 be every 50 years given the design. However, it is anticipated that there may be some sediment
4 accumulation at the inlet structure of the northern portion of Clifton Court Forebay. Therefore, while
5 overall sediment accumulation in this forebay is not expected to be substantial, some dredging may
6 be required at the inlet structure to maintain an even flow path.

7 **Pesticides**

8 Legacy pesticides, such as organochlorines, have low water solubility; they do not readily volatilize
9 and have a tendency to bond to particulates (e.g., soil and sediment), settle out into the sediment,
10 and not be transported far from the source. If present in sediment within in-water construction
11 areas, legacy pesticides would be disturbed locally and would not be expected to partition into the
12 water column to any substantial degree. Therefore, no significant adverse effect on public health
13 would result from construction.

14 Numerous pesticides are currently used throughout the affected environment. While some of these
15 pesticides may be bioaccumulative, those present-use pesticides for which there is sufficient
16 evidence of their presence in waters affected by SWP and CVP operations (i.e., organophosphate
17 pesticides, such as diazinon, chlorpyrifos, diuron, and pyrethroids) are not considered
18 bioaccumulative. Thus, changes in their concentrations would not directly cause bioaccumulative
19 problems in aquatic life or humans. The effects of Alternative 5A on pesticide levels in surface
20 waters upstream of the Delta, in the Delta, and in the SWP/CVP Export Service Areas relative to the
21 No Action Alternative (ELT) would be similar to or slightly less than those described for the
22 Alternative 4. Alternative 5A would not result in increased tributary flows that would mobilize
23 organochlorine pesticides in sediments. Thus, the change in source water in the Delta associated
24 with the change in water supply operations is not expected to adversely affect public health with
25 respect to bioaccumulation of pesticides.

26 **Methylmercury**

27 If mercury is sequestered in sediments at water facility construction sites, it could become
28 suspended in the water column during construction activities, opening up a new pathway into the
29 food chain. Construction activities (e.g., pile driving and cofferdam installation) at intake sites or
30 barge landing locations would result in a localized, short-term resuspension of sediment and an
31 increase in turbidity that may contain elemental or methylated forms of mercury. Please see Chapter
32 8, Section 8.1.3.9, *Mercury*, for a discussion of methylmercury concentrations in sediments.

33 Changes in methylmercury concentrations under Alternative 5A are expected to be small. As
34 described in Chapter 8, *Water Quality*, the greatest annual average methylmercury concentration for
35 drought conditions under Alternative 5A would be 0.168 ng/L for the San Joaquin River at Buckley
36 Cove, which would be the same as the No Action Alternative (ELT). Fish tissue estimates show only
37 small or no increases for mercury concentrations relative to the No Action Alternative (ELT) based
38 on long-term annual average concentrations in the Delta. Mercury concentrations in fish tissue
39 expected for Alternative 5A (with Equation 1), show increases of 5 percent or less, relative to the No
40 Action Alternative (ELT), in all modeled years. Mercury concentrations in fish tissue expected for
41 Alternative 5A (with Equation 2), are estimated to be 7 percent or less relative to the No Action
42 Alternative (ELT), in all modeled years. Because these increases are relatively small, and because it
43 is not apparent that substantive increases are expected throughout the Delta, these estimated
44 changes in mercury concentrations in fish tissue under Alternative 5A are expected to be within the

1 uncertainty inherent in the modeling approach and would not likely be measureable in the
2 environment. See Appendix 8I, *Mercury*, for a discussion of the uncertainty associated with fish
3 tissue estimates of mercury. As discussed in Chapter 8, in the LLT, the primary difference will be
4 changes in the Delta source water fractions due to hydrologic effects from climate change and sea
5 level rise. These effects would occur regardless of the implementation of the alternative and, thus, at
6 the LLT the effects of the alternative on mercury are expected to be similar to those described above.
7 Therefore, modeled changes in mercury in the Delta and in fish tissues due to operation of
8 Alternative 5A would not be expected to adversely affect public health.

9 In summary, operation of the water conveyance facilities under Alternative 5A would not alter
10 bioaccumulative pesticide concentrations or mercury concentrations in the Delta such that there
11 would be an effect on public health. As such, there would be no adverse effect.

12 **CEQA Conclusion:** Operation of the water conveyance facilities under Alternative 5A is not expected
13 to cause additional exceedance of applicable water quality objectives/criteria by frequency,
14 magnitude, and geographic extent that would cause adverse effects on any beneficial uses of waters
15 in the affected environment. Because mercury concentrations are not expected to increase
16 substantially relative to the Existing Conditions, no long-term water quality degradation is expected
17 to occur and, thus, no adverse effects to beneficial uses would occur. Because any increases in
18 mercury or methylmercury concentrations are not likely to be measurable, changes in mercury
19 concentrations or fish tissue mercury concentrations would not make any existing mercury-related
20 impairment measurably worse. Construction activities (e.g., pile driving and cofferdam installation)
21 at intake sites or barge landing locations would result in a localized, short-term resuspension of
22 sediment and an increase in turbidity that may contain elemental or methylated forms of mercury.

23 The effects of Alternative 5A on bioaccumulative pesticide levels in the Delta would be similar to or
24 slightly less than those described for the Alternative 4. Alternative 5A would not result in increased
25 tributary flows that would mobilize organochlorine pesticides in sediments. Thus, the change in
26 source water in the Delta associated with the change in water supply operations is not expected to
27 adversely affect public health with respect to bioaccumulation of pesticides. If present in sediment
28 within in-water construction areas, legacy pesticides would be disturbed locally and would not be
29 expected to partition into the water column to any substantial degree.

30 For these reasons, there would be no significant impact on public health due to mercury or
31 bioaccumulative pesticides as a result of construction of or operation of the water conveyance
32 facilities under Alternative 5A. No mitigation is required.

33 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 34 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 35 **Facilities**

36 **NEPA Effects:** The potential for Alternative 5A transmission line construction and operation to
37 expose people to new sources of EMFs would be similar to Alternative 4. As shown in Table 25-9, a
38 total of 4.59 miles of new temporary 69 kV transmission lines; 14.96 miles of new permanent 230
39 kV transmission lines; 18.72 miles of new temporary 230 kV transmission line; 1.00 mile of new
40 permanent 230 kV/34.5 kV (underbuild) transmission lines; 11.28 miles of new permanent 230
41 kV/34.5 kV (underbuild) transmission lines; and the relocation of 1.19 miles of existing 500 kV
42 transmission line would be required for this alternative. As described for Alternative 4, this effect
43 would not be adverse because transmission lines would generally not be located in populated areas
44 or within 300 feet of sensitive receptors and CPUC's EMF design guidelines would be implemented

1 for any new temporary or new permanent transmission lines constructed and operated under
2 Alternative 5A.

3 **CEQA Conclusion:** The potential for Alternative 5A transmission line construction and operation to
4 expose people to new sources of EMFs would be smaller relative to Alternative 4 because there
5 would be fewer facilities requiring power (i.e., intakes) under Alternative 5A. Under Alternative 5A,
6 the majority of proposed new temporary (69 kV and 230 kV) and new permanent (230 kV and 230
7 kV/34.5 kV) transmission lines would be located within the rights-of-way of existing transmission
8 lines; any new temporary or permanent transmission lines not within the right-of-way of existing
9 transmission lines would, for the most part, be located in sparsely populated areas generally away
10 from existing sensitive receptors. None of the proposed temporary or permanent transmission lines
11 would be within 300 feet of sensitive receptors. Further, the temporary transmission lines would be
12 removed when construction of the water conveyance facility features is completed, so there would
13 be no potential permanent effects. Therefore, these transmission lines would not substantially
14 increase people's exposure to EMFs. This impact is considered to be less than significant because
15 transmission lines would generally not be located in populated areas or within 300 feet of sensitive
16 receptors and CPUC's EMF design guidelines would be implemented for any new temporary or
17 permanent transmission lines constructed and operated under Alternative 5A. No mitigation is
18 required.

19 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing Environmental**
20 **Commitments 3, 4, 6, 7, 10, and 11**

21 Effects of Alternative 5A related to the potential for increase in vector-borne diseases from
22 implementing Environmental Commitments 3, 4, 6, 7, 10, and 11 would be similar to those described
23 for Alternative 4A. However, as described in Chapter 3, *Description of Alternatives*, Alternative 5A
24 would restore fewer acres of habitat under these Environmental Commitments and, therefore, the
25 potential for vector-borne disease effects under Alternative 5A would likely be less than the
26 potential associated with Alternative 4A.

27 **NEPA Effects:** Implementation of portions of Environmental Commitments 3, 4, 6, 7, 10, and 11
28 under Alternative 5A would involve protecting and restoring wetland and other surface water
29 habitat that could potentially increase suitable mosquito habitat within the study area. This
30 potential effect would not be adverse because the total restoration acreage of these types of habitat
31 implemented under Alternative 5A would generally not be located near densely populated areas,
32 and management plans under Environmental Commitment 11: Natural Communities Enhancement
33 and Management would be implemented in consultation with the appropriate MVCDs to ensure
34 MMPs are implemented to reduce mosquito breeding. Additionally, BMPs from the guidelines
35 outlined in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, would be incorporated into
36 Alternative 5A and executed to maintain proper water circulation and flooding during appropriate
37 times of the year (e.g., fall) to prevent stagnant water and habitat for mosquitoes. This consultation
38 would occur when specific restoration and enhancement projects and locations are identified.

