

This chapter focuses on issues related to human health and safety that could potentially be affected by implementation of the BDCP 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 BDCP 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.

25.1 Environmental Setting/Affected Environment

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

The discussion of drinking water covers various nutrients, metals, chemicals, and the physical conditions that affect the quality of water resources as related to human health. Bioaccumulation concerns the uptake of toxicants into the tissues of fish and shellfish, and has the potential to affect the health of those who consume fish and shellfish on a regular basis. Pathogens (disease-causing

1 micro-organisms) in water can create adverse health effects in people who use the Delta for
 2 recreational activities. The discussion of vectors concerns the spread of disease through mosquitoes.
 3 While the California Public Utilities Commission (CPUC) does not recognize the potential adverse
 4 health impacts related to electromagnetic field (EMF) exposure generated by transmission power
 5 lines, this chapter discusses the potential for adverse health effects associated with EMF exposure in
 6 relation to new transmission lines in the study area and extending immediately outside of the study
 7 area. Proposed transmission lines for each alternative are depicted in detail in Figures M3-1, M3-2,
 8 M3-3, M3-4, and M3-5 (Mapbook volume).

9 Federal, state, and local agencies responsible for water quality regulations and standards for
 10 drinking water under which bioaccumulation of toxicants and water-borne pathogens are managed,
 11 are discussed in Section 25.2, *Regulatory Setting*.

12 **25.1.1 Potential Environmental Effects Area**

13 For the purposes of this analysis, the study area (the area in which impacts may occur) for public
 14 health is defined as the Plan Area (the area covered by the BDCP) and Areas of Additional Analysis.
 15 As defined in Chapter 1, *Introduction*, the Plan Area encompasses the aquatic and terrestrial
 16 ecosystems, the natural communities and adjacent riparian and floodplain natural communities
 17 within the statutory Delta (as defined in Water Code Section 12220), as well as the Suisun Marsh
 18 and Yolo Bypass (see Figure 1-4). The statutory Delta includes parts of Yolo, Solano, Contra Costa,
 19 San Joaquin, and Sacramento Counties. The Areas of Additional Analysis are two areas outside the
 20 defined Plan Area that encompass power transmission corridors. One area lies west of the Plan Area
 21 and is considered in analysis of proposed BDCP alternatives that include the western alignment
 22 (Alternatives 1C, 2C, and 6C); the other area lies east of the Plan Area and represents the
 23 transmission line alignment analyzed for Alternative 4) (Figures M3-1, M3-2, M3-3, M3-4, and M3-5
 24 (Mapbook volume).

25 Potential public health impacts occurring as a result of the BDCP alternatives primarily would be
 26 localized. Given downstream flows, potential health effects from water quality-related impacts
 27 would not be transported upstream, and therefore this chapter does not discuss public water
 28 related health effects in the Upstream of the Delta Region. Potential drinking water impacts would
 29 occur first and most prominently in the study area because, after water is exported to other areas of
 30 the state, it is treated and distributed by water purveyors and districts; thus, this chapter discusses
 31 the SWP/CVP Export Service Areas only as necessary. Potential spread of disease through
 32 mosquitoes is expected to occur only within the study area because of the life cycle of mosquitoes
 33 and the distance they travel. It is not expected that there would be significant impacts from vectors
 34 outside of the study area. Additionally, potential effects on public health from EMF exposure would
 35 be limited to the areas surrounding the new transmission lines, which would be confined within the
 36 Plan Area and in the Areas of Additional Analysis. If an alternative that includes one of these
 37 corridors is selected, the extension will be incorporated into the Plan Area.

38 **25.1.1.1 Drinking Water**

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

1 **Constituents of Concern**

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

12 **Disinfection Byproducts**

13 Trihalomethanes (THMs) and Haloacetic Acids (HAA5) are chemicals that are formed along with
 14 other disinfection byproducts (DBP) when chlorine or other disinfectants used to control microbial
 15 contaminants in drinking water react with naturally occurring organic and inorganic matter in
 16 water. THMs are chloroform, bromodichloromethane (BDCM), dibromochloromethane (DBCM), and
 17 bromoform. HAA5 chemicals include monochloroacetic acid, dichloroacetic acid, trichloroacetic acid,
 18 monobromoacetic acid, and dibromoacetic acid. The disinfection process for drinking water includes
 19 adding chlorine to drinking water sources prior to release into public drinking water distribution
 20 systems. The chlorine reacts with organic carbon (total [TOC] and dissolved [DOC]) and bromide
 21 that are in water sources and forms DBPs. Generally, if organic carbon is not chlorinated, or bromide
 22 was not present, the risk of DBP formation at drinking water plants is greatly reduced. The U.S.
 23 Environmental Protection Agency (EPA) indicates that ingestion of water containing DBPs over
 24 many years could lead to liver, kidney, or central nervous system problems, and an increased risk of
 25 cancer (U.S. Environmental Protection Agency 2012a). Table 8-21 (Chapter 8, *Water Quality*)
 26 presents DOC concentrations at selected north- and south-of-Delta stations for water years 2001 –
 27 2006; total organic carbon concentrations at Delta intakes and major tributaries are provided in
 28 Table 8.20. Bromide concentrations at various locations in the Plan Area are provided in Chapter 8,
 29 Section 8.1.3.3.

30 **Trace Metals**

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

38 **Pesticides**

39 Pesticides may be described in two general categories: current use pesticides and legacy pesticides.
 40 Current use pesticides include carbamates (e.g., carbofuran), organophosphates (e.g., chlorpyrifos,
 41 diazinon, diuron, malathion), thiocarbamates (e.g., molinate, thiobencarb), and more recently,
 42 pyrethroids (e.g., permethrin, cypermethrin), a class of synthetic insecticides applied in urban and
 43 agricultural areas. These chemicals have toxic effects on the nervous systems of terrestrial and

1 aquatic life, and some are toxic to the human nervous system. EPA has begun to phase out certain
 2 uses of organophosphates because of their potential toxicity in humans, which has led to the gradual
 3 replacement of organophosphates by pyrethroids (Werner et al. 2008).

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

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

Contaminant	Maximum Contaminant Level	Maximum Contaminant Level
	(mg/L)	(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.

Notes: 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

14 25.1.1.2 Bioaccumulating Constituents

15 As discussed in Chapter 8, *Water Quality* (Section 8.1.3), toxins are present in the existing aquatic
 16 environment of the Delta and may be mobilized into the food chain. The toxins that biomagnify
 17 through the food chain, such as methylmercury, organochlorine and other legacy pesticides, and

1 PCBs, resulting in higher concentrations in predator fish such as striped bass, commonly consumed
2 by humans, are of particular concern for public health.

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

9 In addition to the availability of the chemical to be taken up by biota, some chemicals are magnified
10 more through the food chain. *Bioaccumulation* often is loosely used interchangeably with the term
11 *biomagnification*. Strictly speaking, bioaccumulation occurs at any one trophic level or in any one
12 species (and age-class) as a pollutant is ingested inside of food items or absorbed from the
13 environment and thereby *accumulates* to some concentration in tissues of organisms at that
14 particular trophic level or in that particular species (and age-class). In contrast, *biomagnification*
15 more properly refers to increases in tissue concentrations of a pollutant as it passes upward through
16 the food chain, from prey to predator, to the topmost, mature predators. In these top predators
17 tissue concentrations may be harmful both to the animal (especially to offspring) and to those that
18 consume it. In summary, bioaccumulation happens within a specific trophic level; biomagnification
19 occurs over multiple trophic levels.

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

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

32 For evaluation of risks to human health, analyses of fish fillets are most common because of the
33 limited information that is generally available. If additional information is available and appropriate,
34 fish consumption effects could be analyzed in the form that people may eat (California Office of
35 Environmental Health Hazard Assessment 2008). Please see Chapter 28, *Environmental Justice*,
36 Section 28.2.2, *Characteristics of Relevant Minority Populations*, for a discussion of fish consumption
37 patterns among ethnic groups in the Delta.

38 **Study Area**

39 **Mercury**

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

- 1 • The national recommended water quality criterion for total mercury is 770 nanograms per liter
2 (ng/L)¹ to protect freshwater aquatic life chronic exposure, and 940 ng/L for marine life (U.S.
3 Environmental Protection Agency 2006).
- 4 • The Delta methylmercury total maximum daily load (TMDL) recommended water column
5 concentration of methylmercury, to protect fish from bioaccumulation, is 0.06 ng/L (Central
6 Valley Regional Water Quality Control Board 2008a).
- 7 • The San Francisco Bay mercury TMDL recommended water column concentration of total
8 mercury is 25 ng/L (4-day average).
- 9 • The Delta TMDL recommendation for small, whole-fish mercury content for protection of fish
10 and wildlife is 0.03 milligram per kilogram (mg/kg) wet weight (Central Valley Regional Water
11 Quality Control Board 2008a).
- 12 • The Central Valley Water Board has recommended fish tissue goals (fillet concentrations, wet
13 weight mercury) of 0.24 milligrams of mercury (Hg) per kilogram (mg Hg/kg) wet weight in
14 trophic level 4 fish (adult, top predatory sport fish, such as largemouth bass) (Central Valley
15 Regional Water Quality Control Board 2008b).
- 16 • EPA recommends a water quality criterion for fish tissue of 0.3 mg Hg/kg wet weight for
17 protection of human health and wildlife (U.S. Environmental Protection Agency 2001).

18 Further discussion on water quality standards can be found in Chapter 8, *Water Quality* (Section
19 8.1.1)

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

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

39 To resolve the mercury impairment in the Delta, the Central Valley Water Board has developed a
40 water quality attainment strategy that contains two components: (1) a methylmercury TMDL for the

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

1 Delta; and (2) an amendment of the Basin Plan for the Sacramento and San Joaquin River Basins
2 (Basin Plan) to implement the TMDL program. The Delta methylmercury TMDL was approved by the
3 Central Valley Water Board in 2010. The San Francisco Bay Mercury TMDL has been adopted and is
4 currently being implemented (State Water Resources Control Board 2008).

5 The Delta and Suisun Marsh are both listed as impaired water bodies on the Clean Water Act (CWA)
6 Section 303(d) list for mercury in fish tissue (State Water Resources Control Board 2007). Mercury
7 concentrations in Delta and San Francisco Bay fish tissues exceed human health criteria. For
8 example, the Delta TMDL recommendation for small, whole-fish mercury content for protection of
9 fish and wildlife is 0.03 mg/kg wet weight (Central Valley Regional Water Quality Control Board
10 2008b). Most of these small fish from the Delta and Suisun Marsh exceed the recommended Delta
11 TMDL small fish guideline concentrations for mercury. Monitoring during 2005–2006 found
12 Mississippi silversides' whole-body mercury concentrations at 0.03–0.06 mg Hg/kg wet weight in
13 the Central Delta, 0.17 mg Hg/kg wet weight in the Yolo Bypass, and up to 0.20 mg Hg/kg wet
14 weight at a Cosumnes River site (Slotton et al. 2007). Results from a study of mercury in sportfish
15 from the study area found the median largemouth bass mercury concentration to be 0.53 mg/kg wet
16 weight (Davis et al. 2008).

17 **PCBs**

18 Historically, PCBs were associated with urban discharge, and these contaminants have been
19 detected in fish tissues in San Francisco Bay, although there is little research on PCB levels in the
20 study area. Fish tissue samples taken during 2005 indicate that while high concentrations of PCBs
21 can be found in older, fattier fish in specific regions of the Delta (north Delta, Sacramento, and
22 Stockton), Delta PCB concentrations are generally below California Office of Environmental Health
23 Hazard Assessment (OEHHA) screening values (deVlaming 2008). The 2005 results indicate that the
24 north Delta may be eligible for Section 303(d) de-listing, and the 2008 TMDL for PCBs in San
25 Francisco Bay states that PCBs in the Delta are expected to attenuate naturally, thus eliminating the
26 need for implementing actions to reduce PCBs in the study area waters (San Francisco Bay Regional
27 Water Quality Control Board 2008). Table 8-10 (Chapter 8, *Water Quality*) presents the sum
28 concentrations of all PCBs at the mouths of the Sacramento and San Joaquin Rivers for water years
29 2001-2006.

30 **Legacy Pesticides**

31 As discussed in Chapter 8, *Water Quality* (Section 8.1.3.13), legacy pesticides include primarily
32 organochlorine pesticides, such as dichlorodiphenyltrichloroethane (DDT) and “Group A Pesticides”
33 (aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexane
34 [including lindane], endosulfan, and toxaphene). These chemicals are highly persistent in the
35 environment. Although they were banned in the 1970s because of their health and environmental
36 effects, the compounds and their byproducts are still found throughout the Delta at elevated
37 concentrations (CALFED Bay-Delta Program 2008). Organochlorines are prone to accumulation in
38 sediments, and typically enter the Delta via rivers and streams during high stream flow events.
39 Organochlorines can still be found in terrestrial soils and riverine sediments throughout the Central
40 Valley, where they enter through surface water runoff and erosion of terrestrial soils and through
41 resuspension of riverine bottom sediments (Central Valley Regional Water Quality Control Board
42 2010).

43 There was a large monitoring effort from 1988 to 1993 to assess pesticides in the Delta for DDT
44 compounds (DDT, DDE, and DDD), the Group A Pesticides, and chlorpyrifos, diazinon, atrazine, and

1 thiobencarb (Bay Delta and Tributaries Project 2009). Analysis of monitoring data for the San
2 Joaquin River at Buckley Cove, Sacramento River at Hood (actually collected at Greene's Landing
3 Sacramento River above Point Sacramento, San Joaquin River at Antioch Ship Channel, Old River at
4 Rancho Del Rio, Suisun Bay at Bulls Head Point near Martinez, and Franks Tract indicated that most
5 pesticides were near or below laboratory detection limits.

6 **Bioaccumulation in Fish and Shellfish**

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

12 OEHHA gives two sets of guidelines for fish with mercury. Because human babies and children are
13 most sensitive to possible health effects from mercury, OEHHA recommends that women ages 18 to
14 45 years (pregnant, nursing or who may be pregnant) and children 1 to 17 years eat fish less
15 frequently than men older than 17 and women older than 45 (California Office of Environmental
16 Health Hazard Assessment 2007).

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

27 Waterways within the Delta have been found to have different levels of contaminants; thus, each
28 waterway has a different advisory for fish or shellfish caught in it. Table 25-2 outlines the OEHHA
29 recommended serving amounts for fish within the Delta waterways.

30

1 **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
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

Species	Receptors*				Suggested Servings
	Children (age 1-17)	Men (age 17+)	Women (age 18-45)	Women (age 45+)	
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
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

Species	Receptors*				Suggested Servings
	Children (age 1-17)	Men (age 17+)	Women (age 18-45)	Women (age 45+)	
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
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

1 **25.1.1.3 Pathogens**

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

9 **Overview**

10 Sources of pathogens include wild and domestic animals, aquatic species, urban stormwater runoff,
11 discharge from wastewater treatment plants, and agricultural point and nonpoint sources such as
12 confined feeding lots. Pathogens that have animal hosts can be transported from the watershed to
13 source waters from grazed lands and cattle operations; aquatic species such as waterfowl also
14 contribute pathogens directly to water bodies. Stormwater runoff from urban or rural areas can
15 contain pathogens carried in waste from domestic pets, birds, or rodents, as well as sewage spills.
16 Although some pathogens have the ability to colonize within sediments, current research has not
17 addressed this behavior in the Central Valley (Tetra Tech 2007), so information regarding effects of
18 colonization within sediments is limited. Furthermore, sediment disturbance would be limited to
19 localized areas under the alternatives since, based on the pathogen conceptual model (discussed in
20 Section 25.3.1.2, *Pathogens and Water Quality*), pathogen concentrations experience a rapid die-off
21 the farther they travel from their source; thus, this issue is not discussed further.

22 Pathogen transport into Delta waterways can be expected to be higher during initial wet weather
23 events, since they are carried by stormwater and agricultural runoff into the study area (as was
24 observed with fecal coliform indicators by Tetra Tech (2007). Although transport rates are initially
25 increased during wet weather events, the increased availability of water to the Delta helps to reduce
26 pathogen viability during these instances. Other sources of pathogens include wetland and
27 inundated restoration areas due to increased biological activity associated with these habitats (e.g.,
28 birds and fish species).

29 In most instances, pathogens in drinking water sources are removed by filtration or bio-membranes,
30 or are destroyed by disinfection. Infections in humans may arise from pathogens that break through
31 standard treatment processes implemented at drinking water sources. Infection in humans may also
32 result from food ingestion or the ingestion of untreated water during recreation.

33 Although there are many potential pathogens that enter Delta waterways, the presence of pathogens
34 identified in Table 25-33 is tested by wastewater treatment service districts, public drinking water
35 service districts, and other public agencies as needed (e.g., Department of Public Health).

1 **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
<i>Giardia</i>	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

2

3 **Water Treatment**

4 EPA's Surface Water Treatment Rules (SWTR) require that systems using surface water or
5 groundwater under the direct influence of surface water (1) disinfect water to destroy pathogens,
6 and (2) either meet criteria for avoiding filtration or filter water to remove pathogens so that the
7 contaminants are controlled at the following levels (U.S. 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.

- 1 • Viruses: 99.99% removal/inactivation.
- 2 • *Giardia lamblia*: 99.9% removal/inactivation.
- 3 • *Cryptosporidium*: 99% removal.

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

11 Study Area

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

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

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

33 Data for *Cryptosporidium* and *Giardia* along the Sacramento River showed that these parameters
 34 were often not detected, and when detected the concentrations were generally low, typically less
 35 than one organism per liter (Tetra Tech 2007). The incidence of these pathogens could be caused by
 36 the presence of natural or artificial barriers that limit transport to water and by the significant die-
 37 off of oocysts that do reach the water, as well as by limitations in the analytical detection of
 38 *Cryptosporidium* oocysts in natural waters (Tetra Tech 2007).

39 There was limited pathogen data at the locations examined, as indicated by Tetra Tech (2007).
 40 Where data were collected, these parameters were often not detected. However, when they were
 41 detected, the concentrations were typically less than one organism per liter. Pathogen

1 concentrations are highly variable in time and space; monitoring programs that adequately address
2 these constraints are very limited.

3 Pathogens are listed on the Section 303(d) list for the Stockton Deep Water Ship Channel (SDWSC),
4 with sources including recreational and tourism activities (non-boating) and urban runoff/storm
5 sewers. The Basin Plan addresses this on the basis of water contact recreation such that fecal
6 coliform (minimum 5 samples in any 30-day period) shall not exceed a geometric mean of 200
7 organisms/100 ml, nor shall more than 10% of the total number of samples taken during any 30-day
8 period exceed 400 organisms/100 ml. These criteria have been exceeded at several of the water
9 quality sampling locations in the Delta (Tetra Tech 2007). The Basin Plan water quality objectives
10 for pathogens are detailed in Appendix 8A of Chapter 8, *Water Quality*. It was determined in the
11 report by Tetra Tech (2007) that the data are inadequate to assess if the sites examined exceeded
12 these standards. California drinking water MCLs do not exist for pathogens.

13 **25.1.1.4 Vectors**

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

25 The vector of most concern in the study area is the mosquito because it is considered a nuisance to
26 the public through irritating bites and can transmit various diseases, including the West Nile virus,
27 to birds and humans. The focus of this section is on public nuisances associated with mosquito-
28 borne diseases transmitted to humans. This section provides a description of the habitat and life
29 history of mosquito species that exist in the study area.

30 **Overview**

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

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).

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

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

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

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

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

39 Specifically, the following guidelines are incorporated for habitat management plans in different
 40 MVCDs in the study area.

- 41 ● *Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands, 2004.*

- 1 • *Best Management Practices for Mosquito Control on California State Properties*, California
2 Department of Public Health, June 2008.
- 3 • *Mosquito Reduction Best Management Practices*, Sacramento-Yolo County Mosquito and Vector
4 Control District, 2008.

5 **Study Area**

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

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

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

28 The number of documented human cases of West Nile Virus (WNV) in Delta counties is relatively
29 low compared with the population of the counties, and the number of documented WNV-positive
30 dead birds in Delta counties is less than 200 per year in Delta counties (Table 25-7). Therefore,
31 while WNV is a concern and a potential threat to the study area and California, the documented
32 human occurrences have been relatively limited.

33 **Common Mosquito Species**

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

37 The habitat for the breeding of mosquitoes varies depending on the combination of habitat
38 conditions. The following discussion presents an overview of mosquito species located in the study
39 area that are known to transmit diseases and their habitat. Table 25-4 identifies the seasonal
40 presence of mosquitoes.

1 Table 25-4. 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>) 	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>A. punctipennis</i>) *			

Unless otherwise noted, sources in this table are from http://www.fightthebite.net/download/ecomanagement/SYMVCD_BMP_Manual.pdf.

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

² Alameda County Mosquito Abatement District 2011

³ Solano County Mosquito Abatement District 2005

⁴ Santa Cruz County Government Environmental Health Services 2011. Available: <http://sccounty01.co.santa-cruz.ca.us/eh/Medical_Waste/mosquito_species.htm>. Accessed: December 23, 2011

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

* 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), West Nile virus (WNV), St. Louis Encephalitis (SLE), dog heartworms, and Western Equine
4 Encephalitis (WEE). Table 25-5 summarizes the types of mosquitoes known to occur in the study
5 area and the types of diseases they commonly carry. Brief descriptions of these diseases are
6 provided below the table.

7 **Table 25-5. Mosquitoes Known to Occur in the Delta and the Diseases They Commonly Carry**

Mosquito	Distance Travels from Breeding Ground	Diseases
Pale marsh mosquito ^a	20 miles	CE virus; Dog heartworms
Cool weather mosquito ^b	5 miles	WEE virus*
Western encephalitis mosquito ^c	Unavailable	WEE; St. Louis Encephalitis (SLE) West Nile Virus (WNV)
California salt marsh mosquito ^d	Unavailable	CE virus
Western treehole mosquito ^e	Limited	Dog heartworms
Wetlands mosquito ^f	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 ^g	Unavailable	Major vector of the SLE virus and the WNV**
Tule mosquito ^h	Unavailable	SLE virus WEE virus
Salt marsh mosquito ⁱ	30 miles	Secondary vector of SLE virus Secondary vector of WEE virus
Winter salt marsh mosquito ^j	20 miles	Seasonal nuisance not considered a disease or virus vector
Western malaria mosquito ^k	5 miles	Malaria
Woodland malaria mosquito ^l	Less than 1 mile	Malaria

^a Marin/Sonoma Mosquito and Vector Control District 2009; Solano County Mosquito Abatement District 2005.
^b Napa County Mosquito Abatement District 2006; Solano County Mosquito Abatement District 2005
^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 2005
^e Sacramento-Yolo Mosquito and Vector Control District 2009
^f Solano County Mosquito Abatement District 2005
^g Marin/Sonoma Mosquito and Vector Control District 2009
^h Marin/Sonoma Mosquito and Vector Control District 2009
ⁱ Solano County Mosquito Abatement District 2005 and Napa County Mosquito Abatement District 2006
^j Napa County Mosquito Abatement District 2006
^k Marin/Sonoma Mosquito and Vector Control District 2009, Solano County Mosquito Abatement District 2005 and Marin/Sonoma Mosquito and Vector Control District 2009, Solano County Mosquito Abatement District 2005
^l 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 human 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)

36 **Western Equine Encephalitis**

37 Seasonal viral activity is at its highest for WEE from late spring to early summer, especially in areas
38 with highly irrigated agriculture and stream drainages. The disease has a fatality rate of 33% and
39 affects young children most severely (Marin/Sonoma Mosquito and Vector Control District 2009).
40 The western encephalitis mosquitoes are generally identified as primary transmitters. In California,
41 the pale marsh mosquito is also a major vector. Symptoms range from mild flu-like illness to

encephalitis, which could lead victims into a coma and death (Napa County Mosquito Abatement District 2006). Between 1964 and 2005, 639 cases of WEE were reported in the United States (Centers for Disease Control 2005).

Mosquito-Borne Disease Incidence

Each county, following public health and safety code regulations, designs its individual Mosquito and Vector Control District Programs to control mosquito-borne disease incidence in its individual district. The most common mosquito-borne diseases each district is expected to control include WNV, WEE virus, SLE virus, heartworm disease, and malaria. Based on mosquito-borne disease surveillance and activity data, yearly reports show that WNV has the highest incidence reported within the Delta counties. This virus is commonly identified in small animals, such as squirrels and birds, and can also affect large mammals, including horses and humans. The ratio of dead birds infected with WNV to reported human cases within the statutory Delta counties is approximately 10:1 (Table 25-6 and Table 25-7).

Table 25-6. Confirmed West Nile Virus Cases in California 2008–2010

Cases	2008	2009	2010
Number of Counties	49	42	35
Human Cases	445	112	105
Horses	32	18	19
Dead Birds	2,569	515	412
Mosquito Samples	2,003	1,063	1,305
Sentinel Chickens	585	443	281
Squirrels	32	10	24

Source: The California Department of Public Health West Nile Virus Website 2009, 2010.

Table 25-7. West Nile Virus Activity by County in Study Area, 2008–2010

County	2008				2009				2010			
	Human Case	Horses	Dead Birds	Mosquito Samples	Human Case	Horses	Dead Birds	Mosquito Samples	Human Cases	Horses	Dead Birds	Mosquito Samples
Alameda	1	N/A	12	1	-	-	10	1	1	-	1	-
Contra Costa	4	3	88	31	5	1	45	17	4	-	8	4
Sacramento	18	N/A	N/A	N/A	-	2	28	36	12	2	115	205
San Joaquin	12	N/A	69	207	10	3	24	83	6	1	26	57
Solano	1	N/A	7	1	-	1	3	2	-	1	1	1
Sutter			22	1212				25			1	26
Yolo	1	1	9	19	2	-	7	16	-	-	14	11

Source: The California Department of Public Health West Nile Virus Website 2009, 2010.

Note:

N/A = not available

- = No record

1 **25.1.1.5 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
 44 EMF exposure and a small increased risk of childhood leukemia at average exposures greater than 3

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

9 Proximity to Power Lines

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

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

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

34 25.2 Regulatory Setting

35 Numerous acts, plans, policies, and programs define the framework for regulating water quality,
 36 safety from vectors, and EMF in California. The following discussion focuses on requirements that
 37 are applicable to drinking water (including pathogens and bioaccumulation), vectors, and EMF
 38 within the study area. Additional water quality regulations can be found in Chapter 8, *Water Quality*
 39 (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 federal Clean Water Act (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 (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 FR 60848). As described in the preamble to the final NTR,
 13 when a state adopts, and EPA approves, water quality criteria that meet the requirements of CWA
 14 Section 303(c)(2)(B), EPA will issue a rule amending the NTR to withdraw the federal criteria for
 15 that state. If the state's criteria are no less stringent than the promulgated federal criteria, EPA will
 16 withdraw its criteria without formal rulemaking because additional comment on the criteria would
 17 be unnecessary (65 FR 19659). However, if a state adopts criteria that are less stringent than the
 18 federally promulgated criteria, but in EPA's judgment fully meet CWA requirements, EPA will
 19 provide an opportunity for public comment before withdrawing the federally promulgated criteria
 20 (57 FR 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 of Chapter 8, *Water Quality*).
 26 The owners or operators of public water systems are required to comply with primary (health-
 27 related) MCLs and encouraged to comply with secondary (nuisance- or aesthetics-related) MCLs.
 28 SDWA drinking water standards apply to treated water as it is served to consumers.

29 **25.2.2.5 Surface Water Treatment Rule**

30 The federal Surface Water Treatment Rule (SWTR) is implemented by the California SWTR, which
 31 satisfies three specific requirements of the SDWA by: (1) establishing criteria for determining when
 32 filtration is required for surface waters; (2) defining minimum levels of disinfection for surface
 33 waters; and (3) addressing *Cryptosporidium* spp., *Giardia lamblia*, *Legionella* spp., *E. coli*, viruses,
 34 turbidity, and heterotrophic plate count (procedure used to estimate the number of live
 35 heterotrophic bacteria that are present in a water sample) by prescribing a treatment technique. A
 36 treatment technique is prescribed in lieu of an MCL for a contaminant when it is not technologically
 37 or economically feasible to measure that contaminant. The SWTR applies to all drinking water
 38 supply activities in California and its implementation is overseen by the California Department of
 39 Public 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 (FR 65
 10 31682, May 18, 2000) carried forward the previously promulgated standards of the NTR, thereby
 11 providing a single document listing California’s fully adopted and applicable water quality criteria
 12 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. Public water systems are required to be monitored for regulated
 16 contaminants in their drinking water supply. California’s drinking water standards (e.g., MCLs) are
 17 the same as or more stringent than the federal standards, and include additional contaminants not
 18 regulated by EPA. Like the federal MCLs, California’s primary MCLs address health concerns, while
 19 secondary MCLs address aesthetics, such as taste and odor. The California SDWA is administered by
 20 CDPH, primarily through a permit system.

21 **25.2.3.3 Assembly Bill 1200**

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

- 25 • Subsidence
- 26 • Earthquakes
- 27 • Floods
- 28 • Changes in precipitation, temperature, and ocean levels
- 29 • A combination of these impacts

30 **25.2.4 Regional Agencies and Programs Responsible for** 31 **Regulating Drinking Water**

32 **25.2.4.1 Regional Water Quality Control Board Water Rights Decisions,** 33 **Water Quality Control Plans, and Water Quality Objectives**

34 The preparation and adoption of WQCPs is required by California Water Code Section 13240 and
 35 supported by the CWA. Section 303 of the CWA requires states to adopt water quality standards that
 36 “consist of the designated uses of the navigable waters involved and the water quality criteria for
 37 such waters based upon such uses.” According to Water Code Section 13050, WQCPs consist of a

1 designation or establishment for the waters within a specified area of beneficial uses to be
 2 protected, water quality objectives to protect those uses, and a program of implementation needed
 3 for achieving the objectives. Water Code Section 13050(f) defines beneficial uses to include
 4 domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic
 5 enjoyment; navigation; and the preservation and enhancement of fish, wildlife, and other aquatic
 6 resources or preserves. Because beneficial uses, together with their corresponding water quality
 7 objectives, can be defined per federal regulations as water quality standards, the WQCPs are
 8 regulatory references for meeting the state and federal requirements for water quality control. One
 9 substantial difference between the state and federal programs is that California's WQCPs establish
 10 standards for groundwater in addition to surface water. Adoption or revision of surface water
 11 standards is subject to EPA approval.