39 **CEQA Conclusion:** The potential for impacts related to increases of vector-borne disease from
40 mosquitos during construction, operation, and maintenance of portions of Environmental
41 Commitment 3, 4, 6, 7, 10, and 11 under Alternative 5A is considered less than significant because
42 the total wetland restoration acreage implemented under this alternative would generally not be
43 located near densely populated areas, and management plans under Environmental Commitment
44 11: Natural Communities Enhancement and Management would be implemented in consultation

1 with the appropriate MVCDs to ensure MMPs are implemented to reduce mosquito breeding.
 2 Additionally, BMPs from the guidelines outlined in Appendix 3B, *Environmental Commitments*,
 3 *AMMs*, and *CMs*, would be incorporated and executed to maintain proper water circulation and
 4 flooding during appropriate times of the year (e.g., fall) to prevent stagnant water and habitat for
 5 mosquitoes. No mitigation is required.

6 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of** 7 **Implementing the Restoration Environmental Commitments**

8 Effects of Alternative 5A related to the potential for increase in recreationists' exposure to
 9 pathogens from implementing portions of the restoration Environmental Commitments would be
 10 similar to those described for Alternative 4A. However, as described in Chapter 3, *Description of*
 11 *Alternatives*, Alternative 5A would restore slightly fewer acres of habitat under Environmental
 12 Commitments 3, 4, 6, 7, and 9–11 relative to Alternative 4A.

13 **NEPA Effects:** The study area currently supports habitat types, such as tidal habitat, upland
 14 wetlands, and agricultural lands that produce pathogens as a result of the biological productivity in
 15 these areas (e.g., migrating birds, application of fertilizers, waste products of animals). The study
 16 area does not currently have pathogen concentrations that rise to the level of adversely affecting
 17 beneficial uses of recreation. However, any potential increase in pathogens associated with the
 18 proposed habitat restoration and enhancement Environmental Commitments under Alternative 5A
 19 would be localized and within the vicinity of the actual restoration. This localized increase is not
 20 expected to be of sufficient magnitude and duration to result in adverse effects on recreationists
 21 because these areas would generally not support livestock and most areas would not have public
 22 access.

23 **CEQA Conclusion:** The potential for an increase in recreationists' exposure to pathogens under
 24 Alternative 5A is considered less than significant because of the localized nature of pathogens and
 25 because the rapid die-off of some types of pathogens in water would not create sufficient
 26 magnitudes of pathogen generation that could affect recreational beneficial uses. No mitigation is
 27 required.

28 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 29 **as a Result of Implementing Environmental Commitments 3, 4, and 10**

30 Effects of Alternative 5A related to the potential to mobilize contaminants known to bioaccumulate
 31 (pesticides and methylmercury) from implementing portions of the restoration Environmental
 32 Commitments would be similar to those described for Alternative 4A. However, as described in
 33 Chapter 3, *Description of Alternatives*, Alternative 5A would restore fewer acres of habitat under
 34 Environmental Commitments 3, 4 and 10 relative to Alternative 4A. Therefore, the potential for
 35 mobilization of contaminants under Alternative 5A would likely be less than the potential associated
 36 with Alternative 4A.

37 **NEPA Effects:** The primary concern with habitat restoration regarding constituents known to
 38 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 39 inundated floodplains and marshes. The mobilization depends on the presence of the constituent
 40 and the biogeochemical behavior of the constituent to determine whether it could re-enter the
 41 water column or be reintroduced into the food chain. This potential effect would not be adverse
 42 because the total tidal and nontidal habitat restoration acreage implemented under Alternative 5A
 43 would be relatively small, bioaccumulation of pesticides and/or methylmercury in these restoration

1 areas is not expected to substantially affect public health because of the limited extent of this type of
 2 restored habitat under Alternative 5A, the localized nature of pesticide bioaccumulation, and
 3 because current OEHHA standards would be enforced. Environmental Commitment 12:
 4 Methylmercury Management would be implemented to reduce methylmercury production in
 5 restored habitats.

6 **CEQA Conclusion:** The potential for public health impacts related to mobilization of pesticides and
 7 methylmercury in habitat restoration areas related to Environmental Commitments 3, 4, and 10 is
 8 considered less than significant because the total tidal and nontidal restoration acreage
 9 implemented under Alternative 5A would be relatively small, bioaccumulation of pesticides and/or
 10 methylmercury in the these restoration areas is not expected to substantially affect public health
 11 because of the limited extent of restored habitat under Alternative 5A, the localized nature of
 12 pesticide bioaccumulation, and because current OEHHA standards would be enforced.
 13 Environmental Commitment 12: Methylmercury Management would be implemented to reduce
 14 methylmercury production in restored habitats. No mitigation is required.

15 **Impact PH-8: Increase in *Microcystis* Bloom Formation as a Result of Operation of the Water** 16 **Conveyance Facilities**

17 **NEPA Effects:** Any modified reservoir operations under Alternative 5A are not expected to promote
 18 *Microcystis* production upstream of the Delta relative to the No Action Alternative (ELT and LLT)
 19 since large reservoirs upstream of the Delta are typically low in nutrient concentrations. Further, in
 20 the rivers and streams of the Sacramento River watershed, watersheds of the eastern tributaries
 21 (Cosumnes, Mokelumne, and Calaveras Rivers), and the San Joaquin River upstream of the Delta,
 22 bloom development would be limited by high water velocity and low hydraulic residence times.
 23 These conditions would not be expected to change under Alternative 5A relative to the No Action
 24 Alternative (ELT and LLT)

25 With implementation of water supply operations under Alternative 5A, conditions in the Export
 26 Service Areas are not expected to become more conducive to *Microcystis* bloom formation relative to
 27 the No Action Alternative (ELT and LLT) because the fraction of water flowing through the Delta
 28 that would reach the existing south Delta intakes is not expected to be adversely affected by
 29 *Microcystis* blooms.

30 As discussed in Chapter 8, under this alternative, a portion of the Sacramento River water, which
 31 would be conveyed through the Delta to the south Delta intakes under the No Action Alternative
 32 (ELT and LLT), would be replaced at various locations throughout the Delta by other source water
 33 due to diversion of Sacramento River water at the north Delta intake. The change in flow paths of
 34 water through the Delta that would occur due to operations and maintenance of the water
 35 conveyance facilities under Alternative 5A and could result in localized increases in residence time
 36 in various Delta sub-regions, and decreases in residence time in other areas. In general, there is
 37 substantial uncertainty regarding the extent that facilities operations and maintenance of
 38 Alternative 5A would result in a net increase in water residence times at various locations
 39 throughout the Delta relative to the No Action Alternative (ELT and LLT). Several factors unrelated
 40 to implementation of the alternative would influence water residence times including habitat
 41 restoration (8,000 acres of tidal habitat restoration and enhancements to the Yolo Bypass), climate
 42 change and sea level rise, and climate change would result in increased ambient water temperatures
 43 in the Delta. These effects would occur under both Alternative 5A and No Action Alternative (ELT
 44 and LLT). Thus, because the only difference between operations and maintenance of Alternative 5A

1 and the No Action Alternative is changes in flow paths and source water fractions in the Delta,
 2 Alternative 5A is not expected to increase water residence times or ambient water temperatures
 3 throughout the Delta that would result in adverse effects on *Microcystis*, relative to No Action
 4 Alternative (ELT and LLT).

5 **CEQA Conclusion:** Relative to Existing Conditions, operation of the water conveyance facilities under
 6 Alternative 5A is not expected to promote *Microcystis* bloom formation in the reservoirs and
 7 watersheds upstream of the Delta because large reservoirs upstream are typically low in nutrient
 8 concentrations, and high water velocity and low hydraulic residence times in the upstream area
 9 limit the development of *Microcystis* blooms.

10 The potential for *Microcystis* blooms in the Export Service Areas under Alternative 5A would be less
 11 than under Alternative 4, but source waters to the south Delta intakes could be affected by
 12 *Microcystis* due to an increase in Delta water temperatures associated with climate change and from
 13 an increase in water residence times. The impacts from increased water residence times in the Delta
 14 would be mostly related to tidal habitat restoration and improvements to the Yolo Bypass, which are
 15 assumed to occur separate from Alternative 5A, as well as to climate change and sea level rise. The
 16 combined effect of these factors on increasing *Microcystis* in source waters to the south Delta intakes
 17 would likely be a greater influence than that of Alternative 5A operations.

18 Water supply operations under Alternative 5A could result in localized increases in Delta residence
 19 times in some locations and decreased residence times in other Delta locations. As indicated in
 20 Chapter 8, *Water Quality*, there is substantial uncertainty regarding the extent that Alternative 5A
 21 operations and maintenance would result in a net increase in water residence times relative to
 22 Existing Conditions. Regardless of this uncertainty, it is likely that these potential effects under
 23 Alternative 5A would be relatively small compared to the combined effects of tidal habitat
 24 restoration and Yolo Bypass improvements unrelated to Alternative 5A, and sea level rise and
 25 climate change. The combined effects of restoration activities unrelated to Alternative 5A, climate
 26 change, and sea level rise on increased water residence time, as well as the effects of climate change
 27 on Delta water temperatures, it is possible that *Microcystis* blooms in the Delta would increase in
 28 frequency, magnitude, and geographic extent, relative to Existing Conditions. Although there is
 29 considerable uncertainty regarding this impact, the effects on *Microcystis* due to operations under
 30 Alternative 5A would be less than significant. No mitigation is required.

31 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing** 32 **Environmental Commitment 4**

33 Effects related to *Microcystis* from implementation of Environmental Commitment 4 under
 34 Alternative 5A would be similar to those described for Alternative 4A, but would likely be greater in
 35 magnitude because there would be substantially more acres of tidal natural communities restored
 36 under this alternative (292 acres) relative to Alternative 4A (59 acres).

37 **NEPA Effects:** Under Alternative 5A, Yolo Bypass Fisheries Enhancement would not occur. However,
 38 improvements in the Yolo Bypass, as well as restoration of 8,000 acres of tidal habitat, would be
 39 implemented under a plan separate and distinct from Alternative 5A (see Chapter 3, *Description of*
 40 *Alternatives*). These activities are assumed to occur under both Alternative 5A and the No Action
 41 Alternative. Similar to Alternative 4 (under CM 4), there would be tidal habitat restoration in the
 42 Delta under Alternative 5A with implementation of Environmental Commitment 4. Tidal habitat
 43 restoration would create shallow backwater areas that could result in local warmer water and
 44 increased water residence time of magnitude and extent that would result in measurable changes on

1 *Microcystis* levels in the Delta. However, the 292 acres of tidal habitat restored under this alternative
 2 would be substantially fewer) relative to the No Action Alternative and therefore, as discussed in
 3 Chapter 8, *Water Quality*, would have negligible effects in terms of the potential for creating
 4 conditions conducive to *Microcystis* bloom in the Delta in comparison to the No Action (ELT and
 5 LLT). Therefore, implementation of Environmental Commitment 4 under Alternative 5A would not
 6 be adverse because it would not contribute to measurable changes in *Microcystis* bloom formation.

7 **CEQA Conclusion:** Implementation of Environmental Commitment 4: Tidal Natural Communities
 8 Restoration under Alternative 5A would result in 292 acres of tidal restoration within the Delta. This
 9 would have a negligible effect on creating conditions conducive to *Microcystis* bloom formation,
 10 particularly relative to the development of 8,000 acres of tidal habitat and improvements to the Yolo
 11 Bypass—activities separate and distinct from Alternative 5A. These activities would create shallow
 12 backwater areas that could result in a measureable increase in water temperatures and water
 13 residence times in the Delta, and therefore *Microcystis*, relative to Existing Conditions. Thus,
 14 implementation of Environmental Commitment 4 under Alternative 5A would be less than
 15 significant. No mitigation is required.

16 25.3.5 Cumulative Analysis

17 This cumulative impact analysis considers past, present, and reasonably foreseeable future projects
 18 that could affect the same resources and, where relevant, occur within the same timeframe as the
 19 action alternatives. The effects of the action alternatives, as they relate to public health, considered
 20 in connection with the potential effects of projects (listed in Attachment 3D-A to Appendix 3D,
 21 *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact*
 22 *Conditions*) that may occur in the study area, could be cumulatively adverse. It is expected that some
 23 changes related to public health would take place, even though it is assumed that reasonably
 24 foreseeable future projects would include typical design and construction practices to avoid or
 25 minimize potential impacts.

26 The potential public health effects resulting from the action alternatives as addressed in this chapter
 27 are related to the following.

- 28 ● Drinking water quality as related specifically to humans.
- 29 ● Bioaccumulation of toxicants in fish and aquatic organisms that are consumed by humans.
- 30 ● Pathogens and *Microcystis* in recreational waters.
- 31 ● Vectors—specifically, disease-carrying mosquitoes.
- 32 ● EMFs from transmission lines affecting the public.

33 These effects could occur during construction or operation of the water conveyance facilities and
 34 restoration/enhancement areas, and they primarily would be localized.

35 When the effects of any of the action alternatives are considered in combination with the effects of
 36 initiatives listed in Table 25-11, the cumulative effects on public health are potentially adverse. The
 37 specific programs, projects, and policies are identified below for each impact category based on the
 38 potential to contribute to an impact due to implementation of the proposed project that could be
 39 deemed cumulatively considerable. For a complete list of such projects, consult Appendix 3D,
 40 *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact*

1 *Conditions.* The potential for cumulative impacts on public health is described for effects related to
 2 the construction and operation of the water conveyance facilities and effects stemming from the
 3 long-term implementation of CM2–CM21 under the BDCP alternatives, or the Environmental
 4 Commitments under the non-HCP alternatives (Alternatives 4A, 2D, and 5A).

5 **Table 25-11. Effects on Public Health from the Plans, Policies, and Programs Considered for**
 6 **Cumulative Analysis**

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
Department of Water Resources	North Delta Flood Control and Ecosystem Restoration Project	Final EIR complete	Project implements flood control and ecosystem restoration benefits in the north Delta	Potential to increase the amount of breeding habitat for mosquitoes and thus increase the local populations of mosquitoes. Accordingly, within 10 miles of McCormack-Williamson Tract, there would be the potential to increase the public's exposure to mosquitoes and therefore potentially vector-borne disease.
Freeport Regional Water Authority and Bureau of Reclamation	Freeport Regional Water Project	Project was completed late 2010	Project includes an intake/pumping plant near Freeport on the Sacramento River and a conveyance structure to transport water through Sacramento County to the Folsom South Canal	No adverse effect on public health from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
Reclamation District 2093	Liberty Island Conservation Bank		This project includes the restoration of inaccessible, flood prone land, zoned as agriculture but not actively farmed, to area enhancement of wildlife resources	No effect on public health.
Bureau of Reclamation	Delta-Mendota Canal/California Aqueduct Intertie	Anticipated completion by 2012	The purpose of the intertie is to better coordinate water delivery operations between the California Aqueduct (state) and the Delta-Mendota Canal (federal) and to provide better pumping capacity for the Jones Pumping Plant. New project facilities include a pipeline and pumping plant	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Bureau of Reclamation, California Department of Water Resources, Suisun Resource Conservation District	Suisun Marsh Habitat Management, Preservation, and Restoration Plan	Final EIS/EIR 2011	The plan is intended to balance the benefits of tidal wetland restoration with other habitat uses in Suisun Marsh by evaluating alternatives that provide a politically acceptable change in marsh-wide land uses, such as salt marsh harvest mouse habitat, managed wetlands, public use, and upland habitat.	No adverse effect on public health from vector-borne diseases or mobilization of constituents known to bioaccumulate during construction and operation.