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

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

23 **25.2.4.2 Water Quality Control Plan for the Sacramento River and San** 24 **Joaquin River Basins**

25 The Basin Plan defines the beneficial uses, water quality objectives, implementation programs, and
 26 surveillance and monitoring programs for waters of the Sacramento River and San Joaquin River
 27 basins. The narrative water quality objectives and numeric freshwater criteria/objectives for
 28 priority pollutants (i.e., trace metals) adopted for the Delta are included in Appendix 8A of Chapter
 29 8, *Water Quality*. The Basin Plan contains specific numeric water quality objectives that are
 30 applicable to certain water bodies or portions of water bodies. Numerical objectives have been
 31 established for bacteria, dissolved oxygen, pH, pesticides, electrical conductivity, total dissolved
 32 solids, temperature, turbidity, and trace metals. The Basin Plan also contains narrative descriptions
 33 of water quality objectives for certain parameters that must be attained through pollutant control
 34 measures and watershed management. Narrative water quality objectives also serve as the basis for
 35 the development of detailed numerical objectives. The water quality objectives apply to all surface
 36 waters in the Delta, unless otherwise specified (Central Valley Regional Water Quality Control Board
 37 2007).

38 **25.2.4.3 Water Quality Control Plan for the San Francisco Bay Basin**

39 The Water Quality Control Plan for the San Francisco Bay Basin is the State Water Resources Control
 40 Board's master water quality control planning document. It designates beneficial uses and water
 41 quality objectives for waters of the state, including surface waters and groundwater. It also includes
 42 programs of implementation to achieve water quality objectives. The Basin Plan has been adopted

1 and approved by the State Water Board, EPA, and the Office of Administrative Law where required
2 (San Francisco Bay Regional Water Quality Control Board 2011).

3 **25.2.4.4 Central Valley Regional Water Quality Control Board Drinking** 4 **Water Policy**

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

10 **25.2.4.5 California Drinking Water Standards Incorporated by Reference** 11 **in Basin Plans**

12 CDPH establishes state drinking water standards, enforces both federal and state standards,
13 administers water quality testing programs, and issues permits for public water system operations.
14 The drinking water regulations are found in Title 22 of the California Code of Regulations. The state
15 drinking water standards consist of primary and secondary maximum MCLs. Primary MCLs are
16 established for the protection of environmental health and secondary MCLs are established for
17 constituents that affect the aesthetic qualities of drinking water, such as taste and odor. Both the
18 Central Valley and San Francisco Bay Basin Plans incorporate by reference the CDPH numerical
19 drinking water MCLs. The incorporation into the Basin Plans of the MCLs, which are normally
20 applicable to treated drinking water systems regulated by CDPH, makes the MCLs also applicable to
21 ambient receiving waters regulated by the Regional Water Boards. The state primary and secondary
22 MCLs applicable to the Central Valley and San Francisco Bay Basin Plans are provided in Appendix
23 8A of Chapter 8, *Water Quality*.

24 **25.2.4.6 Safe, Clean, Reliable, Water Supply Act**

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

28 **25.2.5 Regional Agencies and Programs Responsible for Vector** 29 **Control**

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

34 **25.2.5.1 Alameda County Vector Control Services District**

35 The Alameda County Vector Control Services District was established in June 1984 as a County
36 Service Area (VC 1984-1). The District serves all of the cities in Alameda County, as well as the
37 unincorporated area. In the City of Berkeley, the Vector Control Services Section is under the

1 Division of Community Health Protection, Health and Human Services Department (Alameda County
2 Vector Control Services District 2009).

3 **25.2.5.2 Contra Costa Mosquito and Vector Control District**

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

9 **25.2.5.3 Sacramento-Yolo Mosquito and Vector Control District**

10 The Sacramento County-Yolo County Mosquito Abatement District was formed in 1946 to protect
11 the public against diseases transmitted by mosquitoes and provide relief from serious pest nuisance.
12 The district's mission is to "provide safe, effective, and economical mosquito and vector control for
13 Sacramento and Yolo counties" (Sacramento-Yolo Mosquito and Vector Control District 2009).

14 **25.2.5.4 San Joaquin County Mosquito and Vector Control District**

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

21 **25.2.5.5 Solano County Mosquito Abatement District**

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

29 **25.2.5.6 Sutter-Yuba Mosquito Abatement District**

30 The Sutter-Yuba Mosquito Abatement District covers 486 square miles within Sutter County and
31 220 square miles within Yuba County. The district is responsible for suppressing mosquito
32 populations and thereby preventing the spread of mosquito-borne diseases. The district's integrated
33 mosquito management program uses physical control (source reduction/elimination), biological
34 control (mosquitofish), public education, and chemical control to reduce mosquito populations.

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

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

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

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

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

- Water Management Practices
- Vegetation Management Practices
- Wetland Infrastructure Maintenance
- Wetland Restoration and Enhancement Features
- Biological Controls

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

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

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

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

4 Biological controls include encouraging onsite predator populations and providing predator access
5 to mosquitoes.

6 In addition to the BMPs discussed above, the guidelines identify that coordination with the MVCDs is
7 needed to provide them with information regarding habitat and water management schedules and
8 identify targeted implementation of certain BMPs. MVCDs can provide input on site design and
9 project enhancement that can consider mosquito reducing techniques. Use of IPM by the MVCDs
10 depends on the cooperation and sharing of information on habitat and water management
11 schedules, collaborating on the identification of problem areas, and monitoring the effectiveness of
12 the BMPs selected for application on the wetland restoration and enhancement projects.

13 **25.2.5.8 County General Plan Policies Related to Vector Control**

14 **Sacramento County General Plan**

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

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

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

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

22 Implementation Measure B states, "In cooperation with the Sacramento-Yolo Mosquito & Vector
23 Control District (SYMVCD), siting and design of wetlands near residential and commercial areas
24 should consider the SYMVCD Best Management Practices and the County's Stormwater Quality
25 Design Manual" (Sacramento County 2011).

26 **25.2.6 State and Regional Agencies and Programs Responsible** 27 **for Regulating Electromagnetic Fields**

28 **25.2.6.1 California Public Utilities Commission EMF Design Guidelines for** 29 **Electrical Facilities**

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

34 In 2006, CPUC updated its EMF Policy in Decision 06-01-042. The decision reaffirmed that health
35 hazards from exposures to EMF have not been established and that state and federal public health
36 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
37 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should

1 remain in place. In the decision, CPUC required utilities to update their EMF Design Guidelines to
2 reflect the following key elements of the updated EMF Policy.

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

5 B) “...while we continue our current policy of low-cost and no-cost EMF mitigation, as defined by a
6 4% benchmark of total project cost, we would consider minor increases above the 4%
7 benchmark if justified under unique circumstances, but not as a routine application in utility
8 design guidelines. We add the additional distinction that any EMF mitigation cost increases
9 above the 4% benchmark should result in significant EMF mitigation to be justified, and the total
10 costs should be relatively low.”

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

13 D) “Parties generally agree on the following group prioritization for land use categories in
14 determining how mitigation costs will be applied:

15 1. Schools and licensed day care

16 2. Residential

17 3. Commercial/industrial

18 4. Recreational

19 5. Agricultural

20 6. Undeveloped land”

21 E) “Low-cost EMF mitigation is not necessary in agricultural and undeveloped land except for
22 permanently occupied residences, schools or hospitals located on these lands.”

23 F) “Although equal mitigation for an entire class is a desirable goal, we will not limit the spending
24 of EMF mitigation to zero on the basis that not all class members can benefit.”

25 G) “.... We [CPUC] do not request that utilities include non-routine mitigation measures, or other
26 mitigation measures that are based on numeric values of EMF exposure, in revised design
27 guidelines...”

28 CPUC also clarified utilities’ roles on EMF during the Certificate of Public Convenience and Necessity
29 (CPCN) and Permit to Construct (PTC) proceedings. CPUC stated, “EMF concerns in future CPCN and
30 PTC proceedings for electric transmission and substation facilities should be limited to the utility’s
31 compliance with the Commission’s low-cost and no-cost policies.”

32 Furthermore, CPUC directed “the Commission’s Energy Division to monitor and report on new EMF
33 related scientific data as it becomes available.” The EMF Design Guidelines will be revised as more
34 information or direction from CPUC becomes available (California Public Utilities Commission
35 2006).

1 25.2.6.2 Local Utility Policies Regulating Electromagnetic Fields

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

10 Most utilities, such as PG&E, rely on information from the federal and state health agencies that
11 conduct EMF research and monitor this issue to help evaluate potential risks (Pacific Gas and
12 Electric Company 2011a). PG&E's EMF policy states that it will provide reasonable EMF
13 measurement service at no cost for property near electrical facilities owned by PG&E (Pacific Gas
14 and Electric Company 2011b). Additionally, PG&E has procedures to consider EMF exposure in the
15 designs, plans, and communications regarding new and upgraded facilities (Pacific Gas and Electric
16 Company 2011c). SMUD's Board of Directors passed Resolution No. 91-04-18 on April 18, 1991,
17 establishing an EMF policy statement and authorizing the implementation of an EMF program. This
18 program also requires EMF considerations during the planning of facilities.

19 25.2.6.3 County General Plan Policies Related to Electromagnetic Fields

20 Sacramento County General Plan

21 Sacramento County's *General Plan of 2005–2030*, Public Facilities Element (Sacramento County
22 2011) includes a policy addressing electromagnetic fields.

23 Electric and Magnetic Fields Policy

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

27 Power Line Capacity	28 Setback from the Corridor (measured from edge of easement)
29 100-133 kV	100 feet
30 220-230 kV	150 feet
31 500-550 kV	350 feet

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

36 Alameda County East Area General Plan

37 The Environmental Health and Safety Element of the Alameda County East Area General Plan (2000)
38 also includes an Electromagnetic Fields policy.

39 **Policy 325:** The County shall not approve sensitive uses (e.g., hospitals, schools, and retirement
40 homes) within setbacks recommended by the California Department of Education from sources
41 of electromagnetic fields such as major electrical transmission lines and substations. The County

1 shall also consider appropriate setbacks in siting residential subdivisions based on the best
2 information available at the time.

3 **25.3 Environmental Consequences**

4 Potential public health consequences associated with the different alternatives are described below.
5 The *Methods for Analysis* (Section 25.3.1) identifies the methodology and thresholds used to evaluate
6 the effects of different alternatives. The *Determination of Effects* (Section 25.3.2) explains the
7 significance criteria used to evaluate effects on public health. *Effects and Mitigation Approaches*
8 (Section 25.3.3) provides the detailed analysis of the criteria, effects associated with each
9 alternative, and any mitigation measures used to reduce the significance of impacts.

10 Effects associated with construction and operation and maintenance of the water conveyance
11 facilities (CM1) are evaluated at a project level, whereas effects associated with implementation
12 CM2–CM22 are evaluated at a program level. If the effect mechanism is common to CM1 and other
13 CMs, for example vectors, the effects associated with CM1 are discussed first and then combined, as
14 necessary, with the discussion of other CMs to capture the whole of the effect.

15 **25.3.1 Methods for Analysis**

16 The proposed BDCP action alternatives may affect public health in the study area through the
17 following mechanisms.

- 18 • Construction of the water conveyance facilities and water supply operations under all action
19 alternatives would result in an increase in sedimentation basins and solids lagoons. These new
20 features could result in an increase in standing water, thereby potentially increasing vector
21 breeding locations and vector-borne diseases in the study area.
- 22 • Water conveyance facilities operation activities could mobilize or increase the amount of trace
23 metals or pesticides in surface waters.
- 24 • Water conveyance facilities operation activities under all action alternatives would generally
25 result in a change in source water inflow to the study area, thereby potentially influencing
26 parameters that bioaccumulate (e.g., methylmercury).
- 27 • Water conveyance facilities operation activities under all action alternatives would require new
28 transmission lines (with lines at 69 kV and 230 kV), thereby potentially increasing exposure of
29 people to EMFs.
- 30 • Habitat restoration and enhancement activities under all action alternatives would increase the
31 amount of tidal and wetland areas in the study area (including Suisun Marsh and the Yolo
32 Bypass), which are known to generate pathogens that represent a potential public health
33 concern to recreational activities.
- 34 • Habitat restoration activities under all action alternatives could increase standing water in the
35 Delta throughout the year, thereby potentially resulting in an increase in vector breeding
36 locations and in vector-borne diseases in the study area.

- 1 • Habitat restoration activities under all action alternatives could change the water quality such
2 that there is an increase DOC in the study area, thereby potentially increasing the amount of
3 DBPs in the water, which represents a potential drinking water public health concern.
- 4 • Restoration and certain habitat enhancement activities (e.g., channel margin enhancement)
5 under all action alternatives could disturb and re-suspend existing sediment that is
6 contaminated with parameters which bioaccumulate (e.g., methylmercury) or result in
7 mobilization of toxic constituents into the food chain (e.g., methylation of mercury).

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

9 **25.3.1.1 Vectors**

10 Most species of mosquitoes lay their eggs on the surface of stagnant water, although some species
11 use damp soil. A body of standing water represents potential breeding habitat, with the exception of
12 areas that are flushed daily by tidal action and that are either too saline or not stagnant long enough
13 to support mosquito larvae to maturity. The increase in the public's risk of exposure is evaluated by
14 describing the alternative actions during operation that could result in more potential breeding
15 habitat, qualitatively evaluating it against the existing amount of potential breeding habitat and the
16 existing level of documented illnesses associated with mosquitoes in the study area. A qualitative
17 determination is made as to whether the alternative actions would result in a substantial⁴ increase
18 in the public's risk of exposure to vector-borne diseases.

19 **25.3.1.2 Pathogens and Water Quality**

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

29 Human exposure to pathogens primarily occurs through drinking water or contact with pathogen
30 sources in water. The removal of pathogens in drinking water happens prior to distribution and
31 treatment techniques generally have a greater than 99% removal rate, as described in Section
32 25.1.1.33; therefore, pathogens would have a very limited effect on drinking water quality. Thus, the
33 analysis below focuses on recreationists as receptors to any potential increase in pathogens caused
34 by each action alternative in the study area. Specifically, the analysis focuses on the amount of tidal
35 restoration habitat under CM4 for each alternative, because this amount is substantially greater

⁴ 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 than habitat restoration and enhancements under other conservation measures (e.g., CM5, CM6, and
 2 CM7). The findings in Chapter 8, *Water Quality*, are summarized for each action alternative and a
 3 qualitative determination is made as to whether recreationists would experience a substantial
 4 increase of exposure to pathogens.

5 **25.3.1.3 Constituents of Concern and Water Quality**

6 As discussed in Chapter 8, *Water Quality* (Section 8.1.1.6), numerical water quality objectives and
 7 standards have been established to protect beneficial uses, and therefore represent concentrations
 8 or values that should not be exceeded. The beneficial uses provide standards that indirectly
 9 maintain public health, such as contact recreation to protect individuals against illness. Chapter 8,
 10 *Water Quality*, discusses the different water quality standards evaluated through modeling and
 11 determines whether these standards would be exceeded as a result of implementation of the action
 12 alternatives. Therefore, this analysis summarizes the qualitative and quantitative results presented
 13 in Chapter 8 to identify whether the construction and operation of the facilities associated with the
 14 alternatives would exceed water quality standards for pesticides that do not bioaccumulate (for this
 15 assessment, only present use pesticides for which substantial information is available, namely
 16 diazinon, chlorpyrifos, pyrethroids, and diuron, are addressed); trace metals of human health and
 17 drinking water concern (i.e., arsenic, iron, and manganese); DBPs, including HAA5, bromated,
 18 chlorite, and THMs via the THM formation potential⁵ (THMFP). It should be noted that the water
 19 quality analysis did not assess HAA5 or THMFP directly, but rather assessed changes in organic
 20 carbon. As indicated in Section 25.1.1.1, because organic carbon, such as DOC, can react with
 21 disinfectants during the water treatment disinfection process to form DBPs, such as THMs and
 22 HAAs, DOC concentrations can be an indicator of DBPs (discussed in detail in Chapter 8, *Water*
 23 *Quality*, Section 8.1.3.11).

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

28 **25.3.1.4 Bioaccumulation**

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

37 The general methodology used to assess the potential for bioaccumulation effects as a result of
 38 project implementation was to examine existing conditions (i.e., levels and locations) of constituents
 39 that bioaccumulate in fish in the study area, and then to determine whether bioaccumulation in fish

⁵ This evaluates the potential for trihalomethanes to form as a result of the level of dissolved organic carbon, bromide, and chloride in a water source.

1 tissue would be expected to increase above existing levels and locations under the action
2 alternatives. If bioaccumulation is expected to increase under the action alternatives, then a
3 qualitative description of the populations that would be affected is discussed and a qualitative
4 determination is made as to whether the increase would result in a public health concern. It is
5 assumed any additional bioaccumulation that is detected is a potential effect.

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

22 **Conservation Measures**

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

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

33 **Water Supply Construction and Operations**

34 Bioaccumulation related to construction activities for the water conveyance facilities is discussed
35 qualitatively. Due to restricted access, sediment samples were not obtained. Given this restriction,
36 published scientific reports were used to determine the state of the sediment in question. Sediment
37 sampling may be included in the sediment and erosion control plan as it will likely require testing
38 prior to disturbance and then treatment and proper disposal of contaminated sediment.

39 There is insufficient data for some of the factors that result in toxics becoming more available in the
40 food chain. For example, the full extent and magnitude of potential in-water sediment contamination
41 is unknown along the Sacramento River where water supply facilities would be constructed. Also,
42 mobilization of potentially toxic sediments would be directly related to levels of turbidity and
43 suspended sediments resulting from construction. Although resulting turbidity has not been

1 modeled, it is anticipated to be low given the permit requirements for controls. Furthermore, as an
 2 environmental commitment, DWR would develop and implement Erosion and Sediment Control
 3 Plans and Stormwater Pollution Prevention Plans (SWPPP). BMPs implemented as part of these
 4 plans would reduce turbidity levels and maintain water quality during construction (Appendix 3B,
 5 *Environmental Commitments*). Therefore, the disturbance of potentially contaminated sediment will
 6 be discussed qualitatively as it relates to public health.

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

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

23 **25.3.1.5 Electromagnetic Fields**

24 Electromagnetic fields from power lines vary continuously as electrical load varies on individual
 25 transmission lines. As such, EMF would vary with load during water conveyance facilities construction
 26 and operation. When the transmission lines are energized, there would likely be some change in the
 27 level of EMFs in the environment. The magnitude of the change would fluctuate over time based on
 28 load variations. These effects are anticipated to be localized within the immediate proximity of the
 29 transmission lines. Exposure to EMFs from new transmission lines is dependent on the location of the
 30 transmission lines in relation to sensitive receptors (e.g., hospitals, schools, parks) or densely
 31 populated urban areas and the load on the transmission lines. For this analysis schools, hospitals,
 32 parks, and fire stations are considered to be sensitive receptors. Parks and schools provide a location
 33 for people to congregate, and fire stations and hospitals could have sensitive communications and
 34 health equipment that could be affected by EMF interference. Residences and other sensitive
 35 receptors located 300 feet or more from power lines are not considered to be at risk of high EMF
 36 exposure (National Institute of Environmental Health Sciences and National Institutes of Health 2002).
 37 At this distance, EMF exposure from power lines is no different than from typical levels around the
 38 home. Therefore, the methodology for analyzing EMFs involves identifying existing transmission line
 39 locations and comparing them with the location of proposed transmission lines and the population
 40 densities and sensitive receptors associated with existing and proposed transmission lines.

41 The length of the new temporary and permanent transmission lines for the alternatives is related to
 42 the number of intakes required by alternative and the differing location options for transmission
 43 lines to serve the different water conveyance options. Under Alternative 4, the method of delivering
 44 power to construct and operate the water conveyance facilities is assumed to be a “split” system that

1 would connect to the existing grid in two different locations to permanent 230 kV transmission
 2 lines—one in the northern section of the alignment, and one in the southern section of the
 3 alignment. Additionally, part of the proposed permanent 230 kV transmission line alignment for the
 4 west water conveyance alignment alternatives (i.e., 1C, 2C, and 6C) would be outside of the study
 5 area (near Rio Vista) and end at an interconnection point in Suisun City.

6 Table 25-8 identifies each alternative and potential lengths of new temporary and permanent
 7 transmission lines. Temporary transmission lines would be removed once construction was
 8 completed.

9 **25.3.2 Determination of Effects**

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

- 12 • Substantial increase in the public’s risk of exposure to vector-borne diseases. For purposes of
 13 this analysis, “substantial increase” is evaluated qualitatively, depending on the location of the
 14 alternative, in accordance with Section 15064(b) of the State CEQA Guidelines (see footnote 4,
 15 Section 25.3.1.1, *Vectors*).
- 16 • Exceedance(s) of water quality criteria for constituents of concern such that an adverse effect
 17 would occur to public health from drinking water sources. This analysis is based on the
 18 qualitative and quantitative results presented in Chapter 8, *Water Quality*, to identify whether
 19 the construction and operation of the alternatives would exceed water quality standards for
 20 pesticides that do not bioaccumulate (present use pesticides for which substantial information
 21 is available, namely diazinon, chlorpyrifos, pyrethroids, and diuron); trace metals of human
 22 health and drinking water concern (i.e., arsenic, iron, and manganese); DBPs, including HAA5,
 23 bromated, chlorite; and THMs via the THMFP.
- 24 • Substantial mobilization or substantial increase of constituents known to bioaccumulate. For
 25 purposes of this analysis, an expected increase in bioaccumulation above existing conditions
 26 (levels and locations) in fish in the study area as a result of implementing an alternative would
 27 be considered a potential effect and is discussed qualitatively in terms of the populations
 28 affected and potential public health concerns. (See also Section 25.3.1.4, *Bioaccumulation*.)
- 29 • Exposing substantially more people to transmission lines that provide new sources of EMFs.
 30 Exposure to EMFs from new transmission lines is dependent on the location of the transmission
 31 lines in relation to sensitive receptors. For purposes of this analysis, schools, hospitals, parks,
 32 and fire stations are considered to be sensitive receptors. Residences and other sensitive
 33 receptors located 300 feet or more from power lines are not considered to be at risk of high EMF
 34 exposure (National Institute of Environmental Health Sciences and National Institutes of Health
 35 2002). (See the discussion in Section 25.3.1.5, *Electromagnetic Fields*.) Temporary transmission
 36 lines are those that would be removed once construction was completed.

1 Table 25-8. 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)		Temporary Transmission Lines (34.5 kV)	
	Miles	New Sensitive Receptor	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	N/A ^a	N/A	N/A	N/A
1B (Dual Conveyance with East Alignment)	36.79	Stone Lakes National Wildlife Refuge (Elk Grove)	13.49	None	16.35	None	N/A	N/A	N/A	N/A
1C (Dual Conveyance with West Alignment)	17.61	None	13.73	Fire Station 63 (9699 Highway 220, Walnut Grove)	18.45	None	N/A	N/A	N/A	N/A
2A (Dual Conveyance with Pipeline/Tunnel)	14.46	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	N/A	N/A	N/A	N/A
2B (Dual Conveyance with East Alignment)	40.5	Stone Lakes National Wildlife Refuge (Elk Grove)	13.49	None	16.35	None	N/A	N/A	N/A	N/A
2C (Dual Conveyance with West Alignment)	17.61	None	13.73	Fire Station 63 (9699 Highway 220, Walnut Grove)	18.45	None	N/A	N/A	N/A	N/A
3 (Dual Conveyance with Pipeline/Tunnel)	8.68	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	N/A	N/A	N/A	N/A

Alternative	Permanent Transmission Lines (69 kV)		Temporary Transmission Lines (69 kV)		Permanent Transmission Lines (230 kV)		Temporary Transmission Lines (230 kV)		Temporary Transmission Lines (34.5 kV)	
	Miles	New Sensitive Receptor	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors	Miles	New Sensitive Receptors
4 (Dual Conveyance with Modified Pipeline/Tunnel)	5.87	None	N/A	N/A	14.17	None	34.73	None	3.25	None
5 (Dual Conveyance with Pipeline/Tunnel)	8.68	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	N/A	N/A	N/A	N/A
6A (Isolated Conveyance with Pipeline/Tunnel)	8.94	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	N/A	N/A	N/A	N/A
6B (Isolated Conveyance with East Alignment)	36.79	Stone Lakes National Wildlife Refuge (Elk Grove)	13.49	None	16.35	None	N/A	N/A	N/A	N/A
6C (Isolated Conveyance with West Alignment)	17.61	None	13.73	Fire Station 63 (9699 Highway 220, Walnut Grove)	18.45	None	N/A	N/A	N/A	N/A
7 (Dual Conveyance with Pipeline/Tunnel)	7.03	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	N/A	N/A	N/A	N/A
8 (Dual Conveyance with Pipeline/Tunnel)	7.03	None	24.71	Stone Lakes National Wildlife Refuge (Elk Grove)	42.68	None	N/A	N/A	N/A	N/A
9 (Through Delta/Separate Corridors)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

^a N/A: not applicable.

- Substantial increase in recreationists' exposure to pathogens. For purposes of this analysis, a "substantial increase in recreationists' exposure" is based on the amount of tidal habitat restored under CM 4 (the most of all the habitat restoration components), because pathogens in drinking water are effectively removed prior to distribution and have little effect on drinking water; and findings in Chapter 8, *Water Quality* (See also Section 25.3.1.2, *Pathogens and Water Quality*.)

Compatibility with Plans and Policies

Constructing the proposed water conveyance facilities (CM1) and implementing CM2–CM22 could potentially result in incompatibilities with plans and policies related to the effects of water quality constituents and vector-borne diseases on public health. Section 25.2, *Regulatory Setting*, provides an overview of federal, state, regional, and agency-specific plans and policies applicable to the public health effects of water quality and vector-borne diseases. This section summarizes ways in which BDCP is compatible or incompatible with those plans and policies. Potential incompatibilities with local plans or policies do not necessarily translate into adverse environmental effects under NEPA or CEQA. Even where an incompatibility "on paper" exists, it does not by itself constitute an adverse physical effect on the environment, but rather may indicate the potential for a proposed activity to have a physical effect on the environment. The relationship among plans, policies, and regulations, and impacts on the physical environment is discussed in Chapter 13, *Land Use*, Section 13.2.3.

Consistent with requirements of California's Health and Safety Code (Sections 2001–2007; 2060–2067 and 2001 b[2]), the Alameda County Vector Control Services District, Contra Costa Mosquito and Vector Control District, Sacramento-Yolo Mosquito and Vector Control District, San Joaquin County Mosquito and Vector Control District, Solano County Mosquito Abatement District, and the Sutter-Yuba County Mosquito Abatement District (MVCDs), with jurisdictions in the study area, all have policies related to maintaining and protecting public health and quality of life by preventing the spread of mosquito-borne diseases and relieving pest nuisance. Implementing a selected BDCP alternative could potentially create temporary, additional breeding habitat for mosquitoes during construction of the water conveyance facilities; and permanently increase mosquito breeding habitat as a result of restoration activities under conservation measures, as described under 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*; and Impact PH-5: *Increase in vector-borne diseases as a result of implementing CM2–CM7, CM10, and CM11*. The BDCP proponents would implement an environmental commitment to conduct pre-construction consultation and coordinate with local MVCDs, and to prepare MMPs (Appendix 3B, *Environmental Commitments*). As part of that environmental commitment, BDCP proponents would also follow guidelines provided in the Central Valley Joint Venture's Technical Guide to *Best Management Practices for Mosquito Control in Managed Wetlands* to develop and implement BMPs to manage and control the risk of mosquito-borne disease. This environmental commitment would ensure that the BDCP is compatible with the mission and goals of the applicable MVCDs.

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

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

9 The potential effects of implementing the BDCP alternatives on constituents of concern related to
 10 drinking water and recreationists' exposure to pathogens are discussed under Impact PH-2:
 11 *Exceedances of water quality criteria for constituents of concern such that there is an adverse effect on*
 12 *public health as a result of operation of the water conveyance facilities* (for constituents that do not
 13 bioaccumulate); Impact PH-3: *Substantial mobilization of or increase in constituents known to*
 14 *bioaccumulate as a result of construction, operation or maintenance of the water conveyance facilities*
 15 *(which assesses risk in terms of bioaccumulation in fish that people might eat); and Impact PH-6:*
 16 *Substantial increase in recreationists' exposure to pathogens as a result of implementing the*
 17 *restoration conservation measures, which examines the extent of potential for recreationists to come*
 18 *in contact with pathogens in water while using restored tidal habitat. Under most of the proposed*
 19 *alternatives, BDCP would not create an adverse effect under NEPA or a significant impact under*
 20 *CEQA and therefore is compatible with the plans and policies related to water quality.*

21 However, implementing the proposed BDCP action alternatives has the potential to be incompatible
 22 with the Basin Plan, because long-term average concentrations of DOC (Alternatives 6A – 6C, and 7 –
 23 9) and bromide (Alternatives 1A – 9) and, by extension, DBPs are estimated to substantially increase
 24 various Delta locations in the study area as described under these alternatives in Impact PH-2:
 25 *Exceedances of water quality criteria for constituents of concern such that there is an adverse effect on*
 26 *public health as a result of operation of the water conveyance facilities.* Such increases could trigger
 27 the need for substantial and costly changes in drinking water treatment plant design or operations
 28 in order to achieve EPA Stage 1 Disinfectants and Disinfection Byproduct Rule action thresholds. If
 29 upgrades were not undertaken, the increase in DOC and/or bromide concentrations could create an
 30 increased risk of adverse effects on public health from increases in DBPs in drinking water. While
 31 Mitigation Measure WQ-5, *Avoid, minimize, or offset, as feasible, adverse water quality conditions* and
 32 implementing the North Bay Aqueduct Alternative Intake Project (AIP) could reduce the effects of
 33 bromide, and Mitigation Measure WQ-17, *Consult with Delta water purveyors to identify means to*
 34 *avoid, minimize, or offset increases in long-term average DOC concentrations,* is available to reduce
 35 the effects of DOC, the feasibility and effectiveness of these measures are uncertain, and it is not
 36 known if implementation would reduce the severity such that it would not be an adverse effect.

37 The CPUC regulates electric utilities in the state and has established design guidelines for regulating
 38 EMFs. Recognizing that there is scientific uncertainty as to the health effects of EMFs on receptors in
 39 proximity to power lines, the CPUC affirmed that setting numeric exposure limits is not appropriate
 40 but established precautionary no-cost and low-cost policies that utilities would follow for proposed
 41 electrical facilities. The various electrical utilities in the Delta region that might be selected to
 42 provide power to the BDCP generally follow CPUC guidelines. The CPUC ranked land use categories
 43 for mitigation priority. In descending order these are: schools and licensed day care; residential;
 44 commercial/industrial; recreational; agricultural; and undeveloped land. The California Department
 45 of Education established minimum set-back distances for schools in relation to power lines of
 46 different voltages. These are similar to the National Institute of Health's 300- foot setback for

1 sensitive receptors. BDCP would be generally compatible with the policies established by CPUC and
 2 adopted by the selected utility because most new permanent and temporary power lines would be
 3 in sparsely populated areas, would be at least 300 feet from sensitive receptors, and would not
 4 expose new receptors or increase the exposure of current receptors. However, BDCP could be
 5 considered incompatible with the guidelines because one or both of two new sensitive receptors,
 6 one fire station and one park, would be affected by alternatives. BDCP would become compatible
 7 because the proponents would implement an environmental commitment that the location and
 8 design of the proposed new transmission lines would be conducted in accordance with CPUC's EMF
 9 Design Guidelines for Electrical Facilities, and would include one or more of three measures to
 10 reduce EMF exposure.

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

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

20 **25.3.3 Effects and Mitigation Approaches**

21 **25.3.3.1 No Action Alternative**

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

30 **Water Supply Facilities**

31 New water supply facilities would be constructed under the No Action Alternative as listed in Table
 32 25-9; therefore, there could be a disruption to existing sources of methylmercury associated with
 33 this type of construction. Water supply operations under the No Action Alternative likely would not
 34 involve the operation of solids lagoons or sedimentation basins; therefore, there would be no
 35 increase in the public's risk of exposure to vector-borne diseases. Under the No Action Alternative,
 36 there would be a change in various source waters throughout the Delta (i.e., upstream water, Bay
 37 water, agricultural return flow), due to potential changes in inflows, particularly from the
 38 Sacramento River watershed because of increased water demands or changes to climate and
 39 precipitation levels. Water supply operations under the No Action Alternative would continue to use
 40 the existing source(s) of drinking water from the study area. These sources generally meet
 41 regulatory standards for most constituents or experience some exceedances for constituents such as

1 arsenic (see Chapter 8, *Water Quality*, Section 8.3.3.1). However, under the No Action Alternative,
2 existing exceedances would not increase above baseline conditions (see Chapter 8) to levels that
3 adversely affect any beneficial uses or substantially degrade water quality. Furthermore, drinking
4 water from the study area would continue to be treated prior to distribution into the drinking water
5 system. Therefore, there would be no adverse effect on drinking water due to new water conveyance
6 facilities.

7 **New Transmission Lines**

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

26 **Habitat Restoration**

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

1 Table 25-9. 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.
NMFS/USFWS	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 EIR/EIS 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 would occur during a limited time and would be localized
 18 around the area of construction. Once operational, other habitat restoration projects could result in
 19 an increase of methylmercury as a result of biogeochemical processes and sediment conditions
 20 established in tidal wetlands. However, it is expected these projects either have, or would evaluate
 21 the potential for, methylmercury production and would implement measures to monitor and
 22 adaptively manage methylmercury production.

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

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

33 Therefore, under the No Action Alternative, impacts related to public health would be less than
 34 significant.

35 **25.3.3.2 Alternative 1A—Dual Conveyance with Pipeline/Tunnel and** 36 **Intakes 1–5 (15,000 cfs; Operational Scenario A)**

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

40 Construction and operation of the water conveyance facilities could create suitable mosquito habitat
 41 because of the need for solids lagoons and sedimentation basins. Additionally, construction and
 42 operation of the water conveyance facilities could result in exceedances of constituents of concern,

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

13 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 14 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water**
 15 **Conveyance Facilities**

16 **NEPA Effects:** Five intakes, up to 15 solids lagoons, and five sedimentation basins would be
 17 constructed and operated under Alternative 1A. The sedimentation basins would be approximately
 18 120 feet long by 40 feet wide by 55 feet deep, and the solids lagoons would be approximately 165
 19 feet long by 86 feet wide by 10 feet deep. Construction of the cofferdam would take place from June
 20 through October, and it is expected that dewatering of the cofferdams (i.e., removing water from
 21 behind the cofferdams) would occur after the construction of the cofferdams, when generally there
 22 are fewer mosquitoes breeding, as mosquitoes in northern California typically breed April–October
 23 (Sacramento–Yolo Mosquito and Vector Control District 2008). Under DWR would consult and
 24 coordinate with San Joaquin County and Sacramento-Yolo County MVCDs and prepare and
 25 implement Mosquito Management Plans (MMPs) (Appendix 3B, *Environmental Commitments*). BMPs
 26 to be implemented as part of the MMPs would help control mosquitoes. BMP activities will include,
 27 but not necessarily be limited to, the following.

- 28 • Maintain stable water levels.
- 29 • Circulate water.
- 30 • Implement monitoring and sampling programs to detect early signs of mosquito population
- 31 problems.
- 32 • Use biological agents such as mosquito fish to limit larval mosquito populations.
- 33 • Use larvicides and adulticides, as necessary.
- 34 • Test for mosquito larvae during the high mosquito season (June through September).
- 35 • Introduce biological controls such as mosquitofish to areas of standing water if mosquitoes are
- 36 present.
- 37 • Introduce physical controls to areas of standing water (e.g., discharging water more frequently
- 38 or increasing circulation) if mosquitoes are present.

39 Implementation of these BMPs would reduce the likelihood that BDCP operations would require an
 40 increase in abatement activities by the local MVCDs.

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

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

34 **CEQA Conclusion:** Sedimentation basins, solids lagoons, and the intermediate forebay inundation
35 area have the potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes)
36 because of the large volumes of water that would be held within these areas. However, DWR would
37 consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDs and prepare
38 and implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes
39 reducing the need for local MVCDs to increase abatement activities in response to BDCP operations.
40 During operations, the depth, design, and operation of the sedimentation basins and solids lagoons
41 would prevent the development of suitable mosquito habitat. Specifically, the basins would be too
42 deep and the constant movement of water would prevent mosquitoes from breeding and
43 multiplying. Furthermore, the 350-acre inundation area adjacent to the intermediate forebay would
44 be limited to forebay emergency overflow situations and water would be physically pumped back to
45 the intermediate forebay, creating circulation such that the area would have a low potential for
46 creating suitable vector habitat. Therefore, construction and operation of Alternative 1A would not

1 result in a substantial increase in vector-borne diseases and the impact on public health would be
2 less than significant. No mitigation is required.

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

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

9 **Disinfection Byproducts**

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

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

1 proposed project would be designed to improve water quality and to provide reliable deliveries of
 2 State Water Project supplies to its contractors, the Solano County Water Agency and the Napa
 3 County Flood Control and Water Conservation District. The timing of DWR's implementation of the
 4 AIP is uncertain at this time. The adverse water quality effects on the North Bay Aqueduct at Barker
 5 Slough may be avoided or minimized by implementation of the AIP.

6 **Trace Metals**

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

20 **Pesticides**

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

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

1 treatment plant upgrades would be necessary to achieve equivalent levels of drinking water health
2 protection. This would be a significant impact.

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

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

33 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality** 34 **Conditions**

35 It remains to be determined whether, or to what degree, the available and existing salinity
36 response and countermeasure actions of SWP and CVP facilities or municipal water purveyors
37 would be capable of offsetting the actual level of changes in bromide that may occur from
38 implementation of Alternative 1A. Therefore, to determine the feasibility of reducing the effects
39 of increased bromide levels, and potential adverse effects on beneficial uses associated with
40 CM1 operations (and hydrodynamic effects of tidal restoration under CM4), the proposed
41 mitigation requires a series of phased actions to identify and evaluate existing and possible
42 feasible actions, followed by development and implementation of the actions, if determined to
43 be necessary. The development and implementation of any mitigation actions shall be focused
44 on those incremental effects attributable to implementation of Alternative 1A operations only.
45 Development of mitigation actions for the incremental bromide effects attributable to climate

1 change/sea level rise are not required because these changed conditions would occur with or
 2 without implementation of Alternative 1A. The goal of specific actions would be to reduce/avoid
 3 additional degradation of Barker Slough water quality conditions with respect to the CALFED
 4 bromide goal.

5 Following commencement of initial operations of CM1, the BDCP proponents will conduct
 6 additional evaluations described herein, and develop additional modeling (as necessary), to
 7 define the extent to which modified operations could reduce or eliminate the increased bromide
 8 concentrations currently modeled to occur under Alternative 1A. The additional evaluations
 9 should also consider specifically the changes in Delta hydrodynamic conditions associated with
 10 tidal habitat restoration under CM4 (in particular the potential for increased bromide
 11 concentrations that could result from increased tidal exchange) once the specific restoration
 12 locations are identified and designed. If sufficient operational flexibility to offset bromide
 13 increases is not practicable/feasible under Alternative 1A operations, achieving bromide
 14 reduction pursuant to this mitigation measure would not be feasible under this alternative.

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

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

28 **Pesticides**

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

34 Further, residues of legacy organochlorine pesticides enter rivers primarily through surface runoff
 35 and erosion of terrestrial soils during storm events, and through resuspension of riverine bottom
 36 sediments. The combination of these processes may contribute to increases above water quality
 37 objectives (Central Valley Regional Water Quality Control Board 2010). Water supply operations of
 38 the CVP/SWP do not affect terrestrial sources of these pesticides, but may result in geomorphic
 39 changes that ultimately could result in changes to sediment suspension and deposition. However, as
 40 discussed in greater detail in Chapter 8, *Water Quality* (Section 8.3.3), water supply operations
 41 under any BDCP action alternative would not be expected to change total suspended solids or
 42 turbidity levels (highs, lows, typical conditions) to any substantial degree. Changes in the magnitude,
 43 frequency, and geographic distribution of legacy pesticides in water bodies of the affected

1 environment that would result in new or more severe adverse effects on other beneficial uses,
2 relative to the No Action Alternative, would not be expected to occur.

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

12 **Methylmercury**

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

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

- 25 • Install physical erosion control stabilization features (hydroseeding, mulch, silt fencing, fiber
26 rolls, sand bags, and erosion control blankets) to capture sediment and control both wind and
27 water erosion.
- 28 • Retain trees and natural vegetation to the extent feasible to stabilize hillsides, retain moisture,
29 and reduce erosion.
- 30 • Limit construction, clearing of vegetation, and disturbance of soils to areas of proven stability.
- 31 • Use sediment ponds, silt traps, wattles, straw bale barriers or similar measures to retain
32 sediment transported by runoff water onsite.
- 33 • Collect and direct surface runoff at non-erosive velocities to the common drainage courses.
- 34 • Deposit or store excavated materials away from drainage courses.
- 35 • Prevent transport of sediment at the construction site perimeter, toe of erodible slopes, soil
36 stockpiles, and into storm drains.
- 37 • Reduce runoff velocity on exposed slopes.
- 38 • Reduce offsite sediment tracking.

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

3 Modeling showed small, insignificant changes in total mercury and methylmercury levels in water
4 and fish tissues resulting from Alternative 1A water operations. Upstream mercury contributions
5 and methylmercury production in Delta waters would not be altered by the operation of Alternative
6 1A, as it would not change existing mercury sources and would not substantially alter
7 methylmercury concentrations in the Sacramento River or San Joaquin River; therefore, the
8 potential for Alternative 1A to create a public health effect is minimal, and effects would not be
9 adverse. Modeling results indicate that percentage change in assimilative capacity of waterborne
10 total mercury relative to the 25 ng/L Ecological Risk Benchmark for this alternative showed the
11 greatest decrease (1.1%) at Franks Tract relative to the No Action Alternative. Fish tissue estimates
12 showed small or no increase in exceedance quotients based on long-term annual average
13 concentrations for mercury at the nine Delta locations modeled (See Chapter 8, *Water Quality*,
14 Section 8.3.3.2, *Alternative 1A–Dual Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs;*
15 *Operational Scenario A*, for a detailed discussion). The greatest increase was at Mokelumne River
16 (South Fork) at Staten Island (10% relative to the No Action Alternative). Currently, mercury
17 concentrations in fish tissues exceed Delta TMDL guidance targets, which are set for human health
18 rather than effects on fish, and Alternative 1A is not expected to substantially alter this condition
19 through water operations. Large sport fish throughout the Delta are currently uniformly in
20 exceedance of consumption guidelines for mercury, and Alternative 1A is not expected to
21 substantially alter that condition.

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

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

43 Alternative 1A would not result in increased flows in the tributaries that would mobilize legacy
44 organochlorine pesticides in sediments. Other pesticides that are present in study area water
45 channels are not considered bioaccumulative and any changes in concentrations due to Alternative

1 1A operations would not cause them to become bioaccumulative. Water quality modeling results
 2 showed small, insignificant changes in mercury and methylmercury levels in water at certain Delta
 3 locations and fish tissues due to Alternative 1A water operations. Specifically, modeling results
 4 indicate that percentage change in assimilative capacity of waterborne total mercury relative to the
 5 25 ng/L Ecological Risk Benchmark for this alternative showed the greatest decrease (1%) at Franks
 6 Tract and Old River relative to Existing Conditions. Fish tissue estimates showed the greatest
 7 increase (8%) in exceedence quotients relative to Existing Conditions at Mokelumne River (South
 8 Fork) at Staten Island.

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

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

15 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
 16 area. Table 25-8 identifies the miles of the new temporary and permanent 69 kV transmission lines
 17 and the miles of permanent 230 kV lines that would be located outside existing rights-of-way of
 18 existing transmission lines. As described in Table 25-8, a total of 24.71 miles of new temporary 69
 19 kV transmission lines, 8.94 miles of new permanent 69 kV transmission lines, and 42.68 miles of
 20 new permanent 230 kV transmission lines would be required for this alternative. While new
 21 transmission lines generating new sources of EMFs would be constructed under this alternative, the
 22 new temporary and permanent transmission lines would be located in sparsely populated areas
 23 (Figure 25-2). Table 25-8 identifies only one potential new sensitive receptor (Stone Lakes National
 24 Wildlife Refuge) associated with the pipeline/tunnel alignment that is not currently within 300 feet
 25 of an existing transmission line; the majority of sensitive receptors are already located within 300
 26 feet of an existing 69 kV or 230 kV transmission line. Accordingly, new temporary or new
 27 permanent transmission lines would not expose substantially more potential sensitive receptors or
 28 substantially more people to EMFs that they are not already experiencing. Stone Lakes National
 29 Wildlife Refuge would be within 300 feet of a proposed temporary 69 kV transmission line. Visitors
 30 to this area general come for walks, water recreation, and hunting, and as such, it is unlikely that
 31 large groups of people would be staying in the area within 300 feet of this proposed transmission
 32 line, so any EMF exposure would be limited. Further, this line would be removed following
 33 completion of construction of the water conveyance facility features near this area so there would
 34 be no potential permanent effects. Therefore, this temporary transmission line would not
 35 substantially increase people's exposure to EMFs.

36 As discussed in Section 15.1.1.5, the current scientific evidence does not show conclusively that EMF
 37 exposure can increase health risks. In 2006, CPUC updated its EMF policy and reaffirmed that health
 38 hazards from exposures to EMF have not been established. State and federal public health
 39 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
 40 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should be
 41 continued. Based on this, utility companies are required to establish and maintain EMF Design
 42 Guidelines in order to reduce potential health risks associated with power lines. These guidelines
 43 would be implemented for any new temporary or new permanent transmission lines constructed
 44 and operated under Alternative 1A, depending on which electric provider is selected by DWR.
 45 Furthermore, as described in Appendix 3B, *Environmental Commitments*, the location and design of

1 the proposed new transmission lines would be conducted in accordance with CPUC's EMF Design
2 Guidelines for Electrical Facilities, and would include one or more of three measures to reduce EMF
3 exposure.

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

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

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

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

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

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

38 Of the approximate 65,000-acre tidal and freshwater habitat restoration target, approximately
39 55,000 acres of this restoration will consist of tidal perennial aquatic, tidal mudflat, tidal freshwater
40 emergent wetland, and tidal brackish emergent wetland natural communities, and the remaining up
41 to 10,000 acres will consist of transitional uplands to accommodate sea level rise. Of the

1 approximate 55,000 acres of tidally influenced natural community, approximately 20,600 acres
2 must occur in particular ROAs as listed below.

- 3 • 7,000 acres of brackish tidal habitat, of which at least 4,800 acres would be tidal brackish
4 emergent wetland and the remainder would be tidal perennial aquatic and tidal mudflat, in
5 Suisun Marsh ROA.
- 6 • 5,000 acres of freshwater tidal habitat in the Cache Slough ROA.
- 7 • 1,500 acres of freshwater tidal habitat in the Cosumnes/Mokelumne ROA.
- 8 • 2,100 acres of freshwater tidal habitat in the West Delta ROA.
- 9 • 5,000 acres of freshwater tidal habitat in the South Delta ROA.

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

13 Potentially suitable mosquito habitat resulting from the implementation of CM2 – CM7, CM10 and
14 CM11 would generally not be located near densely populated areas (Figure 25-3). Table 25-5
15 outlines the distances travelled from breeding grounds for the species listed. These distances range
16 from less than 1 mile to up to 30 miles. The conservation measures would generally expand existing
17 habitat or replace existing agricultural areas, both of which are currently sources for mosquitoes. Of
18 the ROAs, the South Delta ROA and West Delta ROA currently have the fewest acres of habitat
19 suitable for mosquitoes and are the closest to more densely populated areas (Figure 25-3). Similarly,
20 although much of Yolo Bypass is not proximate to densely populated areas, there are areas of Yolo
21 Bypass near populated areas including El Macero, Davis, and West Sacramento. Therefore, habitat
22 restoration in these ROAs and in the Yolo Bypass may result in an increase in mosquitoes and
23 exposure to vector-borne diseases when compared with restoration of aquatic habitat within the
24 other ROAs.

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

- 38 • Delay or phase fall flooding—phased flooding involves flooding habitat throughout the fall and
39 winter in proportion to wildlife need and takes into consideration other wetland habitat that
40 may be available in surrounding areas.
- 41 • Use rapid fall flooding.
- 42 • Use deep initial flooding.

- 1 • Subsurface irrigate.
- 2 • Utilize water sources with mosquito predators for flooding.
- 3 • Drain irrigation water into ditches or other water bodies with abundant mosquito predators.
- 4 • Employ vegetation management practices to reduce mosquito production in managed wetlands
- 5 (e.g., mowing, burning, disking of vegetation that serves as mosquito breeding substrate).
- 6 • Design wetlands and operations to be inhospitable to mosquitoes.
- 7 • Implement monitoring and sampling programs to detect early signs of mosquito population
- 8 problems.
- 9 • Use biological agents such as mosquito fish to limit larval mosquito populations.
- 10 • Use larvicides and adulticides, as necessary.
- 11 • Test for mosquito larvae during the high mosquito season (June through September).

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

16 **CEQA Conclusion:** Although implementing conservation measures under Alternative 1A would
 17 increase restored and enhanced habitat in the study area that could result in a significant increase in
 18 vectors such as mosquitoes, BDCP proponents would consult and coordinate with San Joaquin
 19 County and Sacramento-Yolo County MVEDs and prepare and implement MMPs (Appendix 3B,
 20 *Environmental Commitments*). BMPs to be implemented as part of the MMPs would help control
 21 mosquitoes. This would reduce the potential for an increase in mosquito breeding habitat, and an
 22 associated substantial increase in vector-borne diseases would not result. Furthermore, habitat
 23 would be restored in areas where existing potentially suitable habitat for mosquitoes already exists.
 24 Finally, predators on mosquitoes would likely increase as a result of restoration and enhancement,
 25 which would keep mosquito populations in check. Accordingly, implementation of CM2 – CM7, CM10
 26 and CM11 under Alternative 1A would not substantially increase the public's risk of exposure to
 27 vector-borne diseases beyond what currently exists and would be less than significant. No
 28 mitigation is required.

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

31 **NEPA Effects:** The study area currently supports habitat types, such as tidal habitat, upland
 32 wetlands, and agricultural lands, that produce pathogens as a result of the biological productivity in
 33 these areas (e.g., migrating birds, application of fertilizers, waste products of animals). The study
 34 area does not currently have pathogen concentrations that rise to the level of adversely affecting
 35 beneficial uses of recreation. Restored habitat and protected agricultural lands under Alternative 1A
 36 could result in an increase in pathogen loading in the study area because these land uses are known
 37 to generate pathogens. However, as exemplified by the Pathogen Conceptual Model (Tetra Tech
 38 2007), any potential increase in pathogens associated with the proposed habitat restoration would
 39 be localized and within the vicinity of the actual restoration. The result would be similar for lands
 40 protected for agricultural uses. This localized increase is not expected to be of sufficient magnitude
 41 and duration to result in adverse effects on recreationists as described in Chapter 8, *Water Quality*

1 (Section 8.3.3.2). Furthermore, depending on the level of recreational access granted by
2 management plans, habitat restoration could increase or decrease opportunities for recreationists
3 within the Delta region. Mechanisms that permit public access could increase opportunities related
4 to upland hunting, hiking, walking, wildlife viewing, botanical viewing, nature photography,
5 picnicking, and sightseeing. Alternatively, acquisition that would exclude public recreational use
6 would decrease opportunities for these activities, thus limiting recreationists' potential exposure to
7 pathogens. Even if recreationists were allowed in the ROAs, the characteristics of pathogens in
8 water as described by the conceptual model would not substantially increase recreationists'
9 exposure. Accordingly, implementation of the restoration conservation measures under Alternative
10 1A would not result in a substantial increase in recreationists' exposure to pathogens. There would
11 be no adverse effect.

12 **CEQA Conclusion:** Implementation of the restoration conservation measures would support habitat
13 types, such as wetlands and agricultural lands, that could produce pathogens as a result of the
14 biological productivity in these areas (e.g., migrating birds, application of fertilizers, waste products
15 of animals). However, the localized nature of pathogen generation, as well as the quick die-off of
16 pathogens once released into water bodies, would generally prevent substantial pathogen exposure
17 to recreationists. Accordingly, impacts on public health would be less than significant. No mitigation
18 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 primary concern with habitat restoration regarding constituents known to
22 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
23 inundated floodplains and marshes. The mobilization depends on the presence of the constituent
24 and the biogeochemical behavior of the constituent to determine whether it could re-enter the
25 water column or be reintroduced into the food chain.

26 **Pesticides**

27 Organochlorines and other relatively water insoluble pesticides would likely be sequestered in the
28 former agricultural soils in ROAs. Additionally, because these chemicals tend to bind to particulates,
29 concentrations are typically highest in sediment. Flooding of former agricultural land, as would
30 occur under CM4, CM5, and CM10, is expected to result in some level of accessibility to biota through
31 uptake by benthic organisms. Moreover, CM2 and CM5 may be managed alongside continuing
32 agriculture, where pesticides may be used on a seasonal basis and where water during flood events
33 may come in contact with residues of these pesticides. However, rapid dissipation would be
34 expected, particularly in the large volumes of water involved in flooding; therefore, it is unlikely that
35 a substantial increase in bioaccumulation by fish would result. Further, CM2–CM22 do not include
36 the use of pesticides known to be bioaccumulative in animals or humans. Additionally, significant
37 increases in organochlorine and other legacy pesticides are not expected in the water column
38 because these lipophilic chemicals strongly partition to sediments. Also, concentrations in the water
39 column should be relatively short-lived because these pesticides settle out of the water column via

1 sediment adsorption in low-velocity flow. As described in Section D.4.6.1 of BDCP Appendix 5.D⁶, if
2 sediment with existing pesticide levels erodes and is transported from an ROA, it is likely that the
3 pesticides would not be transported very far from the source area, and would settle out with
4 suspended particulates and be deposited close to the ROA. For these reasons a substantial
5 mobilization of nor a substantial increase in bioaccumulative pesticides in the study area is not
6 anticipated. Therefore, no adverse effect on public health with respect to bioaccumulation of
7 pesticides is expected.

8 **Methylmercury**

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

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. Results of the CALFED Mercury Project Annual Report for
20 2007 (Stephenson et al. 2007) indicate that river inputs (11.5 grams per day [g/day]
21 methylmercury) and in-situ production from wetland/marsh sediments (11.3 g/day
22 methylmercury) are the leading sources of methylmercury to the Delta waters, and have roughly
23 comparable levels of input. Wood (2010) estimates that in-situ methylmercury production in open
24 water and wetlands contributes approximately 36% of the overall methylmercury load to the Delta
25 (approximately 5 g/day) but is less than riverine/tributary inputs (8 g/day). The higher estimate of
26 methylmercury production from sediments reported by Stephenson is based on periods of higher
27 water (wet) and may be more representative of what might occur when new ROAs are opened for
28 inundation. Once in the aquatic system, the methylmercury can be transported with water flow,
29 taken up by biota, volatilized, demethylated, or returned to sediment (but not necessarily at the
30 original restoration site).

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

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

⁶ As described in Chapter 1, *Introduction*, Section 1.1, the full Draft EIR/EIS should be understood to include not only the EIR/EIS itself and its appendices but also the proposed BDCP documentation including all appendices.

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 exposure 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 to protect people against the
 23 overconsumption of fish with increased body burdens of mercury. Furthermore, implementation of
 24 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 **25.3.3.3 Alternative 1B—Dual Conveyance with East Alignment and** 42 **Intakes 1–5 (15,000 cfs; Operational Scenario A)**

43 Alternative 1B would be similar to Alternative 1A except that the water routed from the north Delta
 44 to the south Delta would be conveyed primarily through a canal along the east side of the Delta

1 instead of through pipelines/tunnels, and there would be no intermediate forebay. From an
 2 intermediate pumping plant, water would be raised to an elevation allowing gravity to carry it
 3 through a continuing canal to the new Byron Tract Forebay, adjacent to and south of Clifton Court
 4 Forebay. Along the way, diverted water would travel under existing watercourses through culvert
 5 siphons or tunnel siphons. CM2–CM22 would also be implemented under this alternative, and their
 6 effects would be the same as under Alternative 1A. A detailed description of the alternative is
 7 provided in Chapter 3, *Description of the Alternatives* (Section 3.5.3); a detailed depiction is provided
 8 in Figure M3-2 in the Mapbook Volume.

9 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 10 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water**
 11 **Conveyance Facilities**

12 **NEPA Effects:** As with Alternative 1A, implementation of CM1 under Alternative 1B would involve
 13 construction and operation of five north Delta intakes, up to 15 solids lagoons, and five
 14 sedimentation basins. Sedimentation basins and solids lagoons have the potential to provide habitat
 15 for vectors that transmit diseases (e.g., mosquitoes) because of the large volumes of water that
 16 would be held within these areas. However, DWR would consult and coordinate with San Joaquin
 17 County and Sacramento-Yolo County MVCDs and prepare and implement MMPs. BMPs to be
 18 implemented as part of the MMPs would help control mosquitoes during construction. See Impact
 19 PH-1 under Alternative 1A.

20 Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons
 21 would be 165 feet long by 86 feet wide by 10 feet deep. During operation, the depth, design, and
 22 operation of the sedimentation basins and solids lagoons would prevent the development of suitable
 23 mosquito habitat (Figure 25-1). Specifically, the basins would be too deep and the constant
 24 movement of water would prevent mosquitoes from breeding and multiplying. As described under
 25 Alternative 1A, implementation of CM1 under Alternative 1B would not substantially increase
 26 suitable vector habitat and would not substantially increase vector-borne diseases. Accordingly, no
 27 adverse effects on public health would result.

28 **CEQA Conclusion:** As with Alternative 1A, implementation of CM1 under Alternative 1B would
 29 involve construction and operation of solids lagoons and sedimentation basins. Public exposure to
 30 vector-borne diseases would not substantially increase because water movement in sedimentation
 31 basins would prevent development of suitable mosquito habitat. Furthermore, DWR would consult
 32 and coordinate with San Joaquin County and Sacramento-Yolo County MVCDs and prepare and
 33 implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes. See
 34 Impact PH-1 for Alternative 1A. During operations, water depth and circulation would prevent the
 35 areas from substantially increasing suitable vector habitat. Therefore, construction and operation of
 36 the water conveyance facilities in Alternative 1B would not result in a substantial increase in vector-
 37 borne diseases and the impact would be less than significant. No mitigation is required.

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

41 **NEPA Effects:** The water supply facilities under Alternative 1B would be the same as those
 42 described for 1A with the exception that the water would be primarily conveyed via an east canal
 43 rather than pipelines and tunnels, and there would be no intermediate forebay. Alternative 1B

1 would have the same number of intakes as Alternative 1A and they would be constructed and
2 operated in the same manner. Water supply operations under Alternative 1B (Operational Scenario
3 A) would be identical to Alternative 1A. Therefore, the water quality and public health effects
4 described for Alternative 1A also appropriately characterize effects under Alternative 1B. There
5 would be no substantial changes in trace metals, pesticides, or DBPs under Operational Scenario A
6 with the exception of bromide concentrations at Barker Slough. Under Alternative 1B, long-term
7 average bromide concentrations are expected to increase at the North Bay Aqueduct at Barker
8 Slough, Staten Island, and Emmaton on the Sacramento River relative to the No Action Alternative.
9 This increase would be greatest at Barker Slough (43%). Increases at Barker Slough would be more
10 substantial during the drought period (93%).

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

23 **CEQA Conclusion:** The operation of water supply facilities under Alternative 1B would be the same
24 as described for Alternative 1A. Water supply operations would increase contributions from the San
25 Joaquin River relative to the Sacramento River, and decrease the dilution capacity of the Sacramento
26 River for contaminants. Water quality modeling results indicate that changes in flows under
27 Alternative 1B would, for the most part, not result in increased exceedances of water quality criteria
28 for trace metals, pesticides, or DBP in the study area (Chapter 8, *Water Quality*, Section 8.3.3.3).
29 However, relative to Existing Conditions, under Alternative 1B bromide concentrations would
30 increase at the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton on the
31 Sacramento River, with the greatest increase occurring at Barker Slough (38%). Increases would be
32 more substantial during the drought period (94%).

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

39 While treatment technologies sufficient to achieve the necessary bromide removal exist,
40 implementation of such technologies would likely require substantial investment in new or modified
41 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
42 long-term average bromide concentrations in drinking water sources would represent an increased
43 risk for adverse effects on public health from DBP in drinking water sources. Assuming the adverse
44 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by

1 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
2 uses potentially provided in Barker Slough would remain significant.

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

5 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
6 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments*, a separate, non-
7 environmental commitment to address the potential increased water treatment costs that could
8 result from bromide-related concentration effects on municipal water purveyor operations.