Agency	Program/Project	Status	Description of Program/Project	Effects on Public Health
California Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	EIR certified in 2010, project is ongoing.	The Dutch Slough Tidal Marsh Restoration Project, located near Oakley in Eastern Contra Costa County, would restore wetland and uplands, and provide public access to the 1,166-acre Dutch Slough property owned DWR. The property is composed of three parcels separated by narrow man-made sloughs.	Reduce levels of mosquito production relative to Existing Conditions in areas where seasonal wetland areas and unmanaged nontidal freshwater marsh are reduced. Increase mosquito production as a result of non-tidal open water management options, which would increase exposure of humans to mosquitoes and potentially vector-borne diseases. Potential incremental increase in methylmercury formation and contribution to Delta load.
California Department of Water Resources and U.S. Bureau of Reclamation	Franks Tract Project	Delayed	Operable gates would be installed to control the flow of water at Threemile Slough and/or West False River. Boat passage facilities would be included to allow for passing of watercraft when the gates are in operation.	No adverse effect would be expected on public health from vector-borne diseases or mobilization of constituents known to bioaccumulate during construction and operation.
Contra Costa Water District	Contra Costa Canal Fish Screen Project	Completed in 2011	Installation of a fish screen at Rock Slough Intake.	No effect on public health.
Semitropic Water District	Delta Wetlands Project	Final EIR 2011	The Delta Wetlands Project involves the construction of a new water diversion and storage system on two islands in the Delta: Bacon Island and Webb Tract (Reservoir Islands). The Reservoir Islands provide for a total estimated storage capacity of 215 thousand acre-feet. The Delta Wetlands Project would increase the availability of high-quality water in the Delta for export or outflow through the following: (1) diversion of water on to the Reservoir Islands during high-flow periods (i.e., December through March); (2) storage of water on the Reservoir Islands; (3) mitigation for wetland and wildlife effects of the water storage operations on the Reservoir Islands by implementing a habitat management plan on Bouldin Island and Holland Tract; (4) supplemental water storage in	Implementation of this project would result in an increase in mosquito breeding habitat. Accordingly, there would be an increase in the public's exposure to mosquitoes and therefore potentially vector-borne disease.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
			Semitropic Groundwater Storage Bank and the Antelope Valley Water Bank; (5) discharging water for export to designated south- of-Delta users when excess CVP or SWP pumping capacity is available (i.e., typically July through November); and (6) releasing water for water quality and outflow enhancement in the Bay-Delta Estuary typically from September through November.	
U.S. Army Corps of Engineers	CALFED Levee System Integrity Program	Ongoing	Includes maintaining and improving levee stability in the Delta.	No effect on public health.
Contra Costa Water District, Bureau of Reclamation, and California Department of Water Resources	Middle River Intake and Pump Station (previously known as the Alternative Intake Project)	Completed in 2011	Construction of a potable water intake and pump station, along Victoria Canal on Victoria Island, to improve drinking water quality for Contra Costa Water District customers.	No effect on public health.
California Department of Water Resources	Mayberry Farms Subsidence Reversal and Carbon Sequestration Project	Completed October 2010	Permanently flood 308-acre parcel of DWR-owned land (Hunting Club leased) and restore 274 acres of palustrine emergent wetlands within Sherman Island to create permanent wetlands and to monitor waterfowl, water quality, and greenhouse gases.	No adverse effect on public health from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
City of Stockton	Delta Water Supply Project (Phase 1)	Completed in 2012	Construction of a new intake structure and pumping station adjacent to the San Joaquin River; a water treatment plant along Lower Sacramento Road; and water pipelines along Eight Mile, Davis, and Lower Sacramento Roads.	No adverse effect on public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during construction and operation.
Bureau of Reclamation, California Department of Fish and Wildlife, and Natomas Central Mutual Water Company	American Basin Fish Screen and Habitat Improvement Project	Expected completion in 2012	This project involves consolidation of diversion facilities; removal of decommissioned facilities; aquatic and riparian habitat restoration; and installing fish screens in the Sacramento River. Total project footprint encompasses about 124 acres east of the Yolo Bypass. Permanent conversion of 70 acres of farmland (including 60 acres of rice) during Phases I and II.	No adverse effect is expected to public health is expected from vector-borne diseases and mobilization of constituents known to bioaccumulate during or after conversion.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
California Department of Water Resources, and California Department of Fish and Wildlife	Sherman and Twitchell Islands Fish Screen Project	Completed in 2009	This project would Install fish screens on ten remaining unscreened diversions used to irrigate state-owned lands on Sherman and Twitchell Islands.	No effect on public health.
University of California, Davis, California Department of Water Resources, California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and Bureau of Reclamation	Delta Smelt Permanent Refuge	Program under development	Develop a permanent facility, possibly at the proposed U.S. Fish and Wildlife Science Center at Rio Vista.	No effect on public health.
Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Water Resources and California Department of Fish and Wildlife	San Joaquin River Restoration Program	Final PEIS/EIR 2012	The program would restore and maintain fish populations in “good condition” in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.	There is the potential for adverse effects on public health from vector-borne disease as operation of this program could result in an increase in adult mosquito populations.
California Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	EIR certified in 2010, project is ongoing	The Dutch Slough Tidal Marsh Restoration Project, located near Oakley in Eastern Contra Costa County, would restore wetland and uplands, and provide public access to the 1,166-acre Dutch Slough property owned DWR. The property is composed of three parcels separated by narrow man-made sloughs.	Reduced levels of mosquito production relative to Existing Conditions in areas where seasonal wetland areas and unmanaged nontidal freshwater marsh are reduced. Increase mosquito production as a result of non-tidal open water management options, which would increase exposure of humans to mosquitoes and potentially vector-borne diseases. Potential incremental increase in methylmercury formation and contribution to Delta load.
California Natural Resources Agency, California Environmental Protection Agency, and California Department of Food and Agriculture	California Water Action Plan	Ongoing and future	Identifies key actions for the next one to five years that address urgent needs and provide the foundation for the sustainable management of California’s water resources.	Actions implemented may affect seasonal and long-term water quality conditions in the Delta.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
State Water Resources Control Board	Bay-Delta Water Quality Control Plan Update	Ongoing and future	<p>The State Water Board is updating the Bay-Delta Water Quality Control Plan in four phases:</p> <p>Phase I: Modifying water quality objectives (i.e., establishing minimum flows) on the Lower San Joaquin River and Stanislaus, Tuolumne, and Merced Rivers to protect the beneficial use of fish and wildlife and (2) modifying the water quality objectives in the southern Delta to protect the beneficial use of agriculture;</p> <p>Phase II: Evaluating and potentially amending existing water quality objectives that protect beneficial uses and the program of implementation to achieve those objectives. Water quality objectives that could be amended include Delta outflow criteria;</p> <p>Phase III: Requires a water rights proceeding to determine changes to existing water rights to achieve the objectives identified in Phase I and Phase II. Phase III will likely not occur until after Phase IV is complete or close to complete;</p> <p>Phase IV: Evaluating and potentially establishing water quality criteria and flow objectives that protect beneficial uses on tributaries to the Sacramento River.</p>	To the extent that modifications in surface water flow patterns, increase minimum instream flows, and increase minimum Delta outflows, this would benefit water quality in the Delta.
Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Services, Department of Water Resources, and Department of Fish and Wildlife	San Joaquin River Restoration Program	Final EIS/EIR and Record of Decision completed in 2011	Program that aims at restoring flows to the San Joaquin River from Friant Dam to the confluence of Merced River (Bureau of Reclamation 2011).	The impact analysis in the EIS/EIR indicated that the program would entail construction and other restoration activities in the area located along the San Joaquin River between Friant Dam and the Merced River, which includes areas with an increased risk of exposure to West Nile virus in wetted portions of the San Joaquin River that provide mosquito habitat. In addition, The reoperation of Friant Dam would increase water volume and change the timing of water flows in the San Joaquin

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
				River. These changes could affect public health by increasing the amount of freestanding water, which could increase the amount of mosquito habitat and exposure to diseases.
Bureau of Reclamation, Department of Water Resources, and State Water Resources Control Board	Drought Contingency Plan (includes Emergency Drought Barriers project)	Completed for 2015; reasonably foreseeable to occur in future years with drought	Modification of Bay-Delta Water Quality Objectives (e.g., Delta outflow and electrical conductivity requirements) and requirements from 2008/2009 SWP/CVP BiOps to balance supplying human needs, repelling saltwater in the Delta, and providing for cold water needs of Chinook salmon.	Reduced Delta outflow may increase the potential for negative effects from flow-related stressors (e.g., <i>Microcystis</i>).

1
2 If the cumulative public health effects (which includes implementation of the action alternatives
3 along with past, present, and reasonably foreseeable future projects, population growth, and climate
4 change) for any of the identified impacts listed above is determined not to be adverse (or significant
5 under CEQA), then no further assessment is required. No further assessment is required because a
6 non-adverse cumulative condition demonstrates that the alternative would not have adverse effects
7 that are individually less than significant but that would “cumulate” or “be additive” with those of
8 other past, present, and reasonably foreseeable projects to result in an adverse cumulative effect. In
9 this case, because the cumulative condition would not be adverse, and the alternative implemented
10 would not contribute considerably to an adverse cumulative condition, no mitigation would be
11 triggered from this cumulative impact assessment finding. Conversely, if the cumulative condition
12 for public health is determined to be adverse, then further assessment is provided to determine if
13 the incremental contribution of the alternatives would contribute considerably to that adverse
14 cumulative condition. If an alternative’s implementation would not contribute considerably to the
15 adverse cumulative effects identified, then no mitigation is required. However, if an alternative’s
16 implementation would contribute considerably to the adverse cumulative effects identified, then
17 mitigation for the alternative’s contribution to the identified adverse cumulative public health
18 effects is proposed.

19 **25.3.5.1 Cumulative Effects of the No Action Alternative**

20 Under the cumulative condition, the No Action Alternative would entail construction and/or
21 operation and maintenance of the projects in Table 25-11. These projects could result in adverse
22 effects on the public health by lowering drinking water quality due to exceedances of water quality
23 criteria for constituents of concern (trace metals of human health/drinking water concern, DBP, and
24 non-bioaccumulative pesticides) and *Microcystis*; exposing sensitive receptors (e.g., hospitals,
25 schools, parks) to EMF from new transmission lines; increasing the public’s risk of exposure to
26 vector-borne diseases; increasing bioaccumulation of persistent toxicants (e.g., mercury) in fish
27 consumed by people; and exposing the public to pathogens and *Microcystis* in recreational waters.
28 Additionally, there would be a change in various source waters throughout the Delta (i.e., upstream
29 water, Bay water, agricultural return flow) due to potential changes in inflows, particularly from the

1 Sacramento River watershed because of increased water demands or changes to climate and
2 precipitation levels which could expose the public to pathogens in recreational waters.

3 Implementation of any projects would comply with federal, state, and local regulatory agency
4 standards (e.g., CPUC design criteria and guidelines regarding EMFs; drinking water quality
5 standards; existing MVCs) and these projects in the cumulative No Action scenario would require
6 its own separate environmental compliance process to ensure effects were minimized. Therefore,
7 there would be no cumulative adverse effects on public health under the No Action Alternative
8 related to drinking water quality due to exceedances of water quality criteria for constituents of
9 concern; EMF exposure; vector-borne diseases; bioaccumulation of persistent toxicants; or
10 pathogens in recreational waters. However, as indicated in Chapter 8, *Water Quality*, projected
11 future water temperature changes in the Delta under the No Action Alternative indicate that water
12 temperatures would increase due to climate change. This increase in temperature could lead to
13 earlier attainment of the water temperature threshold of 19°C required to initiate *Microcystis* bloom
14 formation, and thus earlier occurrences of *Microcystis* blooms in the Delta. In addition, warmer
15 water temperatures could increase bloom duration and magnitude. Accordingly, long-term water
16 quality degradation may occur in the Delta and water exported from the Delta to the SWP and CVP
17 Export Service Areas. Therefore, impacts on beneficial uses, including drinking water and
18 recreational waters, could occur and, as such, public health could be affected. Accordingly, this
19 would be considered an adverse effect.