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

25 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
26 **Conditions**

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

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

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

37 As described for Alternative 1A, construction and operation of the water conveyance facilities under
38 Alternative 1B would not result in a change in water dilution, and mixing of existing constituents
39 would not affect the status of legacy organochlorine pesticides, or methylmercury in the study area.
40 Intermittent and/or short-term construction-related activities (as would occur for in-river
41 construction) would not be anticipated to result in contaminant discharges of sufficient magnitude
42 or duration to contribute to long-term bioaccumulation processes, or cause measureable long-term
43 water quality degradation, as described under Alternative 1A. Legacy pesticides typically bond to

1 particulates and do not mobilize easily. Construction and maintenance of Alternative 1B would not
 2 cause legacy organochlorine pesticides to be transported far from the source or to partition into the
 3 water column, as described under Alternative 1A. Water supply operations under any BDCP action
 4 alternative would not be expected to change total suspended solids or turbidity levels (highs, lows,
 5 typical conditions) to any substantial degree. Changes in the magnitude, frequency, and geographic
 6 distribution of legacy organochlorine pesticides in water bodies of the affected environment that
 7 would result in new or more severe adverse effects on other beneficial uses, relative to the No
 8 Action Alternative, would not be expected to occur.

9 Furthermore, based on modeling results presented in Chapter 8, *Water Quality* (Section 8.3.3.3),
 10 operation of water conveyance facilities under Alternative 1B, as under Alternative 1A, would not
 11 substantially alter mercury or methylmercury concentrations in the Sacramento River or San
 12 Joaquin River, nor would it substantially result in an increase in mercury concentrations in fish
 13 tissues.

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

22 **CEQA Conclusion:** As described under Alternative 1A, construction and maintenance of Alternative
 23 1B 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. Although
 25 methylmercury currently exceeds the TMDL, little to no change in mercury or methylmercury
 26 concentrations in water is expected under Alternative 1B water construction. BMPs implemented as
 27 part of Erosion and Sediment Control Plans and SWPPPs would help ensure that construction
 28 activities would not substantially increase or substantially mobilize legacy organochlorine
 29 pesticides or methylmercury during construction and maintenance. Therefore, construction and
 30 maintenance of Alternative 1B would not cause increased exposure of the public to these
 31 bioaccumulative sediment constituents.

32 Operation of Alternative 1B would not result in increased flows in the tributaries that would
 33 mobilize legacy organochlorine pesticides in sediments. Water quality modeling results showed
 34 small changes in mercury and methylmercury levels in water at certain Delta locations and in
 35 mercury in fish tissues due to Alternative 1B water operations (Chapter 8, *Water Quality*, Section
 36 8.3.3.3). Because construction, maintenance or operation of Alternative 1B would not cause
 37 substantial mobilization or a substantial increase of constituents known to bioaccumulate (i.e.,
 38 organochlorine pesticides or mercury), impacts on public health would be less than significant. No
 39 mitigation is required.

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

43 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
 44 area. As described in Table 25-8, a total of 13.49 miles of new temporary 69 kV transmission lines;

1 36.79 miles of new permanent 69 kV transmission lines; and 16.35 miles of new permanent 230 kV
2 transmission lines would be required for this alternative. While new transmission lines generating
3 new sources of EMFs would be constructed under Alternative 1B, the new temporary and
4 permanent transmission lines would generally be located in sparsely populated areas (Figure 25-2).
5 Table 25-8 identifies only one potential new sensitive receptor (Stone Lakes National Wildlife
6 Refuge) that is not currently within 300 feet of an existing transmission line; the majority of
7 sensitive receptors are already located within 300 feet of an existing 69 kV or 230 kV transmission
8 line. Stone Lakes National Wildlife Refuge would be within 300 feet of a proposed permanent 69 kV
9 transmission line. Visitors to this area general come for walks, water recreation, and hunting, and as
10 such, it is unlikely that large groups of people would be staying in the area within 300 feet of this
11 proposed transmission line, so any EMF exposure would be limited. The majority of sensitive
12 receptors are already located within 300 feet of an existing transmission line. Accordingly, the
13 majority of new temporary or new permanent transmission lines would not expose sensitive
14 receptors or substantially more people to EMFs that they are not already experiencing. Because the
15 proposed transmission lines would be located in sparsely populated areas and would be within 300
16 feet of only one potential new sensitive receptor, the proposed temporary and permanent
17 transmission lines would not substantially increase people's exposure to EMFs.

18 As discussed in Section 25.2.6.1, the current scientific evidence does not show conclusively that EMF
19 exposure increases health risks. In 2006, CPUC updated its EMF Policy and reaffirmed that health
20 hazards from exposures to EMF have not been established. State and federal public health
21 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
22 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should be
23 continued. Based on this, utility companies are required to establish and maintain EMF Design
24 Guidelines in order to minimize health risks associated with power lines. These guidelines would be
25 implemented for any new temporary or new permanent transmission lines constructed and
26 operated under Alternative 1B, depending on which electric provider is selected by DWR.
27 Furthermore, as described under Impact PH-4 for Alternative 1A (and in Appendix 3B,
28 *Environmental Commitments*), location and design of the new transmission lines would be
29 conducted in accordance with CPUC's EMF Design Guidelines for Electrical Facilities. Measures
30 implemented under these guidelines would reduce EMF exposure from the proposed transmission
31 lines. Therefore, operation of the transmission line corridors would not expose substantially more
32 people to transmission lines generating EMFs, and there would be no adverse effect on public health.

33 **CEQA Conclusion:** Under Alternative 1B, new transmission lines would be located in sparsely
34 populated areas generally away from existing sensitive receptors. However, one sensitive receptor,
35 Stone Lakes National Wildlife Refuge, would be within 300 feet of a proposed permanent 69 kV
36 transmission line. Because visitors to this area general come for walks, water recreation, and
37 hunting, it is unlikely that large groups of people would be staying in the area within 300 feet of this
38 proposed transmission line, so any EMF exposure would be limited. Design and implementation of
39 new temporary or permanent transmission lines not within the right-of-way of existing
40 transmission lines would follow CPUC's EMF Design Guidelines for Electrical Facilities and would
41 implement shielding, cancelation, or distance measures to reduce EMF exposure. Since construction
42 and operation of Alternative 1B would not expose substantially more people to transmission lines
43 that generate new sources of EMFs, impacts on public health would be less than significant, and no
44 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 1B would be the same as that described under 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 1B, 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), would reduce the potential for an increase in mosquito
9 breeding habitat, and a substantial increase in vector-borne diseases is unlikely to result.
10 Furthermore, habitat would be restored in areas where potentially suitable habitat for mosquitoes
11 already exists. Finally, mosquito predators (e.g., bats, spiders) would likely increase as a result of
12 restoration and enhancement, which would keep mosquito populations in check. Therefore, effects
13 would be the same under Alternative 1B as under Alternative 1A and there would not be a
14 substantial increase in the public's risk of exposure to vector-borne diseases with implementation of
15 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, Alternative 1B would
18 require environmental commitments, such as coordination with MVCDs and implementation of
19 BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in Appendix 3B) that
20 would help control mosquitoes and reduce the potential for an increase in mosquito breeding
21 habitat. Furthermore, habitat would be restored where potentially suitable vector habitat already
22 exists, and habitat restoration and enhancement would likely increase the number of mosquito
23 predators. Therefore, as described under Alternative 1A, implementation of CM2-CM7, CM10 and
24 CM11 under Alternative 1B would not substantially increase the public's risk of exposure to vector-
25 borne diseases beyond what currently exists. Accordingly, this impact would be less than significant
26 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 1B would be the same as that described under Alternative 1A. Implementation of
31 the restoration conservation measures would support habitat types, such as wetlands and
32 agricultural areas, that produce pathogens as a result of the biological productivity in these areas
33 (e.g., migrating birds, application of fertilizers, waste products of animals). As exemplified by the
34 Pathogen Conceptual Model, any potential increase in pathogens associated with habitat restoration
35 would be localized and within the vicinity of the actual restoration. This would be similar for lands
36 protected for agricultural uses. Depending on the level of recreational access granted by
37 management plans, habitat restoration could increase or decrease opportunities for recreationists in
38 the Delta region. However, effects associated with pathogens would be the same under Alternative
39 1B as under Alternative 1A. Any increase in pathogens would be localized and likely of insufficient
40 magnitude or duration to result in adverse effects on recreationists. Even if recreationists were
41 allowed in the ROAs, the characteristics of pathogens in water as described by the conceptual model
42 would not substantially increase recreationists' exposure. Therefore, recreationists would not
43 experience a substantial increase in exposure to pathogens as a result of the restoration and no
44 adverse effect would result.

1 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 1B
2 would support habitat types, such as wetlands and agricultural areas, that could produce pathogens
3 as a 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 pathogens once released into water bodies would generally prevent a substantial increase in
6 pathogen exposure by recreationists. Therefore, 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 1B as
11 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
12 known to bioaccumulate (i.e., legacy organochlorine pesticides and methylmercury) is the potential
13 for mobilizing contaminants sequestered in sediments of the newly inundated floodplains and
14 marshes, as described under Alternative 1A. It is likely that the pesticide-bearing sediments would
15 not be transported very far from the source area and would settle out with suspended particulates
16 and be deposited close to the ROA. Further, CM2–CM22 do not include the use of pesticides known
17 to be bioaccumulative in animals or humans.

18 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
19 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
20 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
21 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
22 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
23 bioaccumulation of methylmercury in the study area's aquatic systems (i.e., fish and water) during
24 the near-term, CM12 *Methylmercury Management* and existing OEHHA standards would serve to
25 reduce the public's exposure to contaminated fish. Implementation of methylmercury management
26 measures under CM12 would minimize conditions conducive to generation of methylmercury in
27 restored areas.

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

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

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

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

Generally, the water conveyance facilities construction techniques and operation for Alternative 1C would be the same as under Alternative 1A; therefore, Alternative 1C would have similar effects on public health to those described under Alternative 1A. CM2–CM22 would also be implemented under this alternative, and their effects would be the same as under Alternative 1A.

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: As with Alternative 1A, implementation of CM1 under Alternative 1C would involve construction and operation of five north Delta intakes, up to 15 solids lagoons, and five sedimentation basins. Sedimentation basins and solids lagoons near the intakes 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. However, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDs 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. Activities will 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, and introducing physical controls (e.g., discharging water more frequently or increasing circulation) if mosquitoes are present. During operation, 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. 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. Accordingly, as described under Alternative 1A, construction and operation of the intakes, solids lagoons, and/or sedimentation basins under Alternative 1C would not substantially increase suitable vector habitat, and would not substantially increase vector-borne diseases. Therefore, no adverse effects would result.

CEQA Conclusion: As with Alternative 1A, implementation of CM1 under Alternative 1C would involve construction and operation of solids lagoons and sedimentation basins. These areas could provide suitable habitat for vectors (i.e., mosquitoes). However, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes. See Impact PH-1

1 under Alternative 1A. During operations, water depth and circulation would prevent the solids
2 lagoons and sedimentation basins from substantially increasing suitable vector habitat. Accordingly,
3 construction and operation of the water conveyance facilities under Alternative 1C would not result
4 in a substantial increase in vector-borne diseases and the impact would be less than significant. No
5 mitigation is required.

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

9 **NEPA Effects:** Water supply operations under Alternative 1C (Operational Scenario A) would be
10 identical to Alternative 1A. Further, Alternative 1C would have the same number of intakes as
11 Alternative 1A and they would be constructed and operated in the same manner. Therefore, the
12 water quality and public health effects described for Alternative 1A also appropriately characterize
13 effects under Alternative 1C. There would be no substantial changes in trace metals, pesticides, or
14 DBPs under Operational Scenario A relative to the No Action Alternative, with the exception of
15 bromide concentrations at Barker Slough. Under Alternative 1C, long-term average bromide
16 concentrations are expected to increase at the North Bay Aqueduct at Barker Slough, Staten Island,
17 and Emmaton on the Sacramento River relative to the No Action Alternative. This increase would be
18 greatest at Barker Slough (43%). Increases at Barker Slough would be more substantial during the
19 drought period (93%). This increase in the long-term average bromide concentration at Barker
20 Slough may require upgrades and/or changes to the existing water treatment plant. While treatment
21 technologies sufficient to achieve the necessary bromide removal exist, implementation of such
22 technologies would likely require substantial investment in new or modified infrastructure. Should
23 treatment plant upgrades not be undertaken, a change of such magnitude in long-term average
24 bromide concentrations in drinking water sources would represent an increased risk for adverse
25 effects on public health from DBPs in drinking water sources. Mitigation Measure WQ-5 is available
26 to reduce these effects (implementation of this measure along with a separate, non-environmental
27 commitment as set forth in EIR/EIS Appendix 3B, *Environmental Commitments*, relating to the
28 potential increased treatment costs associated with bromide-related changes would reduce these
29 effects). Further, as described for Impact PH-2 under Alternative 1A, the adverse water quality
30 effects on the North Bay Aqueduct at Barker Slough may be further minimized by implementation of
31 the AIP.

32 **CEQA Conclusion:** The operation of water supply facilities under Alternative 1C would be the same
33 as those described above for Alternative 1A. Water supply operations would increase contributions
34 from the San Joaquin River relative to the Sacramento River, and decrease the dilution capacity of
35 the Sacramento River for contaminants. Water quality modeling results indicate that changes in
36 flows under Alternative 1C would, for the most part, not result in increased exceedances of water
37 quality criteria for trace metals, pesticides, or DBPs in the study area (Chapter 8, *Water Quality*,
38 Section 8.3.3.4). However, relative to Existing Conditions, bromide concentrations would increase at
39 the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton on the Sacramento River,
40 with the greatest increase occurring at Barker Slough (38%). During drought periods the increase
41 would be more substantial (94%). The increase in long-term average bromide concentrations
42 predicted for Barker Slough would result in a substantial change in source water quality to existing
43 drinking water treatment plants drawing water from the North Bay Aqueduct. These modeled
44 increases in bromide at Barker Slough could lead to adverse changes in the formation of DBPs at
45 drinking water treatment plants such that considerable water treatment plant upgrades would be

1 necessary to achieve equivalent levels of drinking water health protection. This would be a
2 significant impact.

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

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

33 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality** 34 **Conditions**

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

36 **Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 37 **as a Result of Construction, Operation or Maintenance of the Water Conveyance Facilities**

38 **NEPA Effects:** Similar to effects described for Alternative 1A, sediment-disturbing activities during
39 construction and maintenance of the water conveyance facilities under Alternative 1C could result in
40 the disturbance of existing constituents in sediment, such as organochlorine or other legacy
41 pesticides or methylmercury. During water conveyance facilities operation, changes in dilution and
42 mixing of sources of water could result in a change in constituents known to bioaccumulate. For

1 example, the reduction of flows in the Sacramento River downstream of the proposed north Delta
2 intakes may result in a decreased dilution of constituents known to bioaccumulate in the study area.

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

18 Based on water quality modeling results presented in Chapter 8, *Water Quality* (Section 8.3.3.4) and
19 described under Impact PH-3 for Alternative 1A, operation of water conveyance facilities under
20 Alternative 1C would not substantially alter mercury or methylmercury concentrations in the
21 Sacramento River or San Joaquin River, nor would it substantially alter mercury concentrations in
22 fish tissues.

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

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

31 **CEQA Conclusion:** As described for Alternative 1A, construction and maintenance of Alternative 1C
32 would not cause legacy organochlorine pesticides to be transported far from the source or to
33 partition into the water column based on the chemical properties of the pesticides. Although
34 methylmercury currently exceeds the TMDL, little to no change in mercury or methylmercury
35 concentrations in water is expected under Alternative 1C water conveyance construction. BMPs
36 implemented as part of Erosion and Sediment Control Plans and SWPPPs would help ensure that
37 construction activities would not substantially increase or substantially mobilize legacy
38 organochlorine pesticides or methylmercury during construction and maintenance. Therefore,
39 construction and maintenance of Alternative 1C would not cause increased exposure of the public to
40 these bioaccumulative sediment constituents.

41 Alternative 1C would not result in increased tributary flows that would mobilize legacy
42 organochlorine pesticides in sediments. Water quality modeling results showed small but
43 insignificant changes in mercury and methylmercury levels in water at certain Delta locations and
44 fish tissues due to Alternative 1C water operations. Because construction, maintenance, or operation

1 of Alternative 1C would not cause substantial mobilization or substantial increase of constituents
 2 known to bioaccumulate, impacts on public health would be less than significant. No mitigation is
 3 required.

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

7 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
 8 area. As described in Table 25-8, a total of 13.73 miles of new temporary 69 kV transmission lines;
 9 17.61 miles of new permanent 69 kV transmission lines; and 18.45 miles of new permanent 230 kV
 10 transmission lines would be required for this alternative. New transmission lines generating new
 11 sources of EMFs would be constructed under this alternative, the new temporary and permanent
 12 transmission lines would be located in rights-of-way of existing transmission lines or in sparsely
 13 populated areas (Figure 25-2). Table 25-8 identifies only two potential new sensitive receptor
 14 associated with this alternative, Under Alternative 1C, Fire Station 63, in Walnut Grove, would be
 15 within 300 feet of a proposed temporary 69 kV transmission line This line would be removed
 16 following completion of construction of the water conveyance facility features near this area so
 17 there would be no potential permanent effects. The majority of sensitive receptors in the study area
 18 are already located within 300 feet of an existing transmission line. Therefore, new temporary or
 19 new permanent transmission lines would not expose new sensitive receptors or substantially more
 20 people to EMFs that they are not already exposed. Because this proposed temporary 69 kV
 21 transmission line would be located in a sparsely populated area, would be within 300 feet of only
 22 one potential new sensitive receptor, and would be removed following construction of the water
 23 conveyance facilities for this alternative, the proposed temporary transmission line would not
 24 substantially increase people's exposure to EMFs.

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

38 **CEQA Conclusion:** The majority of proposed temporary and permanent transmission lines would be
 39 located within the right-of-way of existing transmission lines. In general, any new temporary or
 40 permanent transmission lines not within the right-of-way of existing transmission lines would be
 41 located in sparsely populated areas generally away from existing sensitive receptors. However,
 42 under this alternative a proposed temporary 69 kV transmission line would be located within 300
 43 feet of Fire Station 63, in Walnut Grove. Design and implementation of new temporary or permanent
 44 transmission lines not within the right-of-way of existing transmission lines would follow CPUC's
 45 EMF Design Guidelines for Electrical Facilities and would implement shielding, cancelation, or

1 distance measures to reduce EMF exposure. Further, this temporary transmission line would be
2 removed once construction of the water conveyance facilities is completed. Since construction and
3 operation of Alternative 1C would not expose substantially more people to transmission lines that
4 generate new sources of EMFs, impacts would be less than significant, and no mitigation is required.

5 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 6 **and CM11**

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

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

31 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of** 32 **Implementing the Restoration Conservation Measures**

33 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
34 under Alternative 1C would be the same as that described under Alternative 1A. Implementation of
35 the restoration conservation measures would support habitat types, such as wetlands and
36 agricultural areas, that produce pathogens as a result of the biological productivity in these areas
37 (e.g., migrating birds, application of fertilizers, waste products of animals). As exemplified by the
38 Pathogen Conceptual Model, any potential increase in pathogens associated with the habitat
39 restoration would be localized and within the vicinity of the actual restoration. This would be
40 similar for lands protected for agricultural uses. Depending on the level of recreational access
41 granted by management plans, habitat restoration could increase or decrease opportunities for
42 recreationists within the Delta region. However, effects associated with pathogens would be the
43 same under Alternative 1C as under Alternative 1A. Recreationists would not experience a

1 substantial increase in exposure to pathogens as a result of the restoration and no adverse effect
2 would result.

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

10 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 11 **as a Result of Implementing CM2, CM4, CM5, and CM10**

12 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 1C as
13 described under Alternative 1A. The primary concern with habitat restoration regarding
14 constituents known to bioaccumulate is the potential for mobilizing contaminants sequestered in
15 sediments of the newly inundated floodplains and marshes, as described under Alternative 1A. It is
16 likely that the pesticide-bearing sediments would not be transported very far from the source area
17 and would settle out with suspended particulates and be deposited close to the ROA during habitat
18 restoration construction. Further, CM2–CM22 do not include the use of pesticides known to be
19 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 mercury and/or methylmercury in the study area's aquatic systems (i.e., fish and
26 water) during the near-term, CM12 *Methylmercury Management* and existing OEHHA standards
27 would serve to reduce the public's exposure to contaminated fish. Therefore, implementation of the
28 CM2, CM4, CM5, and CM10 under Alternative 1C is not expected to result in an adverse effect on
29 public health with 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 1C would not substantially mobilize or substantially increase the public's
40 exposure to constituents known to bioaccumulate and this impact would be less than significant. No
41 mitigation is required.

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

Alternative 2A would include the same physical/structural components as Alternative 1A, but could potentially utilize two different intake and intake pumping plant locations. Water supply and conveyance operations would follow the guidelines described as Operational Scenario B, which includes Fall X2. In addition, an operable barrier at the Head of Old River to control fish passage would be constructed towards the end of the construction period, between 2022 and 2025. It would include a fish passage approximately 40 feet long and 10 feet wide, constructed of reinforced concrete. The fish passage would likely be open during summer and fall and closed with stoplogs during spring. CM2–CM22 would be implemented under this alternative, and would be the same as under Alternative 1A. See Chapter 3, *Description of Alternatives* (Section 3.5.5), for additional details on Alternative 2A.

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: As with Alternative 1A, implementation of CM1 under Alternative 2A would involve construction and operation of up to 15 solids lagoons, five sedimentation basins, and a 350-acre inundation area adjacent to the intermediate forebay. Sedimentation basins, solids lagoons, and a 350-acre inundation area adjacent to the intermediate 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. However, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDs 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. Implementation of these BMPs would reduce the likelihood that BDCP operations would require an increase in abatement activities by the local MVCDs. During operation, 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. Sedimentation basins would be approximately 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons would be approximately 165 feet long by 86 feet wide by 10 feet deep. Furthermore, use of the 350-acre inundation area would be limited to forebay emergency overflow situations and water would be physically pumped, creating circulation such that the area would have a low potential for creating suitable vector habitat. Therefore, as described under Alternative 1A, construction and operation of the intakes, solids lagoons, and/or sedimentation basins under Alternative 2A would not substantially increase suitable vector habitat and would not substantially increase vector-borne diseases. Accordingly, no adverse effects on public health would result.

CEQA Conclusion: As with Alternative 1A, implementation of CM1 under Alternative 2A would involve construction and operation of solids lagoons, sedimentation basins, and a 350-acre inundation area adjacent to the intermediate forebay. While these areas could provide suitable habitat for vectors (e.g., mosquitoes), water depth and circulation would prevent the areas from substantially increasing suitable vector habitat. In addition, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDs 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. The inundation area would only be used during emergency overflow situations and water would be pumped back into the intermediate forebay, creating circulation that would

1 discourage mosquito breeding. Accordingly, construction and operation of the water conveyance
 2 facilities in Alternative 2A would not result in a substantial increase in vector-borne diseases and
 3 the impact on public health would be less than significant. No mitigation is required.

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

7 **NEPA Effects:**

8 **Disinfection Byproducts**

9 Under Alternative 2A, the geographic extent of effects pertaining to long-term average DOC
 10 concentrations and, by extension, the DBPs in the study area would be similar to that described for
 11 Alternative 1A and the magnitude of predicted long-term change and relative frequency of
 12 concentration threshold exceedances would be slightly greater (see Chapter 8, *Water Quality*,
 13 Section 8.3.3.5, for a detailed discussion). DOC water quality exceedance would conflict with the
 14 Basin Plan, as it exceeds the Basin Plan's requirements. The long-term change and exceedances in
 15 DOC would not be of a sufficient magnitude that they would require existing drinking water
 16 treatment plants to substantially upgrade treatment for DOC removal above levels currently
 17 employed. Under Alternative 2A, the geographic extent of effects pertaining to long-term average
 18 bromide concentrations in the study area would be similar to those described for Alternative 1A,
 19 although the magnitude of predicted long-term change and relative frequency of concentration
 20 threshold exceedances would be different. Relative to the No Action Alternative, modeled long-term
 21 average bromide concentrations would increase at Buckley Cove, Staten Island, Emmaton (during
 22 the drought period only) and the North Bay Aqueduct at Barker Slough. This increase would be
 23 greatest at Barker Slough, where average concentrations could increase by approximately 26%. This
 24 increase would be substantially greater in drought years (75%). (Chapter 8, *Water Quality*, Section
 25 8.3.3.5).

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

39 **Trace Metals**

40 Water quality modeling results indicate that for metals of primary human health and drinking
 41 water concern (arsenic, iron, manganese), concentrations in Delta waters relative to the No Action
 42 Alternative are not expected to change substantially. Average concentrations for arsenic, iron, and

1 manganese in the primary source water (Sacramento River, San Joaquin River, and the Bay at
2 Martinez) would not exceed drinking water quality criteria. No mixing of these three source waters
3 would result in a metal concentration greater than the highest source water concentration, and,
4 given that the average water concentrations for arsenic, iron, and manganese do not exceed water
5 quality criteria, more frequent exceedances of drinking water criteria in the Delta would not be
6 expected to occur under this alternative. Consequently, no adverse effect on public health related to
7 the trace metals arsenic, iron, or manganese from drinking water sources is anticipated.

8 Pesticides

9 Sources of pesticides to the study area include direct input of surface runoff from in-Delta
10 agriculture and Delta urbanized areas as well inputs from rivers upstream of the Delta. These
11 sources would not be affected by implementing Alternative 2A. However, under Alternative 2A
12 operations, the distribution and mixing of Delta source waters would change relative to the No
13 Action Alternative. Modeling results 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 (Stockton). This increase would result from the apparent
16 greater incidence of pesticides in the San Joaquin River and its relative contribution to the total
17 source water volume at this location during July and August. A detailed discussion of pesticides can
18 be found in Chapter 8, *Water Quality* (Section 8.1.3.13). A conclusion regarding the risk to human
19 health at this location, based on the predicted adverse effects from pesticides on aquatic life, cannot
20 be made. However, because the modeled increase would only occur in one location, and over a very
21 short period during the year, it is expected that the potential for affecting public health would be
22 relatively low. Additionally, the prediction of adverse effects of pesticides relative to the No Action
23 Alternative fundamentally assumes that the present pattern of pesticide incidence in surface water
24 would occur at similar levels into the future. In reality, the makeup and character of the pesticide
25 use market during the late long-term would not be exactly as it is today. Use of chlorpyrifos and
26 diazinon is on the decline with their replacement by pyrethroids on the rise (see Chapter 8, *Water
27 Quality*, Section 8.1.3.13, for a detailed discussion on pesticide fate and transport in the Delta). Yet in
28 this assessment it is the apparent greater incidence of diazinon and chlorpyrifos in the San Joaquin
29 River that serves as the basis for concluding that substantially increased San Joaquin River source
30 water fraction would correspond to an increased risk of pesticide-related toxicity to aquatic life.
31 Furthermore, drinking water from the study area would continue to be treated prior to distribution
32 into the drinking water system, and water treatment plants are required to meet drinking water
33 requirements set forth in the California Safe Drinking Water Act (Health and Safety Code Section
34 116275 et seq.) and the regulations adopted by CDPH. Therefore, it is not anticipated that there
35 would be adverse effects on public health related to pesticides from drinking water sources.

36 **CEQA Conclusion:** The operation of water supply facilities under Alternative 2A would adhere to the
37 criteria set forth under Operational Scenario B. As described in Chapter 8, *Water Quality*, Section
38 8.3.3.5, water quality modeling results indicate that, for the most part, there would be no substantial
39 changes in trace metals, DBPs, or pesticides relative to Existing Conditions under this operational
40 scenario. However, relative to Existing Conditions, bromide concentrations would increase at the
41 North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton (during the dry period only),
42 with the greatest increase occurring at Barker Slough (22%). During the drought period the increase
43 in bromide would be more substantial (75%). The increase in long-term average bromide
44 concentrations predicted for Barker Slough would result in a substantial change in source water
45 quality to existing drinking water treatment plants drawing water from the North Bay Aqueduct.

1 These modeled increases in bromide at Barker Slough could lead to adverse changes in the
 2 formation of DBPs at drinking water treatment plants such that considerable water treatment plant
 3 upgrades would be necessary in order to achieve equivalent levels of drinking water health
 4 protection. This would be a significant impact.

5 While treatment technologies sufficient to achieve the necessary 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, a change of such magnitude in
 8 long-term average bromide concentrations in drinking water sources would represent an increased
 9 risk for adverse effects on public health from DBPs in drinking water sources. Assuming the adverse
 10 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
 11 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
 12 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
 13 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
 14 based on currently available information.

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

35 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 36 **Conditions**

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

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

40 **NEPA Effects:** Similar to effects described for Alternative 1A, sediment-disturbing activities during
 41 construction and maintenance of the water conveyance facilities under Alternative 2A could result
 42 in the disturbance of existing constituents, such as legacy organochlorine pesticides, or
 43 methylmercury in sediment. During water conveyance facilities operation, changes in dilution and

1 mixing of sources of water could result in a change in constituents known to bioaccumulate. For
2 example, the reduction of flows in the Sacramento River downstream of the proposed north Delta
3 intakes may result in a decreased dilution of constituents known to bioaccumulate in the study area.

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

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

32 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
33 Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under the
34 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
35 sediment that may contain methylmercury within the area of disturbance during construction and
36 maintenance. Further, operations under Alternative 2A are not expected to increase mercury
37 concentrations substantially and therefore there would be no long-term water quality degradation
38 such that beneficial uses are adversely affected. Increases in mercury or methylmercury
39 concentrations are not likely to be measurable, and changes in mercury concentrations or fish tissue
40 mercury concentrations would not make any existing mercury-related impairment measurably
41 worse. Therefore, it is not expected that aquatic organisms would have measurably higher body
42 burdens of mercury as a result of Alternative 2A water operations. Accordingly, the potential for
43 Alternative 2A to create a public health effect from bioaccumulation of legacy organochlorine
44 pesticides and mercury or methylmercury in fish is minimal, and public health effects are not
45 expected to be adverse.

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

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

26 Because construction, maintenance, or operation of Alternative 2A would not cause substantial
 27 mobilization or substantial increase of constituents known to bioaccumulate (i.e., organochlorine
 28 pesticides or mercury), and therefore impacts on public health would be less than significant. No
 29 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:** Alternative 2A has different intakes than 1A, as the intakes could be 1, 2, 3, 4, and 5; or
 34 1, 2, 3, 6, and 7. Thus, a different configuration of transmission lines may be required; however, the
 35 total number of intakes would remain the same (five). Approximately 621 miles of existing
 36 transmission lines are located within the study area. As described in Table 25-8, a total of 24.71
 37 miles of new temporary 69 kV transmission lines; 14.46 mile of new permanent 69 kV transmission
 38 lines; and 42.68 miles of new permanent 230 kV transmission lines would be required for this
 39 alternative.

40 New transmission lines generating new sources of EMFs would be constructed under this
 41 alternative; the new temporary and permanent transmission lines would generally be located in
 42 sparsely populated areas (Figure 25-2). However, as indicated in Table 25-8, Stone Lakes National
 43 Wildlife Refuge would be within 300 feet of a proposed temporary 69 kV transmission line. Visitors
 44 to this area generally come for walks, water recreation, and hunting, and as such, it is unlikely that

1 large groups of people would be staying in the area within 300 feet of this proposed transmission
 2 line, so any EMF exposure would be limited. Further, this line would be removed when construction
 3 of the water conveyance facility features near this area is completed, so there would be no potential
 4 permanent effects. Therefore, this temporary transmission line would not substantially increase
 5 people's exposure to EMFs. As described for Alternative 1A, the majority of sensitive receptors are
 6 already located within 300 feet of an existing 69 kV or 230 kV transmission line. Accordingly, the
 7 majority of new temporary or new permanent transmission lines would not expose sensitive
 8 receptors or substantially more people to EMFs that they are not already experiencing. Because the
 9 lines would be located in sparsely populated areas and would be within 300 feet of only one
 10 potential new sensitive receptor, the proposed transmission line would not substantially increase
 11 people's exposure to EMFs.

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

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

41 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 42 **and CM11**

43 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 44 under Alternative 2A would be the same as that described for Alternative 1A. Although there would
 45 be an increase in restored and enhanced aquatic habitat in the study area as a result of

1 implementing Alternative 2A, implementation of environmental commitments, such as coordination
2 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
3 Alternative 1A and in Appendix 3B), would reduce the potential for an increase in mosquito
4 breeding habitat, and a substantial increase in vector-borne diseases is unlikely to result.
5 Furthermore, habitat would be restored in areas where potentially suitable habitat for mosquitoes
6 already exists. Finally, mosquito predators (e.g., bats, spiders) would likely increase as a result as
7 restoration and enhancement, which would keep mosquito populations in check. Therefore, effects
8 would be the same under Alternative 2A as under Alternative 1A and there would not be a
9 substantial increase in the public's risk of exposure to vector-borne diseases with implementation of
10 CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

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

22 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of** 23 **Implementing the Restoration Conservation Measures**

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

36 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 2A
37 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
38 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
39 waste products of animals). However, the localized nature of pathogen generation and the quick die-
40 off of pathogens once released into water bodies would generally prevent substantial pathogen
41 exposure to recreationists. Accordingly, impacts on public health would be less than significant. No
42 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 the same under Alternative 2A as
 4 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
 5 known to bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of
 6 the newly inundated floodplains and marshes, as described under Alternative 1A. It is likely that the
 7 pesticide-bearing sediments would not be transported very far from the source area, and would
 8 settle out with suspended particulates and be deposited close to the ROA. Further, CM2–CM22 do
 9 not include 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 for methylmercury in the study area’s aquatic systems (e.g., fish and water) during
 16 the near-term, CM12 *Methylmercury Management* and existing OEHHA standards would serve to
 17 reduce the public’s exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,
 18 and CM10 under Alternative 2A is not expected to result in an adverse effect on public health with
 19 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 1C would not substantially mobilize or substantially increase the public’s
 30 exposure to constituents known to bioaccumulate and this impact would be less than significant. No
 31 mitigation is required.

32 **25.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five**
 33 **Intakes (15,000 cfs; Operational Scenario B)**

34 Alternative 2B would involve construction activities similar to those under Alternative 1A, with the
 35 addition of an operable barrier at the Head of Old River to facilitate fish passage during summer and
 36 fall. However, the water conveyance facilities would be the same as under Alternative 1B with the
 37 exception that two alternative intake locations (Intakes 6 and 7—located downstream of Sutter and
 38 Steamboat Sloughs) might be utilized. In addition, Alternative 2B has the same diversion and
 39 conveyance operations as Alternative 2A. The primary difference between the two alternatives is
 40 that conveyance under Alternative 2B would be in a lined or unlined canal, instead of a
 41 pipeline/tunnel conveyance. Because there would be no difference in conveyance capacity or
 42 operations, there would be no differences between these two alternatives in Delta inflow, source
 43 fractions to various Delta locations, and hydrodynamics in the Delta. CM2–CM22 under Alternative
 44 2B would be the same as described under Alternative 1A.

1 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 2 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water**
 3 **Conveyance Facilities**

4 **NEPA Effects:** As with Alternative 1A, implementation of CM1 under Alternative 2B would involve
 5 construction and operation of up to 15 solids lagoons and 5 sedimentation basins. Sedimentation
 6 basins and solids lagoons have the potential to provide habitat for vectors that transmit diseases
 7 (e.g., mosquitoes) because of the large volumes of water that would be held within these areas.
 8 However, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County
 9 MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help
 10 control mosquitoes. See Impact PH-1 under Alternative 1A. During operation, the depth, design, and
 11 operation of the sedimentation basins and solids lagoons would prevent the development of suitable
 12 mosquito habitat (Figure 25-1). Specifically, the basins would be too deep and the constant
 13 movement of water would prevent mosquitoes from breeding and multiplying. Sedimentation
 14 basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons would be 165 feet
 15 long by 86 feet wide by 10 feet deep. Therefore, as described for Alternative 1A, construction and
 16 operation of the intakes, solids lagoons, and/or sedimentation basins under Alternative 2B would
 17 not substantially increase suitable vector habitat and would not substantially increase vector-borne
 18 diseases. No adverse effects would result.

19 **CEQA Conclusion:** As with Alternative 1A, implementation of CM1 under Alternative 2B would
 20 involve construction and operation of solids lagoons, lagoons, and sedimentation basins. These
 21 areas could provide suitable habitat for vectors (e.g., mosquitoes). However, DWR would consult
 22 and coordinate with San Joaquin County and Sacramento-Yolo County MVCs and prepare and
 23 implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes. See
 24 Impact PH-1 under Alternative 1A. During operations, water depth and circulation would prevent
 25 the areas from substantially increasing suitable vector habitat. Therefore, construction and
 26 operation of the water conveyance facilities in Alternative 2B would not result in a substantial
 27 increase in vector-borne diseases and the impact would be less than significant. No mitigation is
 28 required.

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

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

43 This increase in the long-term average bromide concentration at Barker Slough may require
 44 upgrades and/or changes in operations at certain water treatment plants. While treatment

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

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

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

44 While treatment technologies sufficient to achieve the necessary bromide removal exist,
45 implementation of such technologies would likely require substantial investment in new or modified
46 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in

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

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

28 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 29 **Conditions**

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*). BMPs implemented under the
21 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
22 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of
23 disturbance. Examples of these BMPs are described under Alternative 1A, Impact PH-3. Accordingly,
24 the potential for Alternative 2B to create a public health effect from bioaccumulation of legacy
25 organochlorine pesticides and methylmercury in fish is minimal, and public health effects from
26 construction, operation, or maintenance of the water conveyance facilities are not expected to be
27 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 25-8, 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 25-8 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 general 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*, location and design of the
39 proposed new transmission lines would be conducted in accordance with CPUC's EMF Design
40 Guidelines for Electrical Facilities. Therefore, operation of the transmission line corridors would not
41 expose substantially more people to transmission lines generating EMFs. Therefore, operation of the
42 transmission line corridors would not expose substantially more people to transmission lines
43 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 general come for walks, water recreation, and
 6 hunting, it is unlikely that large groups of people would be staying in the area within 300 feet of this
 7 proposed transmission line, so any EMF exposure would be limited. Design and implementation of
 8 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, cancelation, 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) would reduce the potential for
 22 an increase in mosquito breeding habitat, and a substantial increase in vector-borne diseases is
 23 unlikely to result. Furthermore, habitat would be restored in areas where potentially suitable
 24 habitat for mosquitoes already exists. Finally, mosquito predators (e.g., bats, spiders) would likely
 25 increase as a result of restoration and enhancement, which would keep mosquito populations in
 26 check. Therefore, effects would be the same under Alternative 2B as under Alternative 1A and there
 27 would not be a substantial increase in the public's risk of exposure to vector-borne diseases with
 28 implementation of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

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

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

42 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 43 under Alternative 2B would be the same as that described for Alternative 1A. Implementation of the
 44 restoration conservation measures would support habitat types, such as wetlands and agricultural

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

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

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

20 **NEPA Effects:** The amount of habitat restoration under Alternative 2B would be the same as
 21 Alternative 1A. The primary concern with habitat restoration regarding constituents known to
 22 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 23 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the pesticide-
 24 bearing sediments would not be transported very far from the source area and would settle out with
 25 suspended particulates and be deposited close to the ROA. Further, CM2–CM22 do not include the
 26 use of pesticides known to be bioaccumulative in animals or humans.

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

37 **CEQA Conclusion:** Implementation of CM2, CM4, CM5, and CM10 would have the potential to
 38 mobilize sediment with existing levels of legacy organochlorine pesticides as a result of disturbing
 39 sediment during habitat restoration construction. However, it is unlikely that the pesticide-bearing
 40 sediments would be transported very far from the source area and they would likely settle out with
 41 suspended particulates and be deposited close to the ROAs during habitat restoration construction.
 42 While there would likely be an increase in mobilization and bioaccumulation of methylmercury in
 43 the study area's aquatic systems (i.e., fish and water) during the near-term, measures implemented
 44 under CM12 *Methylmercury Management*, and existing OEHHA standards would serve to reduce the

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

5 **25.3.3.7 Alternative 2C—Dual Conveyance with West Alignment and** 6 **Intakes W1–W5 (15,000 cfs; Operational Scenario B)**

7 Alternative 2C would involve construction activities similar to those described under Alternative 1A;
 8 therefore, construction impacts in terms of public health would be the same and are summarized
 9 below for vector-borne diseases and water quality concerns. Alternative 2C has the same diversion
 10 and conveyance operations as Alternative 2A. Alternative 2C would also have the same transmission
 11 line needs as Alternative 2A. The primary differences between the two alternatives are that under
 12 Alternative 2C, the intakes would be on the west bank of the Sacramento River between Clarksburg
 13 and Walnut Grove, and may utilize intake locations 1, 2, 3, 4, and 5, or 1, 2, 3, 6, and 7; the primary
 14 water conveyance between intakes and the intermediate pumping plant would be a lined or unlined
 15 canal along the western side of the Delta, instead of a pipeline/tunnel; there would be no
 16 intermediate forebay; and water would be pumped from the intermediate pumping plant through a
 17 dual-bore tunnel to a continuing canal to the proposed Byron Tract Forebay immediately northwest
 18 of Clifton Court Forebay. Alternative 2C also includes the construction of an operable barrier at the
 19 Head of Old River, to facilitate fish passage during summer and fall and be closed with stoplogs in
 20 spring. However, because there would be no difference in conveyance capacity or operations, there
 21 would be no differences between these two alternatives in Delta inflow, source fractions to various
 22 Delta locations, and hydrodynamics in the Delta. CM2-CM22 under Alternative 2C would be the
 23 same as described under Alternative 1A. Therefore, Alternative 2C would have effects on public
 24 health similar to those under Alternative 1A.

25 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 26 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water** 27 **Conveyance Facilities**

28 **NEPA Effects:** As with Alternative 1A, implementation of CM1 under Alternative 2C would involve
 29 construction and operation of five north Delta intakes; up to 15 solids lagoons; and five
 30 sedimentation basins. Sedimentation basins and solids lagoons have the potential to provide habitat
 31 for vectors that transmit diseases (e.g., mosquitoes) because of the large volumes of water that
 32 would be held within these areas. However, DWR would consult and coordinate with San Joaquin
 33 County and Sacramento-Yolo County MVEDs and prepare and implement MMPs. BMPs to be
 34 implemented as part of the MMPs would help control mosquitoes. See Impact PH-1 under
 35 Alternative 1A. During operation the depth, design, and operation of the sedimentation basins and
 36 solids lagoons would prevent the development of suitable mosquito habitat (Figure 25-1).
 37 Specifically, the basins would be too deep and the constant movement of water would prevent
 38 mosquitoes from breeding and multiplying. Sedimentation basins would be 120 feet long by 40 feet
 39 wide by 55 feet deep, and solids lagoons would be 165 feet long by 86 feet wide by 10 feet deep.
 40 Therefore, as described for Alternative 1A, construction and operation of the intakes, solids lagoons,
 41 and/or sedimentation basins under Alternative 2C would not substantially increase suitable vector
 42 habitat and would not substantially increase vector-borne diseases. Accordingly, there would be no
 43 adverse effects on public health.

1 **CEQA Conclusion:** As with Alternative 1A, implementation of CM1 under Alternative 2C would
 2 involve construction and operation of solids lagoons, and sedimentation basins. These areas could
 3 provide suitable habitat for vectors (e.g., mosquitoes). DWR would consult and coordinate with San
 4 Joaquin County and Sacramento-Yolo County MVCDs and prepare and implement MMPs. BMPs to be
 5 implemented as part of the MMPs would help control mosquitoes. See Impact PH-1 under
 6 Alternative 1A. During operations, water depth and circulation would prevent the areas from
 7 substantially increasing suitable vector habitat. Therefore, construction and operation of the water
 8 conveyance facilities in Alternative 2C would not result in a substantial increase in vector-borne
 9 diseases and the impact on public health would be less than significant. No mitigation is required.

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

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

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

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

1 would occur at similar levels into the future. In reality, the makeup and character of the pesticide
2 use market during the late long-term would not be exactly as it is today. Use of chlorpyrifos and
3 diazinon is on the decline with their replacement by pyrethroids on the rise. Yet in this assessment it
4 is the apparent greater incidence of diazinon and chlorpyrifos in the San Joaquin River that serves as
5 the basis for concluding that substantially increased San Joaquin River source water fraction would
6 correspond to an increased risk of pesticide-related toxicity to aquatic life. Drinking water from the
7 study area would continue to be treated prior to distribution into the drinking water system, and
8 water treatment plants are required to meet certain drinking water standard, as described in
9 Section 25.2.4. Therefore, it is not anticipated that levels of pesticides in drinking water sources
10 would have adverse effects on 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*, a separate, non-
36 environmental 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, *Environmental Commitments*, for the
42 full list of potential actions that could be taken pursuant to this commitment in order to reduce the
43 water quality treatment costs associated with water quality effects relating to chloride, electrical
44 conductivity, and bromide. Because the BDCP proponents cannot ensure that the results of
45 coordinated actions with water treatment entities will be fully funded or implemented successfully
46 prior to the project's contribution to the impact, the ability to fully mitigate this impact is uncertain.

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

8 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 9 **Conditions**

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

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

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

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

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

42 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
 43 Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under the

1 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
 2 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of
 3 disturbance. Examples of these BMPs are described under Alternative 1A, Impact PH-3. Accordingly,
 4 the potential for Alternative 2C to create a public health effect from bioaccumulation of legacy
 5 organochlorine pesticides and methylmercury in fish is minimal, and public health effects are not
 6 expected to be adverse.

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

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

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

28 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
 29 area. As described in Table 25-8, a total of 13.73 miles of new temporary 69 kV transmission lines;
 30 17.61 miles of new permanent 69 kV transmission lines; and 18.45 miles of new permanent 230 kV
 31 transmission lines would be required for this alternative.

32 While new transmission lines generating new sources of EMFs would be constructed under this
 33 alternative, the new temporary and permanent transmission lines would be located in existing
 34 rights-of-way or in sparsely populated areas (Figure 25-2). Under Alternative 2C, only one potential
 35 new sensitive receptor, Fire Station 63, in Walnut Grove, would be located within 300 feet of a
 36 proposed 69 kV temporary transmission line (Table 25-8). However, also as described for
 37 Alternative 1A, the majority of sensitive receptors are already located within 300 feet of an existing
 38 transmission line; therefore, the majority of new temporary or new permanent transmission lines
 39 would not expose new sensitive receptors or substantially more people to EMFs that they are not
 40 already experiencing. Because the lines would be located in sparsely populated areas and would be
 41 within 300 feet of only one potential new sensitive receptor, the proposed temporary and
 42 permanent transmission lines would not substantially increase people's exposure to EMFs.

43 As discussed in Section 25.1.1.5, the current scientific evidence does not show conclusively that EMF
 44 exposure can increase health risks. In 2006, CPUC updated its EMF Policy and reaffirmed that health

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

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

24 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 25 **and CM11**

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

39 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
40 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described in Alternative
41 1A, Alternative 2C would require environmental commitments, such as coordination with MVCDs
42 and implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and
43 in Appendix 3B) that would help control mosquitoes and reduce the potential for an increase in
44 mosquito breeding habitat. Furthermore, habitat would be restored where potentially suitable
45 vector habitat already exists, and habitat restoration and enhancement would likely increase the

1 number of mosquito predators. Therefore, as described for Alternative 1A, implementation of CM2-
2 CM7, CM10 and CM11 under Alternative 2C would not substantially increase the public's risk of
3 exposure to vector-borne diseases beyond what currently exists. Accordingly, this impact would be
4 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 2C would be the same as that described for Alternative 1A. Implementation of the
9 restoration conservation measures would support habitat types, such as wetlands and agricultural
10 areas, that produce pathogens as a result of the biological productivity in these areas (e.g., migrating
11 birds, application of fertilizers, waste products of animals). As exemplified by the Pathogen
12 Conceptual Model, any potential increase in pathogens associated with the habitat restoration would
13 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
16 within the Delta region. However, effects associated with pathogens would be the same under
17 Alternative 2C as under Alternative 1A. Recreationists would not experience a substantial increase
18 in exposure to pathogens as a result of the restoration and no adverse effect would result.

19 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 2C
20 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
21 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
22 waste products of animals). However, the localized nature of pathogen generation and the quick die-
23 off of pathogens once released into water bodies would generally prevent substantial pathogen
24 exposure to recreationists. Accordingly, impacts would be less than significant and no mitigation is
25 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 amount of habitat restoration would be the same under Alternative 2C as
29 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
30 known to bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of
31 the newly inundated floodplains and marshes, as described under Alternative 1A. It is likely that the
32 pesticide-bearing sediments would not be transported very far from the source area and would
33 settle out with suspended particulates and be deposited close to the ROA. Further, CM2–CM22 do
34 not include the use of pesticides known to be bioaccumulative in animals or humans.

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

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

13 **25.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and** 14 **Intakes 1 and 2 (6,000 cfs; Operational Scenario A)**

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

22 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 23 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water** 24 **Conveyance Facilities**

25 **NEPA Effects:** Alternative 3 would be similar to Alternative 1A, but the water conveyance facilities
 26 would involve construction and operation of up to six solids lagoons, two sedimentation basins, and
 27 a 350-acre inundation area adjacent to the intermediate forebay. The mechanisms for potential
 28 public health effects from construction and operation of the water conveyance facilities are similar
 29 to those described for Alternative 1A. Specifically, sedimentation basins, solids lagoons, and the
 30 inundation area have the potential to provide habitat for vectors that transmit diseases (e.g.,
 31 mosquitoes) because of the large volumes of water that would be held within these areas. However,
 32 DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDS
 33 and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help control
 34 mosquitoes. See Impact PH-1 under Alternative 1A. During operation, the depth, design, and
 35 operation of the sedimentation basins and solids lagoons would prevent the development of suitable
 36 mosquito habitat (Figure 25-1). Specifically, the basins would be too deep and the constant
 37 movement of water would prevent mosquitoes from breeding and multiplying. Sedimentation
 38 basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons would be 165 feet
 39 long by 86 feet wide by 10 feet deep. Furthermore, use of the 350-acre inundation area would be
 40 limited to forebay emergency overflow situations and water would be physically pumped back to
 41 the intermediate forebay, creating circulation such that the area would have a low potential for
 42 creating suitable vector habitat. Therefore, Alternative 3 would not substantially increase suitable
 43 vector habitat, and would not substantially increase vector-borne diseases. Accordingly, no adverse
 44 effects on public health would result.

1 **CEQA Conclusion:** Implementation of CM1 under Alternative 3 would involve construction and
 2 operation of a 350-acre inundation area adjacent to the intermediate forebay, but fewer solids
 3 lagoons and sedimentation basins would be constructed under this alternative relative to
 4 Alternative 1A. These areas could provide suitable habitat for vectors (e.g., mosquitoes). However,
 5 DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVEDs
 6 and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help control
 7 mosquitoes. See Impact PH-1 under Alternative 1A. During operations, water depth and circulation
 8 would prevent the areas from substantially increasing suitable vector habitat. Therefore,
 9 construction and operation of the water conveyance facilities in Alternative 3 would not result in a
 10 substantial increase in vector-borne diseases and the impact on public health would be less than
 11 significant. No mitigation is 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:** The operation of water supply facilities under Alternative 3 would be the same as
 16 those described for Alternative 1A. Although Alternative 3 would have three fewer intakes, they
 17 would be constructed and operated in the same manner as described under Alternative 1A.
 18 Therefore, the description of water quality and public health effects for Alternative 1A also
 19 appropriately characterizes effects under Alternative 3. For the most part, there would be no
 20 substantial changes in trace metals, pesticides, or DBPs under Operational Scenario A. However,
 21 relative to the No Action Alternative, there would be an increase in the long-term average bromide
 22 concentrations at all modeled Delta locations (except at Banks and Jones pumping plants), with
 23 Barker Slough showing the greatest increase (38%). This increase would be more substantial during
 24 the drought period (85%).

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

38 **CEQA Conclusion:** The operation of water supply facilities under Alternative 3 would be the same as
 39 that described above for Alternative 1A. Water supply operations would increase relative
 40 contributions from the San Joaquin River relative to the Sacramento River, and decrease the dilution
 41 capacity of the Sacramento River for contaminants. This could result in changes in water quality.
 42 Water quality modeling results indicate that changes in flows under Alternative 3 operations would
 43 not, for the most part, result in increased exceedances of water quality criteria for constituents of
 44 concern (DBPs, trace metals and pesticides) in the study area. However, relative to Existing
 45 Conditions bromide concentrations would increase at the North Bay Aqueduct at Barker Slough,

1 Staten Island, and Emmaton on the Sacramento River, with the greatest increase occurring at Barker
2 Slough (34%). This increase would be more substantial during the drought period (85%).

3 The increase in long-term average bromide concentrations predicted for Barker Slough would result
4 in a substantial change in source water quality to existing drinking water treatment plants drawing
5 water from the North Bay Aqueduct. These modeled increases in bromide at Barker Slough could
6 lead to adverse changes in the formation of DBPs at drinking water treatment plants such that
7 considerable water treatment plant upgrades would be necessary in order to achieve equivalent
8 levels of drinking water health protection. This would be a 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 DBP 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*, a separate, non-
21 environmental 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, *Environmental Commitments*, for the
27 full list of potential actions that could be taken pursuant to this commitment in order to reduce the
28 water quality treatment costs associated with water quality effects relating to chloride, electrical
29 conductivity, and bromide. Because the BDCP proponents cannot ensure that the results of
30 coordinated actions with water treatment entities will be fully funded or implemented successfully
31 prior to the project's contribution to the impact, the ability to fully mitigate this impact is uncertain.
32 If a solution that is identified by the BDCP proponents and an affected water purveyor is not fully
33 funded, constructed, or implemented before the project's contribution to the impact is made, a
34 significant impact in the form of increased DBP in drinking water sources could occur. Accordingly,
35 this impact would be significant and unavoidable. If, however, all financial contributions, technical
36 contributions, or partnerships required to avoid significant impacts prove to be feasible and any
37 necessary agreements are completed before the project's contribution to the effect is made, impacts
38 would be less than significant.

39 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
40 **Conditions**

41 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 3 would entail constructing and operating only Intakes 1 and 2, three
4 fewer intakes than Alternative 1A would have; however, they would be constructed and operated in
5 the same manner as under Alternative 1A. As described under Alternative 1A, sediment-disturbing
6 activities during construction and maintenance of the water conveyance facilities under Alternative
7 3 could result in the disturbance of existing constituents in sediment, such as pesticides or
8 methylmercury. The public health effects associated with pesticides and methylmercury under
9 Alternative 3 would be similar to, although slightly less than, those under Alternative 1A.

10 Intermittent and/or short-term construction-related activities (as would occur for in-river
11 construction) would not be anticipated to result in contaminant discharges of sufficient magnitude
12 or duration to contribute to long-term bioaccumulation processes, or cause measureable long-term
13 degradation, as described under Alternative 1A. Legacy organochlorine pesticides typically bond to
14 particulates, and do not mobilize easily. Construction and maintenance of Alternative 3 would not
15 cause legacy organochlorine pesticides to be transported far from the source or to partition into the
16 water column as described for Alternative 1A. Additionally, water supply operations under any
17 BDCP action alternative would not be expected to change total suspended solids or turbidity levels
18 (highs, lows, typical conditions) to any substantial degree. Changes in the magnitude, frequency, and
19 geographic distribution of legacy pesticides in water bodies of the affected environment that would
20 result in new or more severe adverse effects on beneficial uses, relative to the No Action Alternative,
21 would not be 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 3 water operations (Chapter 8, *Water Quality*,
24 Section 8.3.3.8). Upstream mercury contributions and methylmercury production in Delta waters
25 would not be altered by the operation of Alternative 3, 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 showed the greatest
29 decrease (0.8%) relative to the No Action Alternative at the Mokelumne River (South Fork) at Staten
30 Island and Franks Tract. Similarly, changes in methylmercury concentration are expected to be very
31 small. Fish tissue mercury concentrations showed small or no increase based on long-term annual
32 average concentrations at the nine Delta locations modeled. There was a 8% increase in the
33 exceedance quotient at the Mokelumne River (South Fork) at Staten Island relative to the No Action
34 Alternative. All water export locations except the Contra Costa Pumping Plant Number 1 showed
35 improved bass tissue mercury estimates (see Chapter 8, *Water Quality*).

36 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
37 Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under the
38 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
39 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of
40 disturbance during construction and maintenance. Examples of these BMPs are described under
41 Alternative 1A, Impact PH-3. Further, operations under Alternative 3 are not expected to increase
42 mercury concentrations substantially and therefore there would be no long-term water quality
43 degradation such that beneficial uses are adversely affected. Increases in mercury or methylmercury
44 concentrations are not likely to be measurable, and changes in mercury concentrations or fish tissue
45 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 3 water operations.

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

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

16 Alternative 3 would not result in increased tributary flows that would mobilize legacy
17 organochlorine pesticides in sediments. Modeling showed small changes in mercury and
18 methylmercury levels in water at certain Delta locations relative to Existing Conditions due to water
19 conveyance operations under this alternative. Specifically, there was a 0.7% decrease, relative to the
20 25 ng/L ecological risk benchmark, for Franks Tract, Old River at Rock Slough, and Contra Costa
21 Pumping Plant. There was a 4% increase in the mercury exceedance quotient for fish tissues,
22 relative to Existing Conditions, at the Mokelumne River (South Fork) at Staten Island, the San
23 Joaquin River at Buckley Cove, Franks Tract, and Old River at Rock Slough due to Alternative 3 water
24 operations. However, these changes would not substantially affect the current level of existing
25 methylmercury degradation in the study area or substantially affect the existing fish tissue
26 concentrations. Since construction, maintenance, or operation of Alternative 3 would not cause
27 substantial mobilization or substantial increase of constituents known to bioaccumulate, impacts on
28 public health would be less than significant. No mitigation is required.

29 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 30 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 31 **Facilities**

32 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
33 area. As described in Table 25-8, a total of 24.71 miles of new temporary 69 kV transmission lines;
34 8.68 mile of new permanent 69 kV transmission lines; and 42.68 miles of new permanent 230 kV
35 transmission lines would be required for this alternative. This alternative would have fewer intakes
36 than Alternative 1A, but would still include the pipeline/tunnel conveyance.

37 As with Alternative 1A, any new temporary and permanent transmission lines needed for
38 Alternative 3 would, for the most part, be located in rights-of-way of existing transmission lines or in
39 areas that are not densely populated and therefore would not expose substantially more people to
40 transmission lines (Figure 25-2). However, as indicated in Table 25-8, Stone Lakes National Wildlife
41 Refuge would be within 300 feet of a proposed temporary 69 kV transmission line. Visitors to this
42 area generally come for walks, water recreation, and hunting, and as such, it is unlikely that large
43 groups of people would be staying in the area within 300 feet of this proposed transmission line, so
44 any EMF exposure would be limited. Further, this line would be removed when construction of the

1 water conveyance facility features near this area is completed, so there would be no potential
 2 permanent effects. Therefore, this temporary transmission line would not substantially increase
 3 people's exposure to EMFs.

4 While the current scientific evidence does not show conclusively that EMF exposure can increase
 5 health risks, the location and design of the proposed new transmission lines would be conducted in
 6 accordance with CPUC's EMF Design Guidelines for Electrical Facilities, as described for Alternative
 7 1A. Therefore, operation of the transmission line corridors would not expose substantially more
 8 people to transmission lines generating EMFs, and there would be no adverse effect on public health.

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

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

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

40 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 41 land potentially suitable for vector habitat (e.g., mosquitoes). However, Alternative 3 would require
 42 environmental commitments, such as coordination with MVCDS and implementation of BMPs under
 43 MMPs (as described under Impact PH-1 for Alternative 1A and in Appendix 3B) that would help
 44 control mosquitoes and reduce the potential for an increase in mosquito breeding habitat.

1 Furthermore, habitat would be restored where potentially suitable vector habitat already exists, and
 2 habitat restoration and enhancement would likely increase the number of mosquito predators.
 3 Therefore, as described for Alternative 1A, implementation of CM2-CM7, CM10 and CM11 under
 4 Alternative 3 would not substantially increase the public's risk of exposure to vector-borne diseases
 5 beyond what currently exists. Accordingly, this impact would be less than significant and no
 6 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 3 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 3 as under Alternative 1A. Accordingly, recreationists would not experience a
 20 substantial increase in exposure to pathogens as a result of implementing restoration conservation
 21 measures and no adverse effect would result.

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

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

31 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 3 as
 32 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
 33 known to bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of
 34 the newly inundated floodplains and marshes, as described under Alternative 1A. It is likely that the
 35 pesticide-bearing sediments would not be transported very far from the source area and would
 36 settle out with suspended particulates and be deposited close to the ROA. Further, CM2-CM22 do
 37 not include the use of pesticides known to be bioaccumulative in animals or humans.

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

1 reduce the public's exposure to contaminated fish. Accordingly, adverse effects on public health due
 2 to the substantial mobilization of or increase in methylmercury as a result of implementing CM2,
 3 CM4, CM5, and CM10 are not expected to occur.