20 The Delta and vicinity are within a highly active seismic area, with a generally high potential for
21 major future earthquake events along nearby and/or regional faults, and with the probability for
22 such events increasing over time. Based on the location, extent and non-engineered nature of many
23 existing levee structures in the Delta area, the potential for significant damage to, or failure of, these
24 structures during a major local seismic event is generally moderate to high. In the instance of a large
25 seismic event, levees constructed on liquefiable foundations are expected to experience large
26 deformations (in excess of 10 feet) under a moderate to large earthquake in the region. A major
27 earthquake event could result in breaching/failure of existing levees within the Delta area, with a
28 substantial number of these structures exhibiting moderate to high failure probabilities. The most
29 immediate and significant effect to water quality under such a scenario would be the influx of large
30 volumes of seawater and/or brackish water into the Delta, which would alter the “normal” balance
31 of freshwater/seawater flows and result in flooding of the associated islands. The corresponding
32 shift in Delta water quality conditions would be characterized by an increase in salinity levels,
33 including specific associated constituents such as bromide (which affects total dissolved solids
34 concentrations and can contribute to the formation of undesirable chemical byproducts in treated
35 drinking water). (See Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water
36 Supplies*, for more detailed discussion). Flooding caused by levee failure could result in a substantial
37 increase in the public’s risk of exposure to vector-borne diseases due to large bodies of standing
38 water prior to flood waters being pumped off inundated Delta islands. Additionally, flood events
39 could cause exceedance(s) of water quality criteria for constituents of concern such that an adverse
40 effect would occur to public health from drinking water sources. While similar risks would occur
41 under implementation of the action alternatives, these risks may be reduced by levee improvements
42 under the proposed project, along with those projects identified in Table 25-11.

1 25.3.5.2 Concurrent Project Effects

2 Construction, operation, and maintenance of the water conveyance facilities and other conservation
3 measures under the action alternatives would result in effects on public health in the Plan Area.
4 Effects could include increases in vector-borne diseases; exceedances of water quality criteria for
5 constituents of concern (i.e., DBPs, trace metals, and pesticides); substantial mobilization of or
6 increase in bioaccumulative constituents (i.e., pesticides and methylmercury); exposure of
7 substantially more people to new sources of EMF; exposure of recreationists to pathogens; and
8 increasing the potential for exposure of the public to *Microcystis* and microcystin in drinking water
9 and recreational waters.

10 Construction activities for the water conveyance facilities and CM2–CM11 and CM16 or
11 Environmental Commitments 3, 4, 6–11 and 16, depending upon the alternative, could overlap in
12 time, with construction of the water conveyance facilities, concluding after approximately 14 years.
13 Potential effects on public health resulting from concurrent construction, and potentially operation,
14 of the water conveyance facilities and these conservation measures or Environmental Commitments
15 could compound potential public health effects, particularly where these activities occur in close
16 proximity and within the same timeframe. For example, construction and operation of the water
17 conveyance facilities and CM2–CM7, CM10 and CM11 or Environmental Commitments 3, 4, 6, 7, 10,
18 and 11 could increase suitable mosquito habitat within the Plan Area. Where the construction and
19 operation of the water conveyance facilities and these conservation measures or Environmental
20 Commitments are implemented in the same timeframe, and particularly within the same general
21 area, the potential for adverse public health effects would increase relative to what may occur
22 during construction and operation of the water conveyance facilities alone. Similarly, where
23 construction and operation of the water conveyance facilities and CM2, CM4, CM5, and CM10 or
24 Environmental Commitment 4, 5 and 10 overlap in time and occur in close proximity, there would
25 be a greater potential for substantial mobilization of or increase in bioaccumulative pesticides and
26 fish tissue concentrations of mercury in that area. Implementation of environmental commitments
27 related to mosquito management and erosion and sediment control, and *CM12 Methylmercury*
28 *Management* (or Environmental Commitment 12) would reduce the severity of these potential
29 effects on public health.

30 In the long term, operation of the water conveyance facilities and conservation measures would
31 occur simultaneously and, as a result, potential effects on public health could be additive for certain
32 alternatives. For example, the concurrent implementation of Alternatives 6A–9, under which
33 operation of the water conveyance facilities would result in significant unavoidable impacts on
34 public health related to modeled increases in mercury concentrations in fish tissue, with
35 conservation measures may be more adverse/significant than when considered separately,
36 particularly because of the bioaccumulative properties of mercury and because the Delta is already
37 impaired due to elevated mercury.

1 **25.3.5.3 Cumulative Effects of the Action Alternatives**

2 **Impact PH-10: Cumulative Impact on Public Health from Constituents of Concern (DBPs and** 3 **Pesticides)**

4 *NEPA Effects:*

5 **All Action Alternatives (Pesticides)**

6 Currently, other projects that could affect drinking water include the projects listed in Table 25-11.
7 These projects may result in changes to flow in the Plan Area and thus could alter surface water
8 pesticide concentrations in the study area. While factors such as TMDLs and future development of
9 more target-specific and less-toxic pesticides would ultimately influence the future cumulative
10 condition for pesticides, forecasting whether these various efforts would ultimately be successful at
11 resolving current pesticide-related impairments requires considerable speculation. Accordingly, it is
12 conservatively assumed that the cumulative condition would be adverse with respect to pesticides.
13 Construction and operation of the water conveyance facilities for Alternatives 1A–1C, 4A, 2D, and 5A
14 are not expected to contribute considerably to the adverse cumulative condition associated with
15 increases in pesticide concentrations in surface water and, consequently, in drinking water. Further,
16 although there would be forecasted increases in pesticide concentrations in surface water at various
17 Delta locations in the study area, according to modeling results for water supply operations for some
18 proposed action alternatives (as previously indicated under Impact PH-2 for Alternatives 2A–2C, 3–
19 5, 6A–6C, and 7–9), the prediction of adverse effects (the long-term risk of pesticide-related toxicity
20 to aquatic life) fundamentally assumes that the present pattern of pesticide incidence in surface
21 water would continue at similar levels into the future. In reality the makeup and character of the
22 pesticide use market during the late long-term would not be exactly as it is today. Use of
23 chlorpyrifos and diazinon is on the decline with their replacement by pyrethroids on the rise. Yet, in
24 this assessment it is the apparent greater incidence of diazinon and chlorpyrifos in the San Joaquin
25 River that serves as the basis for concluding that substantially increased San Joaquin River source
26 water fraction would correspond to an increased risk of pesticide-related toxicity to aquatic life.
27 However, water treatment plants are required to meet drinking water requirements set forth in the
28 California Safe Drinking Water Act and the regulations adopted by CDPH. Therefore, it is not
29 anticipated that there would be cumulative adverse effects on public health from pesticides in
30 drinking water due to implementation of the action alternatives in combination with any of the
31 cumulative projects.

32 **Alternatives 1A–1C, 2A–2C, 3, 4, 5, 6A–6C, 7, 8, and 9 (DBPs [from increases in bromide** 33 **concentrations])**

34 Currently, other projects that could affect concentrations of constituents of concern in drinking
35 water include the projects listed in Table 25-11. These projects may result in changes to flow in the
36 study area and thus could alter DBP concentrations (from increases in bromide concentrations in
37 surface water drinking sources). The BDCP alternatives are anticipated to result in the potential for
38 public health concerns because the changes in flow associated with the water conveyance facilities
39 operations would increase the concentrations of bromide at various modeled Delta locations, with
40 the greatest increase projected to occur at the North Bay Aqueduct at Barker Slough. This increase
41 could necessitate drinking water treatment plant upgrades or operational changes in order to
42 maintain DBP compliance. While treatment technologies sufficient to achieve the necessary bromide
43 removal exist, implementation of such technologies would likely require substantial investment in

1 new or modified infrastructure. Should treatment plant upgrades not be undertaken, a change of
 2 such magnitude in long-term average bromide concentrations in drinking water sources would
 3 represent an increased risk for adverse effects on public health from DBP in drinking water sources.
 4 Implementation of Mitigation Measure WQ-5 would reduce the severity of this impact. The proposed
 5 mitigation requires a series of phased actions to identify and evaluate existing and possible feasible
 6 actions to avoid, minimize, or offset increased bromide concentrations, followed by development
 7 and implementation of the actions, if determined to be necessary. Further, as described for Impact
 8 PH-2 under Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at Barker
 9 Slough may be further minimized by implementation of the AIP. However, when these potential
 10 effects of the BDCP alternatives on public health are considered in combination with the potential
 11 effects of projects listed in Table 25-11 and in Appendix 3D, *Defining Existing Conditions, the No*
 12 *Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, the effects of these
 13 action alternatives would be cumulatively considerable and therefore there would be a cumulative
 14 adverse effect on public health due to DBPs.

15 **Alternatives 4A, 2D, and 5A (DBPs [from increases in DOC and bromide concentrations])**

16 Currently, other past, present, and probably future projects that could affect concentrations of
 17 constituents of concern in drinking water include the projects listed in Table 25-11. These projects
 18 may result in changes to flow in the study area and thus could alter DBP concentrations (from
 19 increases in bromide and DOC concentrations in surface water drinking sources). In addition, the
 20 Delta is currently known to have elevated DOC levels exceeding standards, the cumulative condition
 21 generated from past and present projects is already considered adverse. However, neither habitat
 22 restoration and enhancement activities or construction, operation, and maintenance of the water
 23 conveyance facilities under Alternatives 4A, 2D, and 5A is expected to make a considerable adverse
 24 contribution to existing and future DOC levels in the Delta. The areal extent and magnitude of
 25 habitat restoration under these alternatives is considerably less than under the other action
 26 alternatives and therefore the contribution to existing DOC would be relatively low. In addition, as
 27 indicated in the water quality analysis (see Chapter 8, *Water Quality*), bromide would not increase
 28 substantially in drinking water sources in the study area. Therefore, there would not be a
 29 cumulative adverse effect on public health from increases in DBPs in drinking water sources in the
 30 study area due to implementing Alternatives 4A, 2D, and 5A.