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

16 **25.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel** 17 **and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)**

18 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 19 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water** 20 **Conveyance Facilities**

21 **NEPA Effects:** Alternative 4 would involve construction and operation of three intakes (Intakes 2, 3,
 22 and 5), up to nine solids lagoons, three sedimentation basins, a 245-acre intermediate forebay with a
 23 water surface area of 40 acres, and a 125-acre inundation (emergency overflow) area adjacent to the
 24 intermediate forebay on Glannvale Tract. A map and a schematic diagram depicting the conveyance
 25 facilities associated with Alternative 4 are provided in Figures 3-2 and 3-9. Figure 3-2 shows the
 26 major construction features (including work and borrow/spoil areas) associated with this proposed
 27 water conveyance facility alignment; a detailed depiction is provided in Figure M3-4 in the Mapbook
 28 Volume.

29 Each intake site would require a temporary cofferdam to create a dewatered construction area
 30 encompassing the entire intake site. Construction of the cofferdams would take place from June
 31 through October, and it is expected that dewatering of the cofferdams (i.e., removing water from
 32 behind the cofferdams) would occur after the construction of the cofferdams, when generally there
 33 are fewer mosquitoes breeding, as mosquitoes in northern California typically breed April–October
 34 (Sacramento–Yolo Mosquito and Vector Control District 2008). In addition, sedimentation basins,
 35 solids lagoons, and the inundation area have the potential to provide habitat for vectors that
 36 transmit diseases (e.g., mosquitoes) because of the large volumes of water that would be held within
 37 these areas. The depth, design, and operation of the sedimentation basins and solids lagoons would
 38 prevent the development of suitable mosquito habitat (Figure 25-1). Specifically, the basins would
 39 be too deep and the constant movement of water would prevent mosquitoes from breeding and
 40 multiplying. Sedimentation basins would be divided into three sedimentation channels. Each
 41 channel would be 500 feet long by 200 feet wide by 23 feet deep, and solids lagoons would be 400
 42 feet long by 200 feet wide by 15 feet deep. Furthermore, use of the inundation area adjacent to the
 43 intermediate forebay would be limited to forebay emergency overflow situations and water would

1 be physically pumped back to the intermediate forebay, creating circulation such that the area
2 would have a low potential for creating suitable vector habitat.

3 The sedimentation basins and solids lagoons of Intake 2 would be located within 1 mile of and
4 across the Sacramento River from Clarksburg, and the sedimentation basins and solids lagoons of
5 Intake 3 would be located within 1 mile of Hood. The sedimentation basin and solids lagoons of
6 Intake 5 would be located within 1.5 miles (south) of Hood and 2 miles (north) of Courtland. The
7 sedimentation basins would have a mat slab foundation and interior concrete walls to create
8 separate sedimentation channels. The solids lagoons would be concrete-lined and approximately 10
9 feet deep. Up to three solids lagoons would be used in a rotating cycle for each intake, with one basin
10 filling, one settling, and the third being emptied of settled and dewatered solids. The rate of filling
11 and settling would depend on the volume of water pumped by the intakes; however, water would
12 continuously move through the basins at a relatively slow but regulated rate so that the solids and
13 sediments can be removed from the water, via settling, prior to discharge into the conveyance
14 facilities (Figure 25-1). The flow rates would be high enough to prevent water from stagnating, as
15 stagnant water would not facilitate conveying the water to the conveyance system or removing the
16 sediment from the water. As discussed in Section 25.1.1.4, mosquitoes typically prefer shallow
17 stagnant water with little movement. The sedimentation basins and solids lagoons would be
18 considered too deep and have too much regulated water movement to provide suitable mosquito
19 habitat. Furthermore, during sediment drying and basin cleaning operations, flow would be stopped
20 completely and the moisture in the sediment would be reduced to a point at which the sediment
21 would not support insect/mosquito larvae production. Therefore, it is anticipated that these basins
22 would not substantially increase suitable vector habitat and would not substantially increase the
23 public's exposure to vector-borne diseases. Accordingly, adverse effects are not expected.

24 There would be an approximately 125-acre inundation area adjacent to the 245-acre intermediate
25 forebay to accommodate emergency overflow from the forebay. Water would enter this inundation
26 area only during forebay emergency overflow situations; however, these situations could result in
27 standing water approximately 2 feet deep. While water of this depth would be suitable habitat for
28 mosquitoes, such events would be more likely to occur during high flow events in winter, when
29 fewer mosquitoes are breeding (Sacramento-Yolo Mosquito and Vector Control District 2008).
30 Water in the emergency overflow area would be pumped out and back to the intermediate forebay
31 once the danger of overflow has passed. This pumping would create circulation that would minimize
32 the amount of suitable habitat for mosquitoes. Because the area would be used only during
33 emergencies and the water would be pumped from the area, the potential for creating suitable
34 mosquito habitat would be low. Therefore, adverse effects are not expected.

35 DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDs
36 and prepare and implement MMPs, as necessary, to control mosquitoes and reduce the likelihood
37 that construction and operation of the water conveyance facilities would require an increase in
38 mosquito abatement activities by the local MVCDs. BMPs to be implemented as part of the MMPs
39 would help control mosquitoes during construction and operation of the sedimentation basins,
40 solids lagoons, and intermediate forebay inundation area. BMP activities would include, but not
41 necessarily be limited to, the following.

- 42 ● Maintain stable water levels
- 43 ● Circulate water

- 1 • Implement monitoring and sampling programs to detect early signs of mosquito population
- 2 problems
- 3 • Use biological agents such as mosquito fish to limit larval mosquito populations.
- 4 • Use larvicides and adulticides, as necessary
- 5 • Test for mosquito larvae during the high mosquito season (June through September)
- 6 • Introduce biological controls such as mosquitofish to areas of standing water if mosquitoes are
- 7 present
- 8 • Introduce physical controls to areas of standing water (e.g., discharging water more frequently
- 9 or increasing circulation) if mosquitoes are present.

10 Alternative 4 would not substantially increase suitable vector habitat, and would not substantially
11 increase vector-borne diseases. No adverse effects on public health would result.

12 **CEQA Conclusion:** Sedimentation basins, solids lagoons, and the intermediate forebay inundation
13 area have the potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes)
14 because of the large volumes of water that would be held within these areas. However, during
15 operations, the depth, design, and operation of the sedimentation basins and solids lagoons would
16 prevent the development of suitable mosquito habitat. Specifically, the basins would be too deep and
17 the constant movement of water would prevent mosquitoes from breeding and multiplying.
18 Furthermore, the 125-acre inundation area adjacent to the intermediate forebay would be limited to
19 forebay emergency overflow situations and water would be physically pumped back to the
20 intermediate forebay, creating circulation such that the area would have a low potential for creating
21 suitable vector habitat. Further, DWR would consult and coordinate with San Joaquin County and
22 Sacramento-Yolo County MVEDs and prepare and implement MMPs. BMPs to be implemented as
23 part of the MMPs would help control mosquitoes during construction and operation of the
24 sedimentation basins, solids lagoons, and intermediate forebay inundation area. Therefore,
25 construction and operation of Alternative 4 would not result in a substantial increase in vector-
26 borne diseases and the impact on public health would be less than significant. No mitigation is
27 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 Facilities under Alternative 4 would be operated to provide diversions up to a total of 9,000 cfs from
32 the new north Delta intakes. Alternative 4 water conveyance operations would follow the guidelines
33 described as Operational Scenario H and would include criteria for north Delta diversion bypass
34 flows; south Delta OMR flows; south Delta E/I Ratio; flows over Fremont Weir into Yolo Bypass;
35 Delta inflow; Delta outflow, as determined by the outcome of a decision tree process needed to
36 account for uncertainties related to delta smelt and longfin smelt flow requirements; Delta Cross
37 Channel gate operations; Rio Vista minimum in-stream flow; operations for Delta water quality and
38 residence; and water quality for agricultural and municipal/industrial diversions. These criteria are
39 discussed in detail in Chapter 3, *Description of Alternatives*, Section 3.6.4.2.

1 **NEPA Effects:**

2 **Disinfection Byproducts**

3 Changes to DOC and bromide concentrations and, by extension, DBPs, under Alternative 4
4 operational scenarios (H1–H4) suggest that there would not be exceedances of DBP criteria due to
5 operations, because long-term average DOC and bromide concentrations would be only slightly
6 higher under this alternative relative to the No Action Alternative. For all of the operational
7 scenarios relative to the No Action Alternative, the modeled DOC effects would be greatest at Franks
8 Tract, Rock Slough, and Contra Costa Pumping Plant Number 1. Increased long-term average DOC
9 concentrations at these locations would be greatest under Scenario H4 and would be least under
10 Scenario H1, although differences would generally be small (i.e., ≤ 0.2 mg/L). Under Scenario H4,
11 maximum increases of DOC would be $\leq 12\%$ for these locations. In addition, relative to the No Action
12 Alternative, the frequency which long-term average DOC concentrations would exceed 4 mg/L
13 during the modeled drought period at Buckley Cove would increase by 8%. In general, substantial
14 change in ambient DOC concentrations would need to occur before significant changes in drinking
15 water treatment plant design or operations are triggered. The increases in long-term average DOC
16 concentrations estimated to occur at various Delta locations under the four alternative operational
17 scenarios of Alternative 4 are of sufficiently small magnitude that they would not require existing
18 drinking water treatment plants to substantially upgrade treatment for DOC removal above levels
19 currently employed.

20 Under operational Scenarios H1-H4, modeled long-term average bromide concentrations would
21 increase at Buckley Cove, Staten Island, Emmaton, and Barker Slough, and would decrease at other
22 assessment locations, relative to the No Action Alternative. Overall effects would be greatest under
23 Scenario H2 at Barker Slough, source of the North Bay Aqueduct, where long-term average
24 concentration are predicted to increase by 44% (97% during the drought period). Although
25 Scenario H2 would result in the greatest relative increase in long-term average bromide
26 concentrations at Barker Slough, the difference between operational scenarios is very small (see
27 Chapter 8, *Water Quality*, Section 8.3.3.9, for detail). Regardless of particular Alternative 4
28 operational scenario, the increase in long-term average bromide concentrations at Barker Slough
29 could necessitate changes in water treatment plant operations or require treatment plant upgrades
30 in order to maintain DBP compliance.

31 The Stage 1 Disinfectants and Disinfection Byproduct Rule, adopted by EPA in 1998 as part of the
32 SDWA, requires drinking water utilities to reduce TOC concentrations by specified percentages prior
33 to disinfection. These requirements were adopted because organic carbon, such as DOC, can react
34 with disinfectants during the water treatment disinfection process to form DBPs such as THMs and
35 HAAs, which can pose potential lifetime carcinogenic risks to humans. Water treatment plants that
36 utilize Delta water are designed and operated to meet EPA's 1998 requirements based on the
37 ambient concentrations and seasonal variability that currently exists in the Delta. Ambient DOC and
38 bromide concentrations would need to change substantially to trigger significant changes in plant
39 design or operations. Although the increases in long-term average DOC and bromide concentrations
40 estimated to occur at most modeled Delta locations under Alternative 4 operational scenarios are of
41 sufficiently small magnitude that they would not require existing drinking water treatment plants to
42 substantially upgrade treatment, the modeled average bromide concentration increase predicted for
43 the North Bay Aqueduct at Barker Slough could necessitate upgrades or changes in operations at
44 certain water treatment plants, and this would be considered an adverse effect.

1 While treatment technologies sufficient to achieve the necessary bromide removal exist,
2 implementation of such technologies would likely require substantial investment in new or modified
3 infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in
4 long-term average bromide concentrations in drinking water sources would represent an increased
5 risk for adverse effects on public health from DBPs in drinking water sources. Mitigation Measure
6 WQ-5 is available to reduce these effects (implementation of this measure along with a separate,
7 non-environmental commitment as set forth in EIR/EIS Appendix 3B, *Environmental Commitments*,
8 relating to the potential increased treatment costs associated with bromide-related changes would
9 reduce these effects). Further, DWR issued a Notice of Preparation on December 2, 2009 to
10 construct and operate the AIP that would establish an alternative surface water intake on the
11 Sacramento River upstream of the Sacramento Regional Wastewater Treatment Plant discharge. The
12 AIP would connect to the existing North Bay Aqueduct system by a new segment of pipe. The
13 proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct
14 intake at Barker Slough. The proposed project would be designed to improve water quality and to
15 provide reliable deliveries of SWP supplies to its contractors, the Solano County Water Agency and
16 the Napa County Flood Control and Water Conservation District. The timing of DWR's
17 implementation of the AIP is uncertain at this time. The adverse water quality effects on the North
18 Bay Aqueduct at Barker Slough due to increased bromide may be minimized by implementation of
19 the AIP.

20 **Trace Metals**

21 Water quality modeling results indicate that water conveyance facilities operations would not
22 substantially change concentrations of metals of primarily human health and drinking water
23 concern (arsenic, iron, manganese) in Delta waters relative to the No Action Alternative. The arsenic
24 criterion was established to protect human health from the effects of long-term chronic exposure,
25 while secondary maximum contaminant levels for iron and manganese were established as
26 reasonable goals for drinking water quality. Average concentrations for arsenic, iron, and
27 manganese in the primary source water (Sacramento River, San Joaquin River, and the bay at
28 Martinez) are below these criteria. No mixing of these three source waters could result in a metal
29 concentration greater than the highest source water concentration, and, given that the modeled
30 average water concentrations for arsenic, iron, and manganese do not exceed water quality criteria,
31 more frequent exceedances of drinking water criteria in the Delta would not be an expected result
32 under this alternative. Accordingly, no adverse effect on public health related to the trace metals
33 arsenic, iron, or manganese from drinking water sources is anticipated.

34 **Pesticides**

35 Sources of pesticides to the study area include direct input of surface runoff from in-Delta
36 agriculture and Delta urbanized areas as well as inputs from rivers upstream of the Delta. These
37 sources would not be affected by implementing Alternative 4. However, under Alternative 4
38 Scenarios H1-H4, the distribution and mixing of Delta source waters would change. Changes in
39 source water fractions at the modeled Delta assessment locations would vary depending on
40 operational scenario, but relative differences between the operational scenarios would be small. As
41 described in Chapter 8, *Water Quality* (Section 8.3.3.9), at most modeled Delta locations, these
42 modeled changes in the source water fractions of Sacramento, San Joaquin and Delta agriculture
43 water would not be of sufficient magnitude to substantially increase pesticide concentrations in
44 Delta waters and would not adversely affect beneficial uses of the Delta relative to the No Action
45 Alternative. However, depending on operational scenario, modeled San Joaquin River fractions at

1 Buckley Cove would increase between 16–17% in July (31–34% for the modeled drought period)
2 and 24–25% in August (47–49% for the modeled drought period). These increases would primarily
3 balance through decreases in Sacramento River and eastside tributary waters. While the source
4 water and potential pesticide related toxicity co-occurrence predictions do not mean adverse effects
5 would occur, such considerable modeled increases in summer San Joaquin River source water
6 fraction for all operational scenarios at Buckley Cove could substantially alter the long-term risk of
7 pesticide-related toxicity to aquatic life, given the apparent greater incidence of pesticides in the San
8 Joaquin River. A conclusion regarding the risk to human health at this location, based on the
9 predicted adverse effects from pesticides on aquatic life, cannot be made. However, because the
10 modeled increase would only occur at one location, and over a very short period during the year, it
11 is expected that the potential for affecting public health would be relatively low. Additionally, the
12 prediction of adverse effects of pesticides relative to the No Action Alternative fundamentally
13 assumes that the present pattern of pesticide incidence in surface water would occur at similar
14 levels into the future. In reality, the makeup and character of the pesticide use market during the
15 late long-term would not be exactly as it is today. Use of chlorpyrifos and diazinon is on the decline
16 with their replacement by pyrethroids on the rise (see Chapter 8, *Water Quality*, Section 8.1.3.13, for
17 a detailed discussion on pesticide fate and transport in the Delta). Yet in this assessment it is the
18 apparent greater incidence of diazinon and chlorpyrifos in the San Joaquin River that serves as the
19 basis for concluding that substantially increased San Joaquin River source water fraction would
20 correspond to an increased risk of pesticide-related toxicity to aquatic life. Furthermore, drinking
21 water from the study area would continue to be treated prior to distribution into the drinking water
22 system, and water treatment plants are required to meet drinking water requirements set forth in
23 the California Safe Drinking Water Act (Health and Safety Code Section 116275 et seq.) and the
24 regulations adopted by CDPH. Therefore, it is not anticipated that there would be adverse effects on
25 public health related to pesticides from drinking water sources.

26 **CEQA Conclusion:** Under Alternative 4, water supply operations would increase contributions from
27 the San Joaquin River relative to the Sacramento River, and decrease the dilution capacity of the
28 Sacramento River for contaminants. This could result in changes in water quality. Water quality
29 modeling results (Chapter 8, *Water Quality*, Section 8.3.3.9) indicate that changes in flows under
30 Alternative 4 operational scenarios would not, for the most part, result in increased exceedances of
31 water quality criteria for constituents of concern (DBPs, trace metals and pesticides) in the study
32 area. Long-term average DOC concentrations for the modeled 16-year hydrologic period and the
33 modeled drought period would be predicted to increase by $\leq 14\%$. Under Scenario H4, increases in
34 long-term average DOC concentrations at Franks Tract, Rock Slough, and Contra Costa Pumping
35 Plant would correspond to more frequent concentration threshold exceedances, with the greatest
36 change occurring at Rock Slough and Contra Costa Pumping Plant (see Chapter 8, *Water Quality*,
37 Section 8.3.3.9). However, this predicted change would not be expected to adversely affect MUN
38 beneficial uses, or any other beneficial use.

39 Further, relative to Existing Conditions, Scenario H1-H4 long-term average bromide concentrations
40 would increase at the North Bay Aqueduct at Barker Slough, Staten Island, and Emmaton on the
41 Sacramento River under Alternative 4. Overall effects would be greatest at Barker Slough, with the
42 smallest model predicted increases occurring under Scenario H3 (21%; 72% increase during the
43 drought period), and the largest model predicted increases occurring under Scenario H2 (40%; 98%
44 increase during the drought period). The increase in long-term average bromide concentrations
45 predicted for Barker Slough would result in a substantial change in source water quality to existing
46 drinking water treatment plants drawing water from the North Bay Aqueduct. These modeled

1 increases in bromide at Barker Slough could lead to adverse changes in the formation of DBPs at
 2 drinking water treatment plants such that considerable water treatment plant upgrades would be
 3 necessary in order to achieve equivalent levels of drinking water health protection. This would be a
 4 significant impact.

5 While treatment technologies sufficient to achieve the necessary 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, a change of such magnitude in
 8 long-term average bromide concentrations in drinking water sources would represent an increased
 9 risk for adverse effects on public health from DBPs in drinking water sources. Assuming the adverse
 10 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
 11 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
 12 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
 13 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
 14 based on currently available information.

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

35 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 36 **Conditions**

37 It remains to be determined whether, or to what degree, the available and existing salinity
 38 response and countermeasure actions of SWP and CVP facilities or municipal water purveyors
 39 would be capable of offsetting the actual level of changes in bromide that may occur from
 40 implementation of Alternative 4. Therefore, in order to determine the feasibility of reducing the
 41 effects of increased bromide levels, and potential adverse effects on beneficial uses associated
 42 with CM1 operations (and hydrodynamic effects of tidal restoration under CM4), the proposed
 43 mitigation requires a series of phased actions to identify and evaluate existing and possible
 44 feasible actions, followed by development and implementation of the actions, if determined to
 45 be necessary. The development and implementation of any mitigation actions shall be focused

1 on those incremental effects attributable to implementation of Alternative 4 operations only.
 2 Development of mitigation actions for the incremental bromide effects attributable to climate
 3 change/sea level rise are not required because these changed conditions would occur with or
 4 without implementation of Alternative 4. The goal of specific actions would be to reduce/avoid
 5 additional degradation of Barker Slough water quality conditions with respect to the CALFED
 6 bromide goal.

7 Following commencement of initial operations of CM1, the BDCP proponents will conduct
 8 additional evaluations described herein, and develop additional modeling (as necessary), to
 9 define the extent to which modified operations could reduce or eliminate the increased bromide
 10 concentrations currently modeled to occur under Alternative 4. The additional evaluations
 11 should also consider specifically the changes in Delta hydrodynamic conditions associated with
 12 tidal habitat restoration under CM4 (in particular the potential for increased bromide
 13 concentrations that could result from increased tidal exchange) once the specific restoration
 14 locations are identified and designed. If sufficient operational flexibility to offset bromide
 15 increases is not practicable/feasible under Alternative 4 operations, achieving bromide
 16 reduction pursuant to this mitigation measure would not be feasible under this alternative.

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:** Three intakes would be constructed and operated under sediment-disturbing
 20 activities during construction and maintenance of the water conveyance facilities under Alternative
 21 4 could result in the disturbance of existing constituents in sediment, such as pesticides or
 22 methylmercury, in. In-channel construction activities, such as pile driving during the construction of
 23 cofferdams at the intakes and pier construction at the barge unloading facilities, which would occur
 24 during a 5-month time window, would result in the localized disturbance of river sediment. In
 25 addition, maintenance of the five proposed north Delta intakes and the intermediate forebay would
 26 entail periodic dredging for sediment removal at these locations. Sediment accumulation in both the
 27 northern and southern portion of the expanded Clifton Court Forebay is expected to be minimal
 28 over the 50-year permit period. However, it is anticipated that there may be some sediment
 29 accumulation at the inlet structure of the northern portion of Clifton Court Forebay. Therefore, while
 30 overall sediment accumulation in this forebay is not expected to be substantial, some dredging may
 31 be required at the inlet structure to maintain an even flow path. Under the various Alternative 4
 32 operational scenarios (H1-H4), changes in dilution and mixing of sources of water could result in a
 33 change in constituents known to bioaccumulate. For example, the reduction of flows in the
 34 Sacramento River downstream of the proposed north Delta intakes may result in a decreased
 35 dilution of constituents known to bioaccumulate in the study area.

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. Furthermore, Alternative 4 would not result in increased
 7 tributary flows that would mobilize organochlorine pesticides in sediments. Thus, the change in
 8 source water in the Delta associated with the change in water supply operations is not expected to
 9 adversely affect public health with respect to bioaccumulation of pesticides.

10 **Methylmercury**

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

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

- 23 • Install physical erosion control stabilization features (hydroseeding, mulch, silt fencing, fiber
 24 rolls, sand bags, and erosion control blankets) to capture sediment and control both wind and
 25 water erosion.
- 26 • Retain trees and natural vegetation to the extent feasible to stabilize hillsides, retain moisture,
 27 and reduce erosion.
- 28 • Limit construction, clearing of vegetation, and disturbance of soils to areas of proven stability.
- 29 • Use sediment ponds, silt traps, wattles, straw bale barriers or similar measures to retain
 30 sediment transported by runoff water onsite.
- 31 • Collect and direct surface runoff at non-erosive velocities to the common drainage courses.
- 32 • Deposit or store excavated materials away from drainage courses.
- 33 • Prevent transport of sediment at the construction site perimeter, toe of erodible slopes, soil
 34 stockpiles, and into storm drains.
- 35 • Reduce runoff velocity on exposed slopes.
- 36 • Reduce offsite sediment tracking.

37 Implementation of these measures would help ensure that construction activities would not
 38 substantially increase or substantially mobilize methylmercury. Accordingly, there would be no
 39 adverse effect.

1 Water quality and fish tissue modeling results showed small, insignificant changes in total mercury
2 and methylmercury levels in water and fish tissues resulting from Alternative 4 water operations
3 (see Chapter 8, Section 8.3.3.9, *Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and*
4 *Intakes 1–2, 3, and 5 [9,000 cfs; Operational Scenario HJ]*), for a detailed discussion). Upstream
5 mercury contributions and methylmercury production in Delta waters would not be altered by the
6 operation of Alternative 4, as it would not change existing mercury sources and would not
7 substantially alter methylmercury concentrations in the Sacramento River or San Joaquin River.
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 was greatest for
10 Scenario H4 relative to the No Action Alternative. These changes ranged, from 5.0% at the Jones
11 Pumping Plant to -2.3% at Old River at Rock Slough. These same sites show the smallest range of
12 effects on assimilative capacity for Alternative 4 H1, with 4.3% and -1.4% for these same two
13 stations, respectively. Operational Scenarios H2 and H3 fall between these two extremes. The
14 changes are not expected to result in adverse effects on beneficial uses. Similarly, changes in
15 methylmercury concentration are expected to be very small as predicted by modeling.

16 Fish tissue estimates showed small or no increase in exceedance quotient based on long-term
17 annual average mercury concentrations at the nine Delta locations modeled. The greatest increases
18 in exceedance quotients relative to the No Action Alternative were estimated to be 12% for both Old
19 River at Rock Slough, and for Franks Tract. The lowest percentage change in modeled bass mercury
20 concentrations is predicted to occur under Operational Scenario H1 relative to the No Action
21 Alternative for these locations.

22 Currently, mercury concentrations in fish tissues exceed Delta TMDL guidance targets, which are set
23 for human health rather than effects on fish, and operation of Alternative 4 is not expected to
24 substantially alter this condition. Large sport fish throughout the Delta are currently uniformly in
25 exceedance of consumption guidelines for mercury, and Alternative 4 is not expected to
26 substantially alter that condition. Although methylmercury currently exceeds the TMDL, little to no
27 change in mercury or methylmercury concentrations in water is expected under Alternative 4
28 operational scenarios. Thus, the alternative would not result in increased exceedances of water
29 quality criteria. Because water operations would not substantially increase methylmercury above
30 what currently exists in the study area and would not expose people to a public health hazard,
31 adverse effects on public health are not expected to result.

32 **CEQA Conclusion:** Intermittent and/or short-term construction-related activities (as would occur
33 for 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 organochlorine pesticides
37 typically bond to particulates, and do not mobilize easily. Construction and maintenance of
38 Alternative 4 would not cause these legacy pesticides to be transported far from the source or to
39 partition into the water column. Other pesticides which are currently present in waters affected by
40 SWP and CVP operations are not considered bioaccumulative. Although methylmercury currently
41 exceeds the TMDL, little to no change in methylmercury concentrations in water are expected under
42 Alternative 4 water conveyance construction.

43 Alternative 4 would not result in increased flows in the tributaries that would mobilize legacy
44 organochlorine pesticides in sediments. Other pesticides that are present in study area water

1 channels are not considered bioaccumulative and any changes in concentrations due to Alternative
2 4 operations would not cause them to become bioaccumulative.

3 Water quality modeling results indicated small, insignificant changes in mercury and
4 methylmercury levels in water at certain Delta locations and in mercury in fish tissues due to
5 Alternative 4 operational scenarios (H1–H4). Specifically, modeling results indicate that the
6 percentage change in assimilative capacity of waterborne total mercury relative to the 25 ng/L
7 Ecological Risk Benchmark for this alternative relative to Existing Conditions would show the
8 greatest decrease (2.4%) in the Old River at Rock Slough and at the Contra Costa Pumping Plant.
9 These are bounded by Alternative 4 H1 estimates of -1.4% and -1.5% at these two locations,
10 respectively. In contrast the greatest increase in assimilative capacity relative to Existing Conditions
11 would be 4.4% for operational Scenario H4 at the Jones Pumping Plant. Scenarios H2 and H3 range
12 in changes in assimilative capacity in relation to Existing Conditions from -2.1% (H3 at Contra Costa
13 Pumping Plant to 4.1% (H2 at Banks). These small changes in assimilative capacity are not expected
14 to result in significant impacts to beneficial uses. Fish tissue estimates show only small or no
15 increases in exceedance quotients based on long-term annual average concentrations for mercury at
16 the nine Delta locations modeled. The greatest increase over Existing Conditions was for Scenario
17 H4 and was 15% at Old River at Rock Slough and 13% for Franks Tract as compared to Scenario H1
18 estimates for both of those locations of 9%.

19 BMPs implemented as part of Erosion and Sediment Control Plans and SWPPPs would help ensure
20 that construction activities would not substantially increase or substantially mobilize legacy
21 organochlorine pesticides or methylmercury during construction and maintenance. Further,
22 because mercury concentrations are not expected to increase substantially, no long-term water
23 quality degradation is expected to occur and, thus, no adverse effects to beneficial uses would occur.
24 Because any increases in mercury or methylmercury concentrations are not likely to be measurable,
25 changes in mercury concentrations or fish tissue mercury concentrations would not make any
26 existing mercury-related impairment measurably worse. In comparison to Existing Conditions,
27 Alternative 4 would not increase levels of mercury by frequency, magnitude, and geographic extent
28 such that the affected environment would be expected to have measurably higher body burdens of
29 mercury in aquatic organisms or humans consuming those organisms.

30 Therefore, construction, operation and maintenance of Alternative 4 would not cause increased
31 exposure of the public to these bioaccumulative sediment constituents. Since construction,
32 maintenance, or operation of the water conveyance facilities in Alternative 4 would not cause
33 substantial mobilization or a substantial increase of constituents known to bioaccumulate, impacts
34 on public health would be less than significant. No mitigation is required.

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

38 **NEPA Effects:** Approximately 621 miles of existing transmission lines are located within the study
39 area. Under Alternative 4, the method of delivering power to construct and operate the water
40 conveyance facilities is assumed to be a “split” system that would connect to the existing grid in two
41 different locations—one in the northern section of the alignment, and one in the southern section of
42 the alignment. As described in Table 25-8, a total of 5.87 miles of new permanent 69 kV
43 transmission lines; 34.73 miles of new temporary 230 kV transmission lines; 14.17 miles of new

1 permanent 230 kV transmission lines; and 3.25 miles of new temporary 34.5 kV transmission lines
2 would be constructed and operated under Alternative 4.

3 Any new temporary and permanent transmission lines constructed and operated under Alternative
4 4 would, for the most part, be located in areas that are not densely populated (Figure 25-2) and,
5 therefore, would not expose substantially more people to EMF from transmission lines. None of the
6 proposed temporary or permanent transmission lines for this alternative would be located within
7 300 feet of sensitive receptors.

8 As discussed in Section 25.1.1.5, the current scientific evidence does not show conclusively that EMF
9 exposure can increase health risks. In 2006, CPUC updated its EMF policy and reaffirmed that health
10 hazards from exposures to EMF have not been established. State and federal public health
11 regulatory agencies have determined that setting numeric exposure limits is not appropriate. CPUC
12 also reaffirmed that the existing no-cost and low-cost precautionary-based EMF policy should be
13 continued. Based on this, utility companies are required to establish and maintain EMF Design
14 Guidelines in order to reduce potential health risks associated with power lines. These guidelines
15 would be implemented for any new temporary or new permanent transmission lines constructed
16 and operated under Alternative 4, depending on which electric provider is selected by DWR.
17 Furthermore, as described in Appendix 3B, *Environmental Commitments*, the location and design of
18 the proposed new transmission lines would be conducted in accordance with CPUC's EMF Design
19 Guidelines for Electrical Facilities, and would include one or more of three measures to reduce EMF
20 exposure.

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

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

27 **CEQA Conclusion:** Under Alternative 4, the majority of proposed temporary (34.5 kV and 230 kV)
28 and permanent (69 kV and 230 kV) transmission lines would be located within the rights-of-way of
29 existing transmission lines; any new temporary or permanent transmission lines not within the
30 right-of-way of existing transmission lines would, for the most part, be located in sparsely populated
31 areas generally away from existing sensitive receptors. None of the proposed temporary or
32 permanent transmission lines would be within 300 feet of sensitive receptors. Further, the
33 temporary transmission lines would be removed when construction of the water conveyance facility
34 features is completed, so there would be no potential permanent effects. Therefore, these
35 transmission lines would not substantially increase people's exposure to EMFs.

36 Additionally, design and implementation of new proposed temporary or permanent transmission
37 lines not within the right-of-way of existing transmission lines would follow CPUC's EMF Design
38 Guidelines for Electrical Facilities and would implement shielding, cancellation, or distance measures
39 to reduce EMF exposure. Since construction and operation of Alternative 4 would not expose
40 substantially more people to transmission lines that provide new sources of EMFs, impacts on public
41 health would be less than significant. 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:** Implementation of CM2-CM7, CM10 and CM11 under Alternative 4 would include
 4 fisheries enhancement (CM2); the restoration of up to 65,000 acres of tidal and freshwater habitat
 5 (CM3 and CM4), 10,000 acres of seasonally inundated floodplain (CM5), and 1,200 acres of nontidal
 6 marsh and 500 acres of managed wetlands (CM10); enhancement of channel margin and riparian
 7 habitat (CM6 and CM7); and protection of 150 acres of alkali seasonal wetland complex and 1,500
 8 acres of managed wetlands (CM3 and CM11). These activities could potentially increase suitable
 9 mosquito habitat within the study area.

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

13 Of the approximate 65,000-acre tidal and freshwater habitat restoration target, approximately
 14 55,000 acres of this restoration will consist of tidal perennial aquatic, tidal mudflat, tidal freshwater
 15 emergent wetland, and tidal brackish emergent wetland natural communities, and the remaining up
 16 to 10,000 acres will consist of transitional uplands to accommodate sea level rise. Of the
 17 approximate 55,000 acres of tidally influenced natural community, approximately 20,600 acres
 18 must occur in particular ROAs as listed below.

- 19 • 7,000 acres of brackish tidal habitat, of which at least 4,800 acres would be tidal brackish
 20 emergent wetland and the remainder would be tidal perennial aquatic and tidal mudflat, in
 21 Suisun Marsh (ROA).
- 22 • 5,000 acres of freshwater tidal habitat in the Cache Slough ROA.
- 23 • 1,500 acres of freshwater tidal habitat in the Cosumnes/Mokelumne ROA.
- 24 • 2,100 acres of freshwater tidal habitat in the West Delta ROA.
- 25 • 5,000 acres of freshwater tidal habitat in the South Delta ROA.

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

29 Potentially suitable mosquito habitat resulting from the implementation of CM2 – CM7, CM10 and
 30 CM11 would generally not be located near densely populated areas (Figure 25-3). Table 25-5
 31 outlines the distances travelled from breeding grounds for the species listed. These distances range
 32 from less than 1 mile to up to 30 miles. The conservation measures would generally expand existing
 33 habitat or replace existing agricultural areas, both of which are currently sources for mosquitoes. Of
 34 the ROAs, the South Delta ROA and West Delta ROA currently have the fewest acres of habitat
 35 suitable for mosquitoes and are the closest to more densely populated areas (Figure 25-3). Similarly,
 36 although much of Yolo Bypass is not proximate to densely populated areas, there are areas of Yolo
 37 Bypass near populated areas including El Macero, Davis, and West Sacramento. Therefore, habitat
 38 restoration in these ROAs and in the Yolo Bypass may result in an increase in mosquitoes and
 39 exposure to vector-borne diseases when compared with restoration of aquatic habitat within the
 40 other ROAs.

41 The habitat restoration and enhancement under all of these CMs would be performed in accordance
 42 with Natural Communities Enhancement and Management (CM11), which would require

1 preparation and implementation of management plans for the protected natural communities and
 2 covered species habitats. The preparation and implementation of the management plans would be
 3 performed in consultation with the appropriate MVCs. This consultation would occur when
 4 specific restoration and enhancement projects and locations are identified within the ROAs and
 5 prior to implementation of CM2. It is standard practice to use IPM to control mosquitoes, and, as
 6 part of the consultation with the MVCs, BDCP proponents would prepare and implement MMPs
 7 (Appendix 3B, *Environmental Commitments*). In addition, BMPs from the guidelines outlined in
 8 Section 25.2.5.7 and detailed in Appendix 3B would be incorporated into the proposed project and
 9 executed to maintain proper water circulation and flooding during appropriate times of the year
 10 (e.g., fall) to prevent stagnant water and habitat for mosquitoes. BMPs to be implemented as part of
 11 the MMPs would include, but not necessarily be limited to, the following.

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

28 Finally, restoration of different types of habitat would potentially increase mosquito predators, such
 29 as birds and bats, using the habitat. Therefore, implementation of the habitat restoration and
 30 enhancement conservation measures would not significantly increase the public's risk of exposure
 31 to vector-borne diseases. Accordingly, there would be no adverse effect.

32 **CEQA Conclusion:** Although implementing Alternative 4 would increase restored and enhanced
 33 habitat in the study area that could result in a significant increase in vectors such as mosquitoes,
 34 implementation of environmental commitments, including consultation with the MVCs and
 35 implementation of BMPs as part of MMPs as set forth in Appendix 3B, would reduce the potential for
 36 an increase in mosquito breeding habitat, and, as such, an associated substantial increase in vector-
 37 borne diseases would not result. Furthermore, habitat would be restored in areas where existing
 38 potentially suitable habitat for mosquitoes already exists. Finally, predators on mosquitoes would
 39 likely increase as a result of restoration and enhancement, which would keep mosquito populations
 40 in check. Accordingly, implementation of CM2-CM7, CM10 and CM11 under Alternative 4 would not

1 substantially increase the public's risk of exposure to vector-borne diseases beyond what currently
2 exists and would be less than significant. No mitigation is required.

3 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of** 4 **Implementing the Restoration Conservation Measures**

5 **NEPA Effects:** The study area currently supports habitat types, such as tidal habitat, upland
6 wetlands, and agricultural lands, that produce pathogens as a result of the biological productivity in
7 these areas (e.g., migrating birds, application of fertilizers, waste products of animals). The study
8 area does not currently have pathogen concentrations that rise to the level of adversely affecting
9 beneficial uses of recreation. Restored habitat and protected agricultural lands under Alternative 4
10 could result in an increase in pathogen loading in the study area because these land uses are known
11 to generate pathogens. However, as exemplified by the Pathogen Conceptual Model, any potential
12 increase in pathogens associated with the proposed habitat restoration and enhancement (as part of
13 implementation of restoration conservation measure) would be localized and within the vicinity of
14 the actual restoration. The result would be similar for lands protected for agricultural uses. This
15 localized increase is not expected to be of sufficient magnitude and duration to result in adverse
16 effects on recreationists as described in Chapter 8, *Water Quality* (Section 8.3.3.9). Furthermore,
17 depending on the level of recreational access granted by management plans, habitat restoration and
18 enhancement could increase or decrease opportunities for recreationists within the study area.
19 Mechanisms that permit public access could increase opportunities related to upland hunting,
20 hiking, walking, wildlife and botanical viewing, nature photography, picnicking, and sightseeing.
21 Alternatively, land acquisition that would exclude public recreational use would decrease
22 opportunities for these activities, thus limiting recreationists' potential exposure to pathogens. Even
23 if recreationists were allowed in the ROAs, the characteristics of pathogens in water as described by
24 the conceptual model would not substantially increase recreationists' exposure. Accordingly,
25 implementation of the restoration conservation measures under Alternative 4 would not result in a
26 substantial increase in recreationists' exposure to pathogens. There would be no adverse effect.

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

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

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

40 **Pesticides**

41 Organochlorines and other relatively water insoluble pesticides would likely be sequestered in the
42 former agricultural soils in ROAs. Additionally, because these chemicals tend to bind to particulates,
43 concentrations are typically highest in sediment. Flooding of former agricultural land, as would

1 occur under CM4, CM5, and CM10, is expected to result in some level of accessibility to biota through
2 uptake by benthic organisms. Moreover, CM2 and CM5 may be managed alongside continuing
3 agriculture, where pesticides may be used on a seasonal basis and where water during flood events
4 may come in contact with residues of these pesticides. However, rapid dissipation would be
5 expected, particularly in the large volumes of water involved in flooding; therefore, it is unlikely that
6 a substantial increase in bioaccumulation by fish would result. Further, implementation of CM2,
7 CM4, CM5, and CM10 would not include the use of bioaccumulative pesticides. Additionally,
8 significant increases in concentrations of organochlorine and other legacy pesticides are not
9 expected in the water column because these lipophilic chemicals strongly partition to sediments,
10 and concentrations in the water column would be relatively short-lived because these pesticides
11 settle out of the water column via sediment adsorption in low-velocity flow.

12 As described in Section D.4.6.1 of BDCP Appendix 5.D, if pesticide-laden sediment erodes and is
13 transported from an ROA, it is likely that the pesticides would not be transported very far from the
14 source area, and would settle out with suspended particulates and be deposited close to the ROA.
15 For these reasons, a substantial mobilization of, or a substantial increase in, bioaccumulative
16 pesticides in the study area is not anticipated. Therefore, no adverse effect on public health with
17 respect to bioaccumulation of pesticides is expected.

18 **Methylmercury**

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

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

41 The Sacramento River watershed, and specifically the Yolo Bypass, is the primary source of mercury
42 in the study area. The highest concentrations of mercury and methylmercury are in the Cache Creek
43 area and the Yolo Bypass. The amount of methylmercury produced in the Yolo Bypass has been
44 estimated to represent 40% of the total methylmercury production for the entire Sacramento River

1 watershed (Foe et al. 2008). Water discharging from the Yolo Bypass at Prospect Slough has a
2 reported average annual methylmercury concentration of 0.27 ng/L, more than four times greater
3 than the 0.06 ng/L TMDL.

4 The highest levels of methylmercury generation, mobilization, and bioavailability are expected in
5 the Yolo Bypass with implementation of CM2 under Alternative 4. Implementation of CM2 would
6 subject Yolo Bypass to more frequent and wider areas of inundation. The concentrations of
7 methylmercury in water exiting the Yolo Bypass would depend on many variables. However,
8 implementation of CM2 has the potential to significantly increase the loading, concentrations, and
9 bioavailability of methylmercury in the aquatic system.

10 As part of the implementation of conservation measures under Alternative 4, measures would be
11 developed to reduce the production of methylmercury in ROAs, and these measures would be
12 implemented as part of CM12, *Methylmercury Management*. These measures may include
13 construction and grading in a way that minimizes exposure of mercury-containing soils to the water
14 column; designing areas to support/enhance photodegradation; and pre-design field studies to
15 identify depositional areas where mercury accumulation is most likely and characterization and/or
16 design that avoids these areas. CM12 provides for consideration of new information related to
17 methylmercury degradation that could effectively mitigate methylmercury production and
18 mobilization.

19 In summary, Alternative 4 restoration actions are likely to result in increased production,
20 mobilization, and bioavailability of methylmercury in the aquatic system. Methylmercury would be
21 generated by inundation of restoration areas, with highest concentrations expected in the Yolo
22 Bypass, Cosumnes River and Mokelumne River, and at ROAs closest to these source areas as a result
23 of the BDCP actions. An increase in bioavailability in the aquatic system could result in a
24 corresponding increase in bioaccumulation in fish tissue, biomagnification through the food chain,
25 and human exposure. Because the increase in bioavailability in the food chain cannot be quantified,
26 the increase in human exposure also cannot be quantified. OEHHA standards would continue to be
27 implemented for the consumption of study area fish and to protect people against the
28 overconsumption of fish with increased body burdens of mercury. Furthermore, implementation of
29 CM12, *Methylmercury Management*, would minimize effects because it provides for project-specific
30 mercury management plans including a QA/QC program, and specific tidal habitat restoration
31 design elements to reduce the potential for methylation of mercury and its bioavailability in tidal
32 habitats. As such, adverse effects on public health due to the substantial mobilization of or increase
33 in methylmercury are not expected to occur.

34 **CEQA Conclusion:** Flooding of former agricultural land under CM4, CM5, and CM10, could result in
35 some level of accessibility of legacy organochlorine pesticides to biota through uptake by benthic
36 organisms. Further, CM2 and CM5 may be managed alongside continuing agriculture, where
37 pesticides may be used on a seasonal basis and where water during flood events may come in
38 contact with organochlorine and legacy pesticide residues. However, rapid dissipation would be
39 expected, particularly in the large volumes of water involved in flooding; therefore, it is unlikely that
40 a substantial increase in bioaccumulation by fish would result. Additionally, while there would likely
41 be an increase in mobilization of and potentially an increase in bioaccumulation of methylmercury
42 in the study area's aquatic systems (e.g., fish and water) in the near term, it is unlikely to be
43 substantial. Further, CM12, *Methylmercury Management*, as well as existing OEHHA standards,
44 would serve to reduce the public's exposure to contaminated fish. Implementation of CM2, CM4,
45 CM5, and CM10 under Alternative 4 would not substantially mobilize or substantially increase the

1 public's exposure to constituents known to bioaccumulate and would be less than significant. No
2 mitigation is required.

3 **25.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and** 4 **Intake 1 (3,000 cfs; Operational Scenario C)**

5 Alternative 5 would involve construction activities similar to those described under Alternative 1A;
6 therefore, types of construction impacts would be the same, although somewhat less because there
7 would be only one intake compared to five. Construction impacts are summarized below for vector-
8 borne diseases and water quality concerns. Alternative 5 would have four fewer intakes than
9 Alternative 1A would have, and correspondingly fewer solids lagoons, sedimentation basins, and
10 transmission lines. Therefore, the public health effects of Alternative 5 would be similar to but
11 generally less than those identified for Alternative 1A. Water supply operations under Alternative 5
12 would adhere to the Operational Scenario C criteria. The location of habitat restoration and
13 enhancement that would occur under Alternative 5 would be similar to that of Alternative 1A;
14 however, only 25,000 acres of tidal habitat restoration would occur under Alternative 5, rather than
15 65,000 acres. All other conservation measures under Alternative 5 would be the same as those
16 described under Alternative 1A.

17 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 18 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water** 19 **Conveyance Facilities**

20 **NEPA Effects:** Alternative 5 would involve construction and operation of up to three solids lagoons,
21 one sedimentation basin, and a 350-acre inundation area adjacent to the intermediate forebay;
22 however, the mechanisms for potential public health effects are similar to those described above for
23 Alternative 1A. Specifically, the sedimentation basin, solids lagoons, and the inundation area have
24 the potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of the
25 large volumes of water that would be held within these areas. However, DWR would consult and
26 coordinate with San Joaquin County and Sacramento-Yolo County MVCDs and prepare and
27 implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes. See
28 Impact PH-1 under Alternative 1A. During operation, the depth, design, and operation of the
29 sedimentation basin and solids lagoons would prevent the development of suitable mosquito habitat
30 (Figure 25-1). Specifically, the basins would be too deep and the constant movement of water would
31 prevent mosquitoes from breeding and multiplying. Sedimentation basins would be 120 feet long by
32 40 feet wide by 55 feet deep, and solids lagoons would be 165 feet long by 86 feet wide by 10 feet
33 deep. Furthermore, use of the 350-acre inundation area adjacent to the intermediate forebay would
34 be limited to forebay emergency overflow situations and water would be physically pumped back to
35 the intermediate forebay, creating circulation such that the inundation area would have a low
36 potential for creating suitable vector habitat. Accordingly, as described under Alternative 1A,
37 construction and operation of the intakes, solids lagoons, and/or sedimentation basins under
38 Alternative 5 would not substantially increase suitable vector habitat, and would not substantially
39 increase vector-borne diseases. Therefore, no adverse effects would result.

40 **CEQA Conclusion:** Implementation of CM1 under Alternative 5 would involve the construction and
41 operation of four fewer solids lagoons and one sedimentation basin relative to Alternative 1A, and
42 construction and operation of a 350-acre inundation area adjacent to the intermediate forebay.
43 These areas could provide suitable habitat for vectors (e.g., mosquitoes). The inundation area would
44 only be used during emergency overflow situations and water would be pumped back into the

1 intermediate forebay, creating circulation that would discourage mosquito breeding. In addition,
 2 DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCDs
 3 and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help control
 4 mosquitoes. See Impact PH-1 under Alternative 1A. During operations, water depth and circulation
 5 would prevent the intakes, solids lagoons, and/or sedimentation basins from substantially
 6 increasing suitable vector habitat. Therefore, construction and operation of the water conveyance
 7 facilities in Alternative 5 would not result in a substantial increase in vector-borne diseases and the
 8 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 Number 1, Staten Island, Emmaton, and Barker
 21 Slough, with the greatest increase at Barker Slough (27%). The increase would be more substantial
 22 during 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, non-environmental commitment as set forth
 30 in EIR/EIS Appendix 3B, *Environmental Commitments*, relating to the potential increased treatment
 31 costs associated with bromide-related changes would reduce these effects). Further, as described for
 32 Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at
 33 Barker Slough may be further minimized by implementation of the AIP.

34 The change in source water associated with water supply operations under Operational Scenario C
 35 relative to the No Action Alternative would result in a potential increase in pesticide toxicity to
 36 aquatic life in the summer source water fraction at Buckley Cove, as described for Alternative 2A.
 37 This increase would result from the apparent greater incidence of pesticides in the San Joaquin
 38 River and its relative contribution to the total source water volume at this location during July and
 39 August. Water quality exceedance described above in Alternative 1A would conflict with the Basin
 40 Plan, as it exceeds the Basin Plan's requirements. However, because the modeled increase would
 41 occur only at one location, and over a very short period of time during the year, it is expected that
 42 the potential for affecting public health would be relatively low. The prediction of adverse effects of
 43 pesticides relative to the No Action Alternative fundamentally assumes that the present pattern of
 44 pesticide incidence in surface water would continue at similar levels into the future. In reality, the
 45 use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for concluding

1 a substantially increased San Joaquin River source water fraction, is on the decline with their
2 replacement by pyrethroids on the rise. Furthermore, drinking water from the study area would
3 continue to be treated prior to distribution into the drinking water system, and water treatment
4 plants are required to meet certain drinking water standards set forth in the California Safe Drinking
5 Water Act (Health and Safety Code section 116275 et. seq.) and the regulations adopted by the
6 CDPH. Therefore, it is not anticipated that there would be adverse effects on public health related to
7 levels of pesticides in drinking water sources.

8 **CEQA Conclusion:** The operation of water conveyance facilities under Alternative 5 would adhere to
9 the criteria set forth under Operational Scenario C. Water quality modeling results indicate that, for
10 the most part, there would be no substantial changes in trace metals, DBPs, or pesticides relative to
11 Existing Conditions under this operational scenario. An exception to this is that concentrations of
12 bromide would increase at the North Bay Aqueduct at Barker Slough, Staten Island, and Emmatton
13 on the Sacramento River under Alternative 5, with the greatest increase occurring at Barker Slough
14 (23%). This increase would be more substantial during the drought period (84%). These modeled
15 increases in bromide at Barker Slough could lead to adverse changes in the formation of DBPs at
16 drinking water treatment plants such that considerable water treatment plant upgrades would be
17 necessary to achieve equivalent levels of drinking water health protection. This would be a
18 significant impact.

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

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

1 necessary agreements are completed before the project's contribution to the effect is made, impacts
2 would be less than significant.

3 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
4 **Conditions**

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

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

8 **NEPA Effects:** Alternative 5 would have four fewer intakes than Alternative 1A would have;
9 however, the intake would be constructed and operated in a similar manner to those under
10 Alternative 1A. As described under Alternative 1A, sediment-disturbing activities during
11 construction and maintenance of the water conveyance facilities under Alternative 5 could result in
12 the disturbance of existing constituents in sediment, such as pesticides or methylmercury.
13 Therefore, the public health effects associated with pesticides and methylmercury would be similar,
14 although, slightly less, than those associated with Alternative 1A. Intermittent and/or short-term
15 construction-related activities (as would occur for in-river construction) would not be anticipated to
16 result in contaminant discharges of sufficient magnitude or duration to contribute to long-term
17 bioaccumulation processes, or cause measureable long-term degradation, as described under
18 Alternative 1A. Legacy organochlorine pesticides typically bond to particulates, and do not mobilize
19 easily. Construction and maintenance of Alternative 5 would not cause legacy organochlorine
20 pesticides to be transported far from the source or to partition into the water column, as described
21 for Alternative 1A. Additionally, water supply operations under any BDCP action alternative would
22 not be expected to change total suspended solids or turbidity levels (highs, lows, typical conditions)
23 to any substantial degree. Changes in the magnitude, frequency, and geographic distribution of
24 legacy pesticides in water bodies of the affected environment that would result in new or more
25 severe adverse effects on beneficial uses, relative to the No Action Alternative, would not be
26 expected to occur.

27 Modeling results indicate small, insignificant changes in total mercury and methylmercury levels in
28 water and fish tissues resulting from Alternative 5 water operations (Chapter 8, *Water Quality*,
29 Section 8.3.3.10). Upstream mercury contributions and methylmercury production in Delta waters
30 would not be altered by the operation of Alternative 5, as it would not change existing mercury
31 sources and would not substantially alter methylmercury concentrations in the Sacramento River or
32 San Joaquin River. Results indicate that the percentage change in assimilative capacity of
33 waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark for this alternative
34 relative to the No Action Alternative would be greatest (a 0.9% decrease) at Franks Tract. This
35 change is not expected to result in adverse effects on beneficial uses. Similarly, changes in
36 methylmercury concentration are expected to be very small.

37 Fish tissue mercury concentrations showed small or no increase in exceedance quotients based on
38 long-term annual average concentrations at the nine Delta locations modeled. The greatest increase
39 relative to the No Action Alternative was 7% at Mokelumne River (South Fork) at Staten Island.

40 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
41 Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under the
42 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
43 sediment that may contain organochlorine pesticides and methylmercury within the area of

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

9 Accordingly, the potential for Alternative 5 to create a public health effect from bioaccumulation of
10 legacy organochlorine pesticides and methylmercury in fish is minimal, and public health effects are
11 not expected to be adverse.

12 **CEQA Conclusion:** Construction and maintenance of Alternative 5 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 is expected under
16 Alternative 5 water construction. BMPs implemented as part of Erosion and Sediment Control Plans
17 and SWPPPs would help ensure that construction activities would not substantially increase or
18 substantially mobilize legacy organochlorine pesticides or methylmercury during construction and
19 maintenance. Therefore, construction and maintenance of Alternative 5 would not cause increased
20 exposure of the public to these bioaccumulative sediment constituents.

21 Alternative 5 would not result in increased flows in the tributaries 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 and in mercury in fish tissues due to
24 Alternative 5 water operations. Specifically, the analysis of percentage change in assimilative
25 capacity of waterborne total mercury of Alternative 5 relative to the 25 ng/L ecological risk
26 benchmark as compared to Existing Conditions showed the greatest decrease to be 0.9% at Old
27 River at Rock Slough and the Contra Costa Pumping Plant. Fish tissue estimates show only small or
28 no increases in exceedance quotients based on long-term annual average concentrations for
29 mercury at the Delta locations. The greatest change in exceedance quotients of 5% is expected for
30 Franks Tract and Old River at Rock Slough relative to Existing Conditions. However, these changes
31 would not substantially affect the current level of existing methylmercury degradation in the study
32 area or substantially affect the existing fish tissue concentrations.

33 Since construction, maintenance or operation of Alternative 5 are not expected to cause substantial
34 mobilization or a substantial increase of constituents known to bioaccumulate (i.e., organochlorine
35 pesticides), impacts on public health would be less than significant. No 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:** Approximately 621 miles of existing transmission lines are located within the study
40 area. As described in Table 25-8, a total of 24.71 miles of new temporary 69 kV transmission lines;
41 8.68 miles of new permanent 69 kV transmission lines; and 42.68 miles of new permanent 230 kV
42 transmission lines would be required for this alternative. This alternative would have fewer intakes
43 than Alternative 1A, but would still include the pipeline/tunnel conveyance.

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

12 As described for Alternative 1A, the majority of sensitive receptors are already located within 300
 13 feet of an existing transmission line; therefore, the majority of new temporary or new permanent
 14 transmission lines would not expose new sensitive receptors or substantially more people to EMFs
 15 that they are not already experiencing. Because the transmission lines would generally be located in
 16 sparsely populated areas and would be within 300 feet of only one potential new sensitive
 17 receptors, the proposed temporary and permanent transmission lines would not substantially
 18 increase people's exposure to EMFs. While the current scientific evidence does not show
 19 conclusively that EMF exposure can increase health risks, the location and design of the new
 20 transmission lines would be conducted in accordance with CPUC's EMF Design Guidelines for
 21 Electrical Facilities to reduce EMF exposure. Therefore, operation of the transmission line corridors
 22 would not expose substantially more people to transmission lines generating EMFs and there would
 23 be no adverse effect on public health.

24 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
 25 transmission lines would be located within the rights-of-way of existing transmission lines and any
 26 new temporary or permanent transmission lines not within the right-of-way of existing
 27 transmission lines would, for the most part, be located in sparsely populated areas generally away
 28 from existing sensitive receptors. However, one sensitive receptor, Stone Lakes National Wildlife
 29 Refuge, would be within 300 feet of a proposed 69 kV temporary transmission line. Because visitors
 30 to this area generally come for walks, water recreation, and hunting, it is unlikely that large groups
 31 of people would be staying in the area within 300 feet of this proposed transmission line, so any
 32 EMF exposure would be limited. Further, this line would be removed construction of the water
 33 conveyance facility features near this area is completed, so there would be no potential permanent
 34 effects. Therefore, this temporary transmission line would not substantially increase people's
 35 exposure to EMFs. Design and implementation of new temporary or permanent transmission lines
 36 not within the right-of-way of existing transmission lines would follow CPUC's EMF Design
 37 Guidelines for Electrical Facilities and would implement shielding, cancelation, or distance measures
 38 to reduce EMF exposure. Because construction and operation of Alternative 5 would not expose
 39 substantially more people to transmission lines that generate new sources of EMFs, impacts would
 40 be less than significant, and no mitigation is required.

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

43 **NEPA Effects:** The location of habitat restoration and enhancement that would occur under
 44 Alternative 5 would be similar to that of Alternative 1A; however, in addition to fisheries
 45 enhancement (CM2), only approximately 25,000 acres of tidal habitat restoration would occur

1 under Alternative 5 rather than the approximate 65,000 acres under Alternative 1A. Because fewer
 2 acres would be restored, effects would be less than those described under Alternative 1A.
 3 Implementation of environmental commitments, such as coordination with MVCDs and
 4 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 5 Appendix 3B) would also reduce the potential for an increase in mosquito breeding habitat, and a
 6 substantial increase in vector-borne diseases is unlikely to result. Furthermore, habitat would be
 7 restored in areas where potentially suitable habitat for mosquitoes already exists. Finally, mosquito
 8 predators (e.g., bats, spiders) would likely increase as a result of restoration and enhancement,
 9 which would keep mosquito populations in check. Therefore, effects would be similar to those under
 10 Alternative 1A and there would not be a substantial increase in the public's risk of exposure to
 11 vector-borne diseases with implementation of CM2-CM7, CM10 and CM11. Accordingly, there would
 12 be no adverse effect.

13 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 14 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described for Alternative
 15 1A, Alternative 5 would require environmental commitments such as coordination with MVCDs and
 16 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 17 Appendix 3B) that would help control mosquitoes and reduce the potential for an increase in
 18 mosquito breeding habitat. Furthermore, habitat would be restored where existing potentially
 19 suitable vector habitat already exists and habitat restoration and enhancement would likely
 20 increase the number of mosquito predators. Therefore, as described under Alternative 1A,
 21 implementation of CM2-CM7, CM10 and CM11 under Alternative 5 would not substantially increase
 22 the public's risk of exposure to vector-borne diseases beyond what currently exists. Accordingly,
 23 this impact would be less than significant and no mitigation is required.

24 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of** 25 **Implementing the Restoration Conservation Measures**

26 **NEPA Effects:** The location of habitat restoration and enhancement that would occur under
 27 Alternative 5 would be similar to that of Alternative 1A; however, only approximately 25,000 acres
 28 of tidal habitat restoration would occur under Alternative 5 rather than the approximate 65,000
 29 acres under Alternative 1A. Because fewer acres would be restored, effects would be less than those
 30 described under Alternative 1A. Implementation of the restoration conservation measures would
 31 support habitat types, such as wetlands and agricultural areas, that produce pathogens as a result of
 32 the biological productivity in these areas (e.g., migrating birds, application of fertilizers, waste
 33 products of animals). As exemplified by the Pathogen Conceptual Model, any potential increase in
 34 pathogens associated with the habitat restoration would be localized and within the vicinity of the
 35 actual restoration. This would be similar for lands protected for agricultural uses. Depending on the
 36 level of recreational access granted by management plans, habitat restoration could increase or
 37 decrease opportunities for recreationists within the Delta region. However, as discussed above for
 38 Alternative 1A, recreationists would not experience a substantial increase of exposure to pathogens
 39 as a result of the restoration, and no adverse effect would result

40 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 5
 41 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 42 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 43 waste products of animals). However, only approximately 25,000 acres of tidal habitat would be
 44 restored under Alternative 5, compared with the approximate 65,000 acres under Alternative 1A. In
 45 addition, the localized nature of pathogen generation and the quick die-off of pathogens once

1 released into water bodies would generally prevent substantial pathogen exposure to recreationists.
2 Accordingly, impacts would be less than significant and no mitigation is required.