31 **Alternatives 6A–C, 7–9 (DBPs [from increases in DOC concentrations])**

32 Currently, other projects that could affect drinking water include the projects listed in Table 25-11.
 33 These projects may result in changes to flow in the study area and thus could alter DOC/DBP
 34 concentrations in the study area. Furthermore, since the Bay-Delta is currently known to have
 35 elevated DOC levels exceeding standards, the cumulative condition generated from past and present
 36 projects is already considered adverse.

37 Alternatives 6A–6C and 7–9 could have substantially adverse effects on public health associated
 38 with DBPs in drinking water as a result of increases in DOC concentrations at certain Delta locations.
 39 Operation of the water conveyance facilities under these alternatives would result in increased DOC
 40 levels at Franks Tract, Rock Slough and Contra Costa Pumping Plant No. 1. Under these alternatives,
 41 long-term average DOC concentration could increase by up to 41%, relative to the No Action
 42 Alternative. This increase could necessitate drinking water treatment plant upgrades or operational
 43 changes in order to maintain DBP compliance. Thus, the DOC contributions at Franks Tract, Rock
 44 Slough, and Contra Costa Pumping Plant No. 1 from these proposed alternatives are determined to

1 contribute considerably to the adverse cumulative condition for DOC in the Delta and potentially
2 DBPs in drinking water, which could result in an adverse effect on public health. While Mitigation
3 Measure WQ-17 is available to reduce impacts associated with DOC, it is unknown whether it would
4 reduce potential adverse effects entirely. Therefore, the contribution of Alternatives 6A–C and 7–9
5 to the cumulative DOC-related public health effects would be cumulatively considerable, and there
6 would be a cumulative adverse effect.

7 **CEQA Conclusion:** Operation of cumulative projects within the Delta could result in cumulative
8 impacts on public health related to increases in DBPs in drinking water. Alternatives 4A, 2D, and 5A
9 would not substantially increase DOC and bromide concentrations, and therefore DBPs, in drinking
10 water sources in the study area. Bromide concentrations at Barker Slough are anticipated to
11 increase substantially under all action alternatives except Alternatives 4A, 2D and 5A during the
12 drought period relative to Existing Conditions, and Alternatives 1A–1C, 2A–2C, 4, 5 and 6A–6C
13 would substantially increase long-term average bromide concentrations at Barker Slough relative to
14 Existing Conditions in all modeled years. DOC concentrations could increase by up to 46% at Franks
15 Tract, Rock Slough and Contra Costa Pumping Plant No. 1 relative to Existing Conditions under
16 Alternatives 6A–6C and 7–9. This cumulative impact is considered significant and the incremental
17 contribution to potential impacts of DBPs on public health from the action alternatives discussed
18 would be cumulatively considerable.

19 Mitigation Measure WQ-5 is available to reduce these effects (implementation of this measure along
20 with a separate other commitment as set forth in EIR/EIS Appendix 3B, *Environmental*
21 *Commitments, AMMs, and CMs*, relating to the potential increased treatment costs associated with
22 bromide-related changes would reduce these effects). While Mitigation Measures WQ-5 and
23 implementation of the AIP may reduce impacts associated with increase bromide concentrations at
24 Barker Slough, and Mitigation Measure WQ-17 may reduce impacts associated with DOC, it is
25 unknown to what level of reduction (i.e., below significance).

26 In addition to and to supplement Mitigation Measure WQ-5, the project proponents have
27 incorporated into the project, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments,*
28 *AMMs, and CMs*, a separate other commitment to address the potential increased water treatment
29 costs that could result from bromide-related concentration effects on municipal water purveyor
30 operations. Potential options for making use of this financial commitment include funding or
31 providing other assistance towards implementation of the North Bay Aqueduct AIP, acquiring
32 alternative water supplies, or other actions to indirectly reduce the effects of elevated bromide and
33 DOC in existing water supply diversion facilities. Please refer to Appendix 3B for the full list of
34 potential actions that could be taken pursuant to this commitment in order to reduce the water
35 quality treatment costs associated with water quality effects relating to chloride, electrical
36 conductivity, and bromide. Because the proponents cannot ensure that the results of coordinated
37 actions with water treatment entities will be fully funded or implemented successfully prior to the
38 project's contribution to the cumulative impact, the ability to fully mitigate this impact is uncertain.
39 If a solution that is identified by the proponents and an affected water purveyor is not fully funded,
40 constructed, or implemented before the project's contribution to the cumulative impact is made, a
41 cumulatively considerable impact in the form of increased DBP in drinking water sources could
42 occur. Accordingly, this cumulative impact would be significant and unavoidable. If, however, all
43 financial contributions, technical contributions, or partnerships required to avoid significant
44 impacts prove to be feasible and any necessary agreements are completed before the project's
45 contribution to the cumulative effect is made, the cumulative impact would be less than significant.

1 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 2 **Conditions; Site and Design Restoration Sites to Reduce Bromide Increases in Barker**
 3 **Slough**

4 Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A.

5 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 6 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

7 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

8 **Impact PH-11: Cumulative Impact from Substantial Mobilization of or Increase in**
 9 **Constituents Known to Bioaccumulate as a Result of Construction, Operation or Maintenance**
 10 **of the Water Conveyance Facilities or as a Result of Implementing the Restoration**
 11 **Conservation Measures or Environmental Commitments**

12 *NEPA Effects:*

13 **Alternatives 1A–1C, 2A–2C, 3, 4, 5, 4A, 2D and 5A**

14 Numerous regulatory efforts have been implemented to control and reduce mercury loading to the
 15 Delta, which include a Delta mercury TMDL and its implementation strategies, increased restrictions
 16 on point-source discharges such as publically owned treatment works (POTWs), greater restrictions
 17 on suction dredging in Delta tributary watersheds, and continued clean-up actions on mine drainage
 18 in the upper watersheds. A key challenge surrounds the pool of mercury deposited in the sediments
 19 of the Delta, which cannot be readily or rapidly reduced despite efforts to reduce loads in Delta
 20 tributaries, and which serves as a source for continued methylation and bioaccumulation of
 21 methylmercury by Delta biota. Consequently, mercury levels in Delta waters are considered to be an
 22 adverse cumulative condition.

23 Projects shown in Table 25-11 could affect constituents known to bioaccumulate, such as
 24 methylmercury. These projects are not anticipated to substantially increase methylmercury
 25 concentrations in the study area because they are not anticipated to have actions that would
 26 mobilize such a constituent. Once operational, the habitat restoration projects could result in an
 27 increase of methylmercury in the study area as a result of biogeochemical processes and sediment
 28 conditions established in tidal wetlands. However, it is expected these projects either have
 29 evaluated or would evaluate the potential for methylmercury production and would implement
 30 measures to monitor and adaptively manage methylmercury production. For example, the Suisun
 31 Marsh Plan EIS/EIR evaluated the potential for methylmercury production due to tidal restoration
 32 and determined it would result in less-than-significant impacts and that monitoring and other
 33 measures would be incorporated into the adaptive management plan to manage methylmercury
 34 concerns. Therefore, the habitat restoration projects that would occur under cumulative conditions
 35 are not likely to adversely affect public health. However, because the existing condition is already
 36 considered cumulatively adverse, the cumulative effect of these restoration projects would be
 37 considered adverse.

38 Based on water quality modeling results, water conveyance facilities operation and maintenance for
 39 Alternatives 1A–5A would not be expected to substantially alter the existing adverse cumulative
 40 condition for mercury and the mercury impairment in the Delta. However, implementation of the
 41 following conservation measures and Environmental Commitments for the identified alternatives

1 could create conditions resulting in increased methylation of mercury within the Delta per unit time,
 2 increased biotic exposure to and uptake of methylmercury, and result in increased mercury
 3 bioaccumulation in fish tissues.

- 4 • Tidal wetland restoration: CM4 (Alternatives 1A–1C, 2A–2C, 3, 4, and 5) and Environmental
 5 Commitment 4 (Alternatives 4A, 2D, and 5A)
- 6 • Nontidal marsh restoration: CM10 (Alternatives 1A–1C, 2A–2C, 3, 4, and 5) and Environmental
 7 Commitment 10 (Alternatives 4A, 2D, and 5A)
- 8 • Floodplain restoration: CM5 (Alternatives 1A–1C, 2A–2C, 3, 4, and 5)
- 9 • Yolo Bypass fisheries enhancement: CM2 (Alternatives 1A–1C, 2A–2C, 3, 4, and 5)

10 Although the amount of habitat restoration to be implemented for the Environmental Commitments
 11 of Alternatives 4A, 2D, and 5A would be relatively small compared to the areal extent of the Delta
 12 and compared to that implemented under Alternatives 1A–1C, 2A–2C, 3, 4, and 5, implementation of
 13 habitat restoration identified above under all of these action alternatives would be expected to
 14 contribute considerably to methylation of mercury at certain localized areas within the Delta (i.e.,
 15 where the aquatic restoration areas are planned).

16 Design of habitat restoration sites for Alternatives 4A, 2D, and 5A would be guided by
 17 Environmental Commitment 12: Methylmercury Management and design of habitat restoration sites
 18 for Alternatives 1A–1C, 2A–2C, 3, 4, and 5 would similarly be guided by *CM12 Methylmercury*
 19 *Management*, both of which require development of site-specific mercury management plans as
 20 restoration actions are implemented. In addition, existing OEHHA standards would reduce the
 21 public's exposure to mercury-contaminated fish.

22 The effectiveness of minimization and mitigation actions implemented according to the mercury
 23 management plans is not known at this time, although the potential to reduce methylmercury
 24 concentrations exists based on current research. Although Environmental Commitment 12 and
 25 CM12 would be implemented with the goal to reduce this potential effect, the uncertainties related
 26 to site-specific restoration conditions and the potential for increases in methylmercury
 27 concentrations in the Delta could contribute substantially to the cumulative condition for mercury in
 28 the Delta.

29 Thus, the incremental contribution of implementing CM4, CM5, and CM10, and possibly CM2 for
 30 Alternatives 1A–1C, 2A–2C, 3, 4, and 5, or Environmental Commitments 3, 4, and 10 for Alternatives
 31 4A, 2D, and 5A, in combination with projects shown in Table 25-11, could make a considerable
 32 incremental contribution to methylation of mercury in these restored wetland habitats and to the
 33 existing cumulative condition for mercury in the Delta. Because the existing condition is already
 34 considered cumulatively adverse, the cumulative effect would be adverse.

35 **Alternatives 6A–C and 7–9**

36 Water quality modeling results for Alternatives 6A–C and 7–9 water supply operations indicate that
 37 there may be small, insignificant increases in waterborne mercury and methylmercury
 38 concentrations at various modeled Delta locations within the study area; these increases are not
 39 expected to substantially alter the existing adverse cumulative condition for mercury and the
 40 mercury impairment in the Delta. Therefore, the incremental contribution to the existing adverse
 41 cumulative condition for waterborne mercury in the study area would not be considered adverse.

1 However, under Alternatives 6A–6C and 7–9, modeling results indicated that water supply
 2 operations would result in substantial increases in fish tissue mercury concentrations at certain
 3 Delta locations (see Impact PH-3 for Alternatives 6A–6C and 7–9) relative to the No Action
 4 Alternative. Thus, body burdens of mercury in fish would be measurably higher, and could thereby
 5 substantially increase the health risks to people consuming those fish. The incremental contribution
 6 of operating the water conveyance facilities under these action alternatives to increasing fish tissue
 7 mercury concentrations in fish, and thus contributing to potential public health effects from
 8 mercury bioaccumulation in the study area is considered cumulatively considerable and
 9 cumulatively adverse.

10 Further, implementation of CM4 (tidal wetland habitat), CM5 (floodplain habitat), CM10 (nontidal
 11 marsh habitat), and possibly CM2 (Yolo Bypass fisheries enhancements) could create conditions
 12 resulting in increased methylation of mercury within the Delta per unit time, increased biotic
 13 exposure to and uptake of methylmercury, and result in increased mercury bioaccumulation in fish
 14 tissues. The incremental contribution of implementing these conservation measures in combination
 15 with projects shown in Table 25-11 could make a cumulatively considerable contribution to
 16 methylation of mercury in these restored wetland habitats and to the existing cumulative condition
 17 for mercury in the Delta. Because the baseline condition is already considered cumulatively adverse,
 18 the cumulative effect would be adverse.

19 **CEQA Conclusion:** Water conveyance facilities operations and maintenance under any action
 20 alternative would not be expected to substantially alter the existing adverse cumulative condition
 21 for mercury and the Delta’s mercury impairment. However, water quality modeling results indicate
 22 that water supply operations for Alternatives 6A–6C and 7–9 would result in substantial increases in
 23 fish tissue mercury concentrations at certain Delta locations. Additionally, implementing CM4, CM5,
 24 CM10, and possibly CM2 as part of the BDCP alternatives, or Environmental Commitments 3, 4, and
 25 10 as part of the non-HCP alternatives, could create conditions resulting in increased methylation of
 26 mercury within the Delta per unit time, increased biotic exposure to and uptake of methylmercury,
 27 and result in increased mercury bioaccumulation in fish tissues. These potential increases in the
 28 bioaccumulation of mercury by fish in the study area could increase the health risks to people
 29 consuming those fish. Because the baseline condition for mercury in the study area is already
 30 impaired, implementation of the cumulative projects identified in Table 25-11 combined with the
 31 action alternatives would result in a significant cumulative impact on public health due to increased
 32 body burdens of mercury in fish, and the contribution of the action alternatives, as identified, would
 33 be cumulatively considerable.

34 To help reduce the severity of this impact design and implementation of wetland, floodplain, tidal
 35 and nontidal habitat shall conform to the relevant requirements of the Delta Mercury Control
 36 Strategy of the Central Valley Water Board Basin Plan. Requirements of the Delta Mercury Control
 37 Strategy include the following.

- 38 ● Required participation in efforts to evaluate and minimize health risk associated with eating
 39 mercury contaminated fish.
- 40 ● Required participation in monitoring methylmercury loading from wetlands.
- 41 ● Implementation of appropriate and site-specific methylmercury control measures.

42 Appropriate methylmercury control measures shall be developed at the time of formal restoration
 43 planning and design. All practicable measures (i.e., those that are both feasible and reasonable from
 44 a cost-benefit perspective) to reduce methylmercury formation shall be considered for

1 implementation. As part of CM12 and Environmental Commitment 12, appropriate strategies and
 2 control measures to minimize the production of methylmercury in restored tidal wetland areas
 3 would promote the following actions.

- 4 • Assessment of preresoration conditions to determine the risk that the project could result in
 5 increased mercury methylation and bioavailability
- 6 • Definition of design elements that minimize conditions conducive to generation of
 7 methylmercury in restored areas
- 8 • Definition of adaptive management strategies that can be implemented to monitor and minimize
 9 actual post-restoration creation and mobilization of methylmercury into environmental media
 10 and biota

11 Implementation of Environmental Commitment 12 would be consistent with the revised description
 12 of CM12 (see Appendix 11F, *Substantive BDCP Revisions*). Development and implementation of this
 13 Environmental Commitment would be done in coordination with the Sacramento-San Joaquin Delta
 14 Methylmercury Total Maximum Daily Load (Methylmercury TMDL) and *Amendments to the Water
 15 Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of
 16 Methylmercury and Total Mercury in the Sacramento-San Joaquin Delta Estuary* (Mercury Basin Plan
 17 Amendments)(Central Valley Regional Water Quality Control Board 2010b, 2011).

18 The methylmercury control measures implemented under CM12 and Environmental Commitment
 19 12 may not completely eliminate the adverse cumulative water quality conditions, but would be
 20 expected to lessen the contributions to the degree feasible. Hence, some level of contribution to
 21 adverse cumulative conditions is anticipated to remain after mitigation, and therefore the action
 22 alternatives' contribution to this cumulative impact would remain cumulatively considerable.

23 **Impact PH-12: Cumulative Impact on Public Health from Construction, Operation or** 24 **Maintenance of the Action Alternatives with Respect to Pathogens, Trace Metals, Vectors, and** 25 **EMFs**

26 **NEPA Effects:** When the effects of implementing any of the action alternatives on pathogens and
 27 trace metals (including the new water conveyance facilities, fish screens, gates, and other physical
 28 structures and their operations and maintenance activities) are considered together with the
 29 potential effects of projects listed in Table 25-11, as well as in Appendix 3D, *Defining Existing
 30 Conditions, the No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, the
 31 cumulative water quality condition in the study area for the pathogens and trace metals is not
 32 considered to be adverse. Primary sources of trace metals to Delta waters include acid mine
 33 drainage (e.g., zinc, cadmium, copper, lead) from abandoned and inactive mines (i.e., Iron Mountain
 34 and Spring Creek mines) in the Shasta watershed area, which enter the Sacramento River system
 35 through Shasta Lake and Keswick Reservoir; agriculture (e.g., copper and zinc); POTW discharges
 36 (e.g., copper, zinc, and aluminum); and urban runoff (e.g., zinc, copper, lead, cadmium). Continued
 37 efforts to control acid mine drainage into the Sacramento River system and increasingly stringent
 38 regulations are expected in the future. Monitoring and regulatory controls on agricultural runoff,
 39 POTW discharges, and urban runoff are anticipated to prevent trace metal concentration under the
 40 cumulative condition from becoming adverse.

41 There are numerous potential sources of disease-causing pathogens in the Delta, including urban
 42 runoff, wastewater treatment discharges, agricultural discharges, and wetlands. Tidal wetland
 43 creation, which would occur under several of the cumulative projects and the action alternatives,

1 could encourage increased coliform presence because of the aquatic, terrestrial, and avian wildlife
 2 that would be drawn to these areas. However, the localized nature of pathogen generation and the
 3 quick die-off of some types of pathogens once released into water bodies would generally prevent
 4 substantial pathogen exposure to recreationists and the cumulative effect would not be considerable
 5 or adverse. Accordingly, the incremental contribution of the action alternatives would not be
 6 cumulatively considerable.

7 Although the cumulative projects could result in an increase in potential mosquito habitat (e.g.,
 8 more standing shallow water), vector habitat is already present in the study area and programs to
 9 prevent mosquitoes from breeding and multiplying are in place. With any action alternative,
 10 implementation of environmental commitments, such as coordination with MVCDS and
 11 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 12 Appendix 3B, *Environmental Commitments, AMMs, and CMs*), would help control mosquitoes and
 13 reduce the potential for an increase in mosquito breeding habitat, and a cumulatively considerable
 14 increase in vector-borne diseases is unlikely to result. Furthermore, mosquito predators would
 15 likely increase as a result of restoration and enhancement actions undertaken for the cumulative
 16 projects, including the action alternatives. Therefore an action alternative's incremental impacts
 17 associated with vectors would not be cumulatively considerable or adverse.

18 Past, present and reasonably foreseeable future projects have resulted in the development and
 19 operation of transmission lines in the study area that expose existing populations and sensitive
 20 receptors to EMFs. Although existing populations and sensitive receptors are exposed to EMFs, it is
 21 not considered an adverse condition because current scientific evidence does not show conclusively
 22 that EMF exposure can increase health risks. Design and implementation of new temporary or
 23 permanent transmission lines under the action alternatives will incorporate CPUC's EMF Design
 24 Guidelines if feasible, which includes shielding, cancellation, and measures to reduce EMF exposure.
 25 Accordingly, although the action alternatives (except for Alternative 9) would have new EMF-
 26 generating facilities, they would not be a cumulatively considerable incremental contribution. There
 27 would not be an adverse cumulative effect with respect to an increase in public exposure to EMFs.

28 **CEQA Conclusion:** Construction, and operation and maintenance of the action alternatives would
 29 not result in a significant incremental contribution to pathogens, trace metals, vectors, or EMFs in
 30 the study area. In combination with other past, present, and reasonably foreseeable future within
 31 the Delta, these alternatives would not result in significant cumulative impacts on public health
 32 related to pathogens, trace metals, disease vectors, or electromagnetic fields. The action alternatives
 33 contribution to this impact is not considered to be cumulatively considerable.

34 **Impact PH-13: Cumulative Impact on Public Health due to Increases in *Microcystis* Bloom**
 35 **Formation as a Result of Operation of the Water Conveyance Facilities and Implementation of**
 36 **CM2 and CM4 or Environmental Commitment 4**

37 **NEPA Effects:** Neither operation of the water conveyance facilities or implementation of CM2 and
 38 CM4 (under the BDCP alternatives) or Environmental Commitment 4 (under Alternatives 4A, 2D,
 39 and 5A) would be expected to promote *Microcystis* bloom formation in the reservoirs and
 40 watersheds upstream of the Delta. *Microcystis* blooms in the Export Service Areas could increase due
 41 to increased water temperatures resulting from climate change, but not due to water conveyance
 42 facility operations. Hydraulic residence times in the Export Service Area would not be affected by
 43 operations of the water conveyance facilities, and therefore conditions in those areas would not be
 44 more conducive to *Microcystis* bloom formation. However, as discussed in Chapter 8, *Water Quality*,

1 because the degree to which *Microcystis* blooms, and thus concentrations of microcystins, would
2 increase in source water from the South Delta is unknown, it cannot be determined whether the
3 action alternatives would result in increased or decreased levels of microcystins in the mixture of
4 source waters exported from Banks and Jones pumping plants, relative to the No Action Alternative.

5 Operation of the water conveyance facilities, as well as implementation of CM2 and CM4 under the
6 BDCP alternatives, would increase hydraulic residence time during the summer period in the Delta
7 relative to the No Action Alternative. Longer residence times in portions of the Delta could
8 potentially increase the frequency, magnitude, and geographic extent of *Microcystis* blooms relative
9 to the No Action Alternative. Siting and design of restoration areas would have a substantial
10 influence on the magnitude of residence time increases that would occur under these alternatives.
11 However, as discussed in Chapter 8, *Water Quality*, the expected residence time changes under the
12 BDCP alternatives, compared the No Action Alternative, are in a direction and of magnitude that
13 could lead to an increase in Delta *Microcystis* blooms, which could potentially result in adverse
14 effects on public health through exposure via drinking water quality and recreational waters.

15 As described in Chapter 8, change in flow paths of water through the Delta would occur under
16 Alternatives 4A, 2D, and 5A, which could result in localized increases in hydraulic residence time in
17 various Delta areas, and decreases in residence time in other areas. Implementation of the small
18 amount of habitat restoration within the Delta under the Environmental Commitments for these
19 non-HCP alternatives could also affect hydraulic residence times at the affected areas. While there is
20 uncertainty regarding the degree to which the alternatives would affect water residence times in the
21 Delta, it is anticipated that the combined effects of restoration activities, sea level rise and climate
22 change will drive the residence time changes and that the alternatives and other cumulative projects
23 would not contribute considerably to the adverse *Microcystis* and microcystins condition in the
24 Delta, in particular because the amount of habitat restoration by the alternatives to be implemented
25 would be so limited in area and location as it would not affect residence times Delta-wide.

26 Therefore, the effects on hydraulic residence time in the Delta of operating the water conveyance
27 facilities under the BDCP alternatives relative to the No Action Alternative, as well as the effects of
28 implementing CM2 and CM4, could result in an adverse effect on public health due to the potential
29 adverse effects of *Microcystis* and microcystin on beneficial uses, including drinking water and
30 recreational waters. As such, there would be an adverse effect on public health. Mitigation Measures
31 WQ-32a and WQ-32b may reduce the effect on *Microcystis* from increased hydraulic residence time.
32 However, the effectiveness of these mitigation measures to result in feasible measures for reducing
33 water quality effects, and therefore potential public health effects, is uncertain. Other past, present,
34 and probable future projects and programs in the region (identified in Table 25-11 and Appendix
35 3D, *Environmental Commitments, AMMs, and CMs*) could contribute to lower flows and longer
36 hydraulic residence times and water temperatures conducive to *Microcystis* blooms. The predicted
37 increase in *Microcystis* blooms in the Delta as a result of operation of the water conveyance facilities
38 and implementation of CM2 and CM4 under all action alternatives except Alternative 4A, 2D and 5A
39 would be cumulatively considerable. Accordingly, there would be a cumulative adverse effect on
40 public health as a result of increasing *Microcystis* blooms and microcystin levels in the Delta.

1 **CEQA Conclusion:** Although there is uncertainty, water supply operations under Alternatives 4A, 2D,
 2 and 5A are not expected to increase water residence times or ambient water temperatures
 3 throughout the Delta relative to Existing Conditions, and therefore Delta waters are not expected to
 4 be adversely affected by *Microcystis* blooms under these three alternatives. Implementation of
 5 Environmental Commitment 4 under Alternatives 4A, 2D, and 5A is not expected to contribute
 6 substantially to conditions conducive to *Microcystis* blooms because the area of restoration would be
 7 so small as to have no effect on through-Delta residence time.

8 Modeling results indicate that hydraulic residence times in the Delta would increase under the BDCP
 9 alternatives relative to Existing Conditions. Under these alternatives, the operation of the water
 10 conveyance facilities and implementation of CM2 and CM4 would increase hydraulic residence times
 11 in the Delta such that conditions would be favorable to *Microcystis* blooms, and therefore
 12 microcystin, throughout the area. Accordingly, beneficial uses including drinking water and
 13 recreational waters would be impacted and, as a result, so would public health.

14 Other past, present, and probable future projects and programs in the region (identified in Table 25-
 15 11 and Appendix 3D, *Environmental Commitments, AMMs, and CMs*) could contribute to lower flows
 16 and longer hydraulic residence times and water temperatures conducive to *Microcystis* blooms, and
 17 this could result in a significant impact on public health in the study area. The incremental
 18 contribution of operation of the water conveyance facilities and implementation of CM2 and CM4 to
 19 the cumulative effect on public health related to *Microcystis* under the BDCP alternatives would be
 20 cumulatively considerable and significant.

21 Implementation of Mitigation Measure WQ-32a and WQ-32b may reduce degradation of Delta water
 22 quality due to *Microcystis*. Mitigation Measure WQ-32a would require that hydraulic residence time
 23 considerations be incorporated into restoration area site design for CM2 and CM4 using the best
 24 available science at the time of design. Mitigation Measure WQ-32b would require that the project
 25 proponents monitor for *Microcystis* abundance in the Delta and use appropriate statistical methods
 26 to determine whether increases in abundance are significant. This mitigation measure also requires
 27 that if *Microcystis* abundance increases (relative to Existing Conditions), the project proponents will
 28 investigate and evaluate measures that could be taken to reduce hydraulic residence time in affected
 29 areas of the Delta. However, because the effectiveness of these mitigation measures to result in
 30 feasible measures for reducing water quality effects, and therefore potential public health effects, is
 31 uncertain, this impact would be cumulatively significant and unavoidable.

32 **Mitigation Measure WQ-32a: Design Restoration Sites to Reduce Potential for Increased**
 33 ***Microcystis* Blooms**

34 Please see Mitigation Measure WQ-32a under Impact WQ-32 in the discussion of Alternative 1A
 35 in Chapter 8, *Water Quality*.

36 **Mitigation Measure WQ-32b: Investigate and Implement Operational Measures to Manage**
 37 **Water Residence Time**

38 Please see Mitigation Measure WQ-32b under Impact WQ-32 in the discussion of Alternative 1A
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