3 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate** 4 **as a Result of Implementing CM2, CM4, CM5, and CM10**

5 **NEPA Effects:** The amount of habitat restoration would be less in Alternative 5 than described for
6 Alternative 1A. The primary concern with habitat restoration regarding constituents known to
7 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
8 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the pesticide-
9 bearing sediments would not be transported very far from the source area, and would settle out
10 with suspended particulates and be deposited close to the ROA. Further, CM2–CM22 do not include
11 the use of pesticides known to be bioaccumulative in animals or humans.

12 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
13 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
14 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
15 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
16 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
17 bioaccumulation of methylmercury in the study area’s aquatic systems (i.e., fish and water) during
18 the near-term, measures implemented under CM12 *Methylmercury Management* and existing
19 OEHHA standards would serve to reduce the public’s exposure to contaminated fish. Therefore,
20 implementation of CM2, CM4, CM5, and CM10 under Alternative 5 is not expected to result in an
21 adverse effect on public health with respect to pesticides or methylmercury.

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

34 **25.3.3.11 Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and** 35 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

36 Alternative 6A would eliminate the use of south Delta intakes, which would result in an increase in
37 San Joaquin River water flowing into the Delta. There would be the same number of north Delta
38 intakes (five) and they would pump the same amount of water as described under Alternative 1A
39 (up to 15,000 cfs). Because of changes in the relative amounts of San Joaquin River and Sacramento
40 River water entering the Delta, this alternative may result in changes to the water quality in the
41 Delta. The conservation measures under Alternative 6A would be the same as those described under
42 1A.

1 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 2 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water**
 3 **Conveyance Facilities**

4 **NEPA Effects:** As described for Alternative 1A, Alternative 6A would involve similar construction
 5 and operation of up to 15 solids lagoons, five sedimentation basins, and a 350-acre inundation area
 6 adjacent to the intermediate forebay. Sedimentation basins, solids lagoons, and the inundation area
 7 have the potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of
 8 the large volumes of water that would be held within these areas. However, DWR would consult and
 9 coordinate with San Joaquin County and Sacramento-Yolo County MVCDs and prepare and
 10 implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes. See
 11 Impact PH-1 under Alternative 1A. Implementation of these BMPs would reduce the likelihood that
 12 BDCP operations would require an increase in abatement activities by the local MVCDs. During
 13 operation, the depth, design, and operation of the sedimentation basins and solids lagoons would
 14 prevent the development of suitable mosquito habitat (Figure 25-1). Specifically, the basins would
 15 be too deep and the constant movement of water would prevent mosquitoes from breeding and
 16 multiplying. Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids
 17 lagoons would be 165 feet long by 86 feet wide by 10 feet deep. Furthermore, use of the inundation
 18 area would be limited to forebay emergency overflow situations and water would be physically
 19 pumped back to the intermediate forebay, creating circulation such that the inundation area would
 20 have a low potential for creating suitable vector habitat. Therefore, as described for Alternative 1A,
 21 construction and operation of the intakes, solids lagoons, and/or sedimentation basins under
 22 Alternative 6A would not substantially increase suitable vector habitat, and would not substantially
 23 increase in vector-borne diseases. Accordingly, no adverse effects would result.

24 **CEQA Conclusion:** As described for Alternative 1A, implementation of CM1 under Alternative 6A
 25 would involve construction and operation of solids lagoons, sedimentation basins, and a 350-acre
 26 inundation area adjacent to the intermediate forebay, which have the potential to provide habitat
 27 for vectors that transmit diseases (e.g., mosquitoes). However, DWR would consult and coordinate
 28 with San Joaquin County and Sacramento-Yolo County MVCDs and prepare and implement MMPs.
 29 BMPs to be implemented as part of the MMPs would help control mosquitoes. See Impact PH-1
 30 under Alternative 1A. During operations, water depth and circulation would prevent the areas from
 31 substantially increasing suitable vector habitat. Therefore, construction and operation of the water
 32 conveyance facilities in Alternative 6A would not result in a substantial increase in vector-borne
 33 diseases and the impact on public health would be less than significant. No mitigation is required.

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

37 **NEPA Effects:**

38 **Disinfection Byproducts**

39 Modeled long-term average DOC concentrations and, by extension, DBPs, would decrease at Banks
 40 and Jones pumping plants, as described in Chapter 8, *Water Quality* (Section 8.3.3.11) relative to the
 41 No Action Alternative. Such long-term average DOC concentrations would include fewer
 42 exceedances of concentration thresholds. This modeled improvement would correspond to
 43 substantial improvement in SWP/CVP Export Service Areas water quality with respect to DOC.

1 However, as discussed in Chapter 8, long-term average concentrations of DOC and, by extension,
2 DBPs, are estimated to substantially increase at Franks Tract, Rock Slough and Contra Costa
3 Pumping Plant Number 1 ($\leq 41\%$ net increase) relative to the No Action Alternative. DOC water
4 quality exceedance would conflict with the Basin Plan, as it exceeds the Basin Plan's requirements.
5 These increases could potentially trigger substantial changes in drinking water treatment plant
6 design or operations. In particular, assessment locations at Rock Slough and Contra Costa Pumping
7 Plant Number 1 represent municipal intakes servicing existing drinking water treatment plants.
8 Under Alternative 6A, drinking water treatment plants obtaining water from these interior Delta
9 locations would likely need to upgrade existing treatment systems in order to achieve EPA Stage 1
10 Disinfectants and Disinfection Byproduct Rule action thresholds.

11 Relative to the No Action Alternative, Alternative 6A would result in increases in long-term average
12 bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at Barker
13 Slough. Increases would be greatest at Staten Island (45%; 41% during the drought period) and at
14 Barker Slough (22%; 72% during the drought period). The long-term average increase predicted for
15 Barker Slough could necessitate changes in water treatment plant operations or require treatment
16 plant upgrades in order to maintain DBP compliance.

17 While treatment technologies sufficient to achieve the necessary DOC and 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 for these predicted increases in
20 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
21 DOC and bromide concentrations in drinking water sources would represent an increased risk for
22 adverse effects on public health from DBPs. Mitigation Measure WQ-17 is available to partially
23 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
24 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
25 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
26 effects of increased bromide in drinking water sources at Barker Slough (implementation of this
27 measure along with a separate, non-environmental commitment as set forth in EIR/EIS Appendix
28 3B, *Environmental Commitments*, relating to the potential increased treatment costs associated with
29 bromide-related changes would reduce these effects). Further, as described for Impact PH-2 under
30 Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at Barker Slough may
31 be further minimized by implementation of the AIP. However, the overall effect on public health
32 related to potential increases in DBPs (resulting from DOC and bromide increases) at the
33 aforementioned Delta locations would still be considered adverse unless affected water treatment
34 plants are upgraded or undergo operational changes in order to achieve drinking water compliance
35 standards.

36 **Trace Metals**

37 Alternative 6A would not result in substantial increases in trace metal concentrations in the Delta
38 relative to the No Action Alternative. Changes in source water fraction would occur in the south
39 Delta (see Appendix 8D, *Source Water Fingerprinting*). Throughout much of the south Delta, San
40 Joaquin River water would replace Sacramento River water, with the future trace metals profile
41 largely reflecting that of the San Joaquin River. However, trace metal concentration profiles between
42 the San Joaquin and Sacramento Rivers are very similar and currently meet Basin Plan objectives
43 and CTR criteria. While the change in trace metal concentrations in the south Delta would likely be
44 measurable, Alternative 6A would not be expected to substantially increase the frequency with
45 which applicable Basin Plan objectives or CTR criteria would be exceeded in the Delta or

1 substantially degrade the quality of Delta waters with regard to trace metals. Therefore, trace metal
2 concentrations are not expected to increase above conditions under the No Action Alternative and
3 would not result in adverse impacts on public health.

4 **Pesticides**

5 The change in source water (e.g., more San Joaquin River water) associated with Alternative 6A
6 would be of sufficient magnitude to increase the existing pesticide concentrations in the Delta,
7 resulting in an increased risk of toxicity to aquatic life in certain areas (Buckley Cove, Franks Tract,
8 Rock Slough, the San Joaquin River at Antioch, and Contra Costa Pumping Plant Number 1) during
9 certain times of the year relative to the No Action Alternative. A conclusion regarding the risk to
10 human health at these locations, based on the predicted adverse effects from pesticides on aquatic
11 life, cannot be made. The prediction of adverse effects of pesticides fundamentally assumes that the
12 present pattern of pesticide incidence in surface water would continue at similar levels into the
13 future. In reality, the use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the
14 basis for concluding a substantially increased San Joaquin River source water fraction, is on the
15 decline with their replacement by pyrethroids on the rise. Furthermore, drinking water from the
16 study area would continue to be treated prior to distribution into the drinking water system, and
17 water treatment plants are required to meet drinking water requirements set forth in the California
18 Safe Drinking Water Act and the regulations adopted by CDPH. Therefore, it is not anticipated that
19 there would be adverse effects on public health from pesticides in drinking water sources.

20 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
21 operation of the water conveyance facilities under Alternative 6A would be of sufficient magnitude
22 to increase the existing pesticide concentrations in the Delta relative to Existing Conditions,
23 according to water quality modeling results. This increase could result in an increased risk of
24 toxicity to aquatic life at some locations in the study area (Buckley Cove, Franks Tract, Rock Slough,
25 the San Joaquin River at Antioch, and Contra Costa Pumping Plant Number 1) during certain times of
26 the year relative to Existing Conditions. A conclusion regarding the risk to human health at these
27 locations, based on the predicted adverse effects from pesticides on aquatic life, cannot be made.
28 However, the prediction of adverse effects of pesticides relative to Existing Conditions
29 fundamentally assumes that the present pattern of pesticide incidence in surface water would
30 continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon pesticides,
31 the two pesticides that serve as the basis for concluding a substantially increased San Joaquin River
32 source water fraction, is on the decline with their replacement by pyrethroids on the rise.
33 Furthermore, drinking water from the study area would continue to be treated prior to distribution
34 into the drinking water system, and water treatment plants are required to meet drinking water
35 requirements set forth in the California Safe Drinking Water Act and the regulations adopted by
36 CDPH. Thus, these potential increases in pesticide concentrations would not significantly impact
37 public health. The change in source water would not alter trace metal concentrations in the study
38 area to the degree that there would be an a beneficial use impairment. Finally, under Alternative 6A,
39 modeled long-term average bromide concentrations would increase at Staten Island (41%; 37%
40 during the drought period) and Barker Slough (19%; 73% during the drought period) relative to
41 Existing Conditions. Modeled long-term average DOC concentrations at Franks Tract, Rock Slough
42 and Contra Costa Pumping Plant Number 1 would increase $\leq 46\%$. The increases in bromide and
43 DOC concentrations at these locations may be substantial enough to necessitate water treatment
44 plant upgrades or changes in plant operations in order to maintain DBP compliance. Should
45 treatment plant upgrades not be undertaken for the affected Delta locations, a change of such

1 magnitude in long-term average DOC and bromide concentrations in drinking water sources would
 2 represent an increased risk for effects on public health from DBPs, which would be a significant
 3 impact.

4 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
 5 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
 6 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
 7 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
 8 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
 9 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
 10 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
 11 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
 12 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
 13 less-than-significant level.

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

34 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 35 **Conditions**

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

37 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 38 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

39 To reduce the effect of CM1 operations on increased DOC concentrations specifically predicted
 40 to occur at municipal water purveyors obtaining raw source water through south Delta intakes
 41 at Rock Slough and those associated with Contra Costa Pumping Plant Number 1, the BDCP
 42 proponents shall consult with the purveyors (i.e., Contra Costa water district and entities to
 43 which they supply raw water) to identify the means to either avoid, minimize, or offset increases

1 in long-term average DOC concentrations that affect the beneficial use of the water. The BDCP
 2 proponents shall consult with these entities to determine existing DBP concentrations (as
 3 system-wide running averages), and then implement any combination of measures sufficient to
 4 maintaining these concentrations at existing levels in treated drinking water of affected water
 5 purveyors. Such actions may include, but not be limited to: 1) upgrading and maintaining
 6 adequate drinking water treatment systems, 2) developing or obtaining replacement surface
 7 water supplies from other water rights holders, 3) developing replacement groundwater
 8 supplies, or 4) physically routing a portion of the water diverted from the Sacramento River
 9 through the associated new conveyance pipelines/tunnel to affected purveyors.

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

12 **NEPA Effects:** As described for Alternative 1A, intermittent and/or short-term construction-related
 13 activities (as would occur for in-river construction) would not be anticipated to result in
 14 contaminant discharges (i.e., bioaccumulative organochlorine pesticides and methylmercury) of
 15 sufficient magnitude or duration to contribute to long-term bioaccumulation processes, or cause
 16 measureable long-term water quality degradation. Legacy organochlorine pesticides typically bond
 17 to particulates, and do not mobilize easily. Construction and maintenance of Alternative 6A would
 18 not cause legacy organochlorine pesticides to be transported far from the source or to partition into
 19 the water column. Water supply operations under any BDCP action alternative would not be
 20 expected to change total suspended solids or turbidity levels (highs, lows, typical conditions) to any
 21 substantial degree. Changes in the magnitude, frequency, and geographic distribution of legacy
 22 pesticides in water bodies of the affected environment that would result in new or more severe
 23 adverse effects on beneficial uses, relative to the No Action Alternative, would not be expected to
 24 occur.

25 Water quality modeling results indicate small, insignificant changes in total mercury and
 26 methylmercury levels in water resulting from Alternative 6A water operations (Chapter 8, *Water*
 27 *Quality*, Section 8.3.3.11). Modeling results indicate that the percentage change in assimilative
 28 capacity of waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark for this
 29 alternative showed the greatest decrease (9.1%) at the Contra Costa Pumping Plant relative to the
 30 No Action Alternative. These changes are not expected to result in adverse effects on beneficial uses.
 31 Similarly, changes in methylmercury concentration are expected to be relatively small.

32 Fish tissue estimates showed substantial increases in concentration and exceedance quotients at
 33 some Delta locations modeled. The greatest increase in exceedance quotients (ranging from 33 to
 34 74%) are expected for Franks Tract and Old River at Rock Slough relative to the No Action
 35 Alternative. These changes in fish tissue mercury concentrations would make existing mercury-
 36 related impairments in the Delta measurably worse. Relative to the No Action Alternative, body
 37 burdens of mercury in fish would be measurably higher, and could thereby substantially increase
 38 the health risks to people consuming those fish. Accordingly, the potential for Alternative 6A to
 39 create a public health effect from bioaccumulation of mercury would exist and this is considered an
 40 adverse effect.

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

1 disturbance during construction and maintenance. Additionally, OEHHA standards would continue
2 to be implemented for the consumption of study area fish and to protect people against the
3 overconsumption of fish with increased body burdens of mercury.

4 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative
5 6A would not cause legacy organochlorine pesticides to be transported far from the source or to
6 partition into the water column based on the chemical properties of the pesticides. Therefore,
7 construction and maintenance of Alternative 6A water conveyance facilities would not cause
8 increased exposure of the public to these pesticides. As environmental commitments, DWR would
9 develop and implement Erosion and Sediment Control Plans and SWPPPs (Appendix 3B,
10 *Environmental Commitments*). BMPs implemented under the Erosion and Sediment Control Plans
11 and the SWPPPs would help reduce turbidity and keep sediment that may contain legacy
12 organochlorine pesticides and methylmercury within the area of disturbance.

13 Based on water quality modeling results, changes in water concentrations of mercury and
14 methylmercury would occur at some locations relative to Existing Conditions as a result of
15 operations under Alternative 6A. Specifically, the analysis of percentage change in assimilative
16 capacity of waterborne total mercury of Alternative 6A relative to the 25 ng/L ecological risk
17 benchmark as compared to Existing Conditions showed the greatest decrease to be 9.2% at the
18 Contra Costa Pumping Plant. This change would not alter beneficial uses of waters in the study area.
19 However, relative to Existing Conditions, modeling results indicate that body burdens of mercury in
20 fish would be measurably higher at Franks Tract and Old River at Rock Slough; the increases in
21 exceedance quotients are expected to range from 33% to 64% at these location. These increases in
22 the body burdens of mercury, could increase the health risks to people consuming those fish.
23 Accordingly, the potential for Alternative 6A to create a public health effect from bioaccumulation of
24 mercury would exist and this is considered a significant and unavoidable impact. The estimated
25 increases of mercury body burdens in fish are based on the changes expected from the modeled
26 blending of source waters that define CM1 for Alternative 6A, and are therefore inherent to the
27 alternative. OEHHA standards would continue to be implemented for the consumption of study area
28 fish and to protect people against the overconsumption of fish with increased body burdens of
29 mercury.

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. A total of 24.71 miles of new temporary 69 kV transmission lines; 8.94 miles of new permanent
35 69 kV transmission lines; and 42.68 miles of new permanent 230 kV transmission lines would be
36 required for this alternative. The temporary and permanent transmission lines needed for
37 Alternative 6A (Table 25-8) would be very similar in location and length to those for Alternative 1A
38 because 6A would involve the construction and operation of five intakes and a pipeline/tunnel
39 conveyance as described for Alternative 1A. As with Alternative 1A, any new temporary and
40 permanent transmission lines needed for Alternative 6A would, for the most part, be located in
41 rights-of-way of existing transmission lines or areas that are not densely populated (Figure 25-2).

42 However, as indicated in Table 25-8, Stone Lakes National Wildlife Refuge would be within 300 feet
43 of a proposed temporary 69 kV transmission line. Visitors to this area generally come for walks,
44 water recreation, and hunting, and as such, it is unlikely that large groups of people would be

1 staying in the area within 300 feet of this proposed transmission line, so any EMF exposure would
 2 be limited. Further, this line would be removed construction of the water conveyance facility
 3 features near this area is completed, so there would be no potential permanent effects. Therefore,
 4 this temporary transmission line would not substantially increase people's exposure to EMFs.

5 While the current scientific evidence does not show conclusively that EMF exposure can increase
 6 health risks, the location and design of the new transmission lines would be conducted in
 7 accordance with CPUC's EMF Design Guidelines for Electrical Facilities, as described for Alternative
 8 1A. Therefore, operation of the transmission line corridors would not expose substantially more
 9 people to transmission lines generating EMFs. Because the lines would be located in sparsely
 10 populated areas and would be within 300 feet of only one potential new sensitive receptors, the
 11 proposed temporary and permanent transmission lines would not substantially increase people's
 12 exposure to EMFs, and there would be no adverse effect on public health.

13 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
 14 transmission lines would be located within the right-of-way of existing transmission lines and any
 15 new temporary or permanent transmission lines not within the right-of-way of existing
 16 transmission lines would, for the most part, be located in sparsely populated areas generally away
 17 from existing sensitive receptors. However, one sensitive receptor, Stone Lakes National Wildlife
 18 Refuge, would be within 300 feet of a proposed temporary 69 kV temporary transmission line.
 19 Because visitors to this area generally come for walks, water recreation, and hunting, it is unlikely
 20 that large groups of people would be staying in the area within 300 feet of this proposed
 21 transmission line, so any EMF exposure would be limited. Further, this line would be removed
 22 construction of the water conveyance facility features near this area is completed, so there would be
 23 no potential permanent effects. Therefore, this temporary transmission line would not substantially
 24 increase people's exposure to EMFs. While the current scientific evidence does not show
 25 conclusively that EMF exposure can increase health risks, design and implementation of new
 26 temporary or permanent transmission lines not within the right-of-way of existing transmission
 27 lines would follow CPUC's EMF Design Guidelines for Electrical Facilities and would implement
 28 shielding, cancelation, or distance measures to reduce EMF exposure. Since construction and
 29 operation of Alternative 6A would not expose substantially more people to transmission lines that
 30 generate new sources of EMFs, impacts on public health would be less than significant, and no
 31 mitigation is required.

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

34 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 35 under Alternative 6A would be the same as that described for Alternative 1A. Although there would
 36 be an increase in restored and enhanced aquatic habitat in the study area as a result of
 37 implementing Alternative 6A, implementation of environmental commitments such as coordination
 38 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
 39 Alternative 1A and in Appendix 3B), would reduce the potential for an increase in mosquito
 40 breeding habitat, and a substantial increase in vector-borne diseases is unlikely to result.
 41 Furthermore, habitat would be restored in areas where potentially suitable habitat for mosquitoes
 42 already exists. Finally, mosquito predators (e.g., bats, spiders) would likely increase as a result of
 43 restoration and enhancement, which would keep mosquito populations in check. Therefore, effects
 44 on public health would be the same under Alternative 6A as under Alternative 1A and there would

1 not be a substantial increase in the public's risk of exposure to vector-borne diseases with
 2 implementation of CM2-CM7, CM10 and CM11. Accordingly, there would be no adverse effect.

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

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

16 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 17 under Alternative 6A would be the same as that described for Alternative 1A. Implementation of the
 18 restoration conservation measures would support habitat types, such as wetlands and agricultural
 19 areas, that produce pathogens as a result of the biological productivity in these areas (e.g., migrating
 20 birds, application of fertilizers, waste products of animals). As exemplified by the Pathogen
 21 Conceptual Model, any potential increase in pathogens associated with the proposed habitat
 22 restoration would be localized and within the vicinity of the actual restoration. This would be
 23 similar for lands protected for agricultural uses. Depending on the level of recreational access
 24 granted by management plans, habitat restoration could increase or decrease opportunities for
 25 recreationists within the Delta region. However, effects associated with pathogens
 26 would be the same under Alternative 6A as under Alternative 1A. Recreationists would not
 27 experience a substantial increase in exposure to pathogens as a result of the restoration and no
 28 adverse effect would result.

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

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

38 **NEPA Effects:** The amount of habitat restoration under Alternative 6A would be the same as for
 39 Alternative 1A. The primary concern with habitat restoration regarding constituents known to
 40 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 41 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the legacy
 42 organochlorine pesticide-bearing sediments would not be transported very far from the source area

1 and would settle out with suspended particulates and be deposited close to the ROA. Further, CM2–
2 CM22 do not include the use of pesticides known to be bioaccumulative in animals or humans.

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

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

25 **25.3.3.12 Alternative 6B—Isolated Conveyance with East Alignment and** 26 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

27 The operation of water supply facilities under Alternative 6B would generally be the same as the
28 operation described above for 6A. The primary difference between the two alternatives is that water
29 conveyance under Alternative 6B would be in a lined or unlined canal, instead of a pipeline/tunnel,
30 and there would be no intermediate forebay or emergency inundation area. The conservation
31 measures under Alternative 6B would be the same as those described under Alternative 1A.

32 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 33 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water** 34 **Conveyance Facilities**

35 **NEPA Effects:** As described for Alternative 1A, Alternative 6B would involve construction and
36 operation of five north Delta intakes, up to 15 solids lagoons, and five sedimentation basins.
37 Sedimentation basins and solids lagoons have the potential to provide habitat for vectors that
38 transmit diseases (e.g., mosquitoes) because of the large volumes of water that would be held within
39 these areas. However, DWR would consult and coordinate with San Joaquin County and Sacramento-
40 Yolo County MVCDs and prepare and implement MMPs. BMPs to be implemented as part of the
41 MMPs would help control mosquitoes. See Impact PH-1 under Alternative 1A. Implementation of
42 these BMPs would reduce the likelihood that BDCP operations would require an increase in
43 abatement activities by the local MVCDs. During operation, the depth, design, and operation of the

1 sedimentation basins and solids lagoons would prevent the development of suitable mosquito
 2 habitat (Figure 25-1). Specifically, the basins would be too deep and the constant movement of
 3 water would prevent mosquitoes from breeding and multiplying. Sedimentation basins would be
 4 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons would be 165 feet long by 86 feet
 5 wide by 10 feet deep. Therefore, as described for Alternative 1A, construction and operation of the
 6 intakes, solids lagoons, and/or sedimentation basins under Alternative 6B would not substantially
 7 increase suitable vector habitat, and would not substantially increase vector-borne diseases.
 8 Accordingly, no adverse effects would result.

9 **CEQA Conclusion:** As described for Alternative 1A, implementation of CM1 under Alternative 6B
 10 would involve construction and operation of solids lagoons, and sedimentation basins. These areas
 11 could provide suitable habitat for vectors (e.g., mosquitoes). However, DWR would consult and
 12 coordinate with San Joaquin County and Sacramento-Yolo County MVEDs and prepare and
 13 implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes. See
 14 Impact PH-1 under Alternative 1A. During operations, water depth and circulation would prevent
 15 the areas from substantially increasing suitable vector habitat. Therefore, construction and
 16 operation of the water conveyance facilities in Alternative 6B would not result in a substantial
 17 increase in vector-borne diseases and the impact on public health would be less than significant. No
 18 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 The description of water quality and public health effects related to DBPs, pesticides and trace
 23 metals for Alternative 6A also appropriately characterizes effects under this alternative.

24 **NEPA Effects:**

25 **Disinfection Byproducts**

26 Modeled long-term average DOC concentrations and, by extension, DBPs would decrease at Banks
 27 and Jones pumping plants; however, long-term average concentrations of DOC are estimated to
 28 substantially increase at Franks Tract, Rock Slough and Contra Costa Pumping Plant Number 1
 29 relative to the No Action Alternative, as under Alternative 6A. Exceedances of water quality
 30 objectives would conflict with the Basin Plan because it would exceed Basin Plan requirements.
 31 These increases could potentially trigger substantial changes in drinking water treatment plant
 32 design or operations. In particular, assessment locations at Rock Slough and Contra Costa Pumping
 33 Plant Number 1 represent municipal intakes servicing existing drinking water treatment plants.
 34 Drinking water treatment plants obtaining water from these interior Delta locations would likely
 35 need to upgrade existing treatment systems in order to achieve EPA Stage 1 Disinfectants and
 36 Disinfection Byproduct Rule action thresholds.

37 Relative to the No Action Alternative, Alternative 6B would result in increases in long-term average
 38 bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at Barker
 39 Slough. Increases would be greatest at Staten Island and at Barker Slough, as indicated under
 40 Alternative 6A. The long-term average increase predicted for Barker Slough could necessitate
 41 changes in water treatment plant operations or require treatment plant upgrades in order to
 42 maintain DBP compliance.

1 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
2 implementation of such technologies would likely require substantial investment in new or modified
3 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
4 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
5 DOC and bromide concentrations in drinking water sources would represent an increased risk for
6 adverse effects on public health from DBPs. While Mitigation Measure WQ-17 is available to partially
7 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
8 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
9 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
10 effects of increased bromide in drinking water sources at Barker Slough (implementation of this
11 measure along with a separate, non-environmental commitment as set forth in EIR/EIS Appendix
12 3B, *Environmental Commitments*, relating to the potential increased treatment costs associated with
13 bromide-related changes would reduce these effects). Further, as described for Impact PH-2 under
14 Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at Barker Slough may
15 be further minimized by implementation of the AIP. However, the overall effect on public health
16 related to potential increases in DBPs (resulting from DOC and bromide increases) at the
17 aforementioned Delta locations would still be considered adverse.

18 **Trace Metals**

19 Alternative 6B has the same diversion and conveyance operations as Alternative 6A. Because there
20 would be no difference in operations, there would be no differences between these two alternatives
21 in source fractions to various Delta locations, and hydrodynamics in the Delta. Therefore, trace
22 metal concentrations are not expected to increase above conditions under the No Action Alternative
23 and would not result in adverse impacts.

24 **Pesticides**

25 The change in source water (e.g., more San Joaquin River water) associated with Alternative 6B
26 would be of sufficient magnitude to increase the existing pesticide concentrations in the Delta,
27 resulting in an increased risk of toxicity to aquatic life at Buckley Cove, Franks Tract, Rock Slough,
28 the San Joaquin River at Antioch, and Contra Costa Pumping Plant Number 1 during certain times of
29 the year relative to the No Action Alternative. A conclusion regarding the risk to human health at
30 these locations, based on the predicted adverse effects from pesticides on aquatic life cannot be
31 made. The prediction of adverse effects of pesticides fundamentally assumes that the present
32 pattern of pesticide incidence in surface water would continue at similar levels into the future. In
33 reality, the use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for
34 concluding a substantially increased San Joaquin River source water fraction, is on the decline with
35 their replacement by pyrethroids on the rise. Furthermore, drinking water from the study area
36 would continue to be treated prior to distribution into the drinking water system, and water
37 treatment plants are required to meet drinking water requirements set forth in the California Safe
38 Drinking Water Act and the regulations adopted by CDPH. Therefore, it is not anticipated that there
39 would be adverse effects on public health from pesticides in drinking water sources.

40 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
41 operation of the water conveyance facilities under Alternative 6B would be of sufficient magnitude
42 to increase the existing pesticide concentrations in the Delta, according to water quality modeling
43 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
44 the study area (Buckley Cove, Franks Tract, Rock Slough, the San Joaquin River at Antioch, and

1 Contra Costa Pumping Plant Number 1) during certain times of the year relative to Existing
2 Conditions. A conclusion regarding the risk to human health at these locations, based on the
3 predicted adverse effects from pesticides on aquatic life, cannot be made. However, the prediction of
4 adverse effects of pesticides relative to Existing Conditions fundamentally assumes that the present
5 pattern of pesticide incidence in surface water would continue at similar levels into the future. In
6 reality, the use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for
7 concluding a substantially increased San Joaquin River source water fraction, is on the decline with
8 their replacement by pyrethroids on the rise. Furthermore, drinking water from the study area
9 would continue to be treated prior to distribution into the drinking water system, and water
10 treatment plants are required to meet drinking water requirements set forth in the California Safe
11 Drinking Water Act and the regulations adopted by CDPH. Thus, these potential increases in
12 pesticide concentrations would not significantly impact public health. The change in source water
13 would not alter trace metal concentrations in the study area to the degree that there would be an a
14 beneficial use impairment. Finally, under Alternative 6B, modeled increases in bromide
15 concentrations at Barker Slough, and in DOC concentrations at Franks Tract, Rock Slough, and
16 Contra Costa Pumping Plant Number 1 (described under Alternative 6A), may be substantial enough
17 to necessitate water treatment plant upgrades or changes in plant operations in order to maintain
18 DBP compliance. Should treatment plant upgrades not be undertaken for the affected Delta
19 locations, a change of such magnitude in long-term average DOC and bromide concentrations in
20 drinking water sources would represent an increased risk for effects on public health from DBPs,
21 which would be a significant impact.

22 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
23 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
24 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
25 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
26 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
27 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
28 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
29 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
30 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
31 less-than-significant level.

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

1 significant impact in the form of increased DBP in drinking water sources could occur. Accordingly,
 2 this impact would be significant and unavoidable. If, however, all financial contributions, technical
 3 contributions, or partnerships required to avoid significant impacts prove to be feasible and any
 4 necessary agreements are completed before the project's contribution to the effect is made, impacts
 5 would be less than significant.

6 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 7 **Conditions**

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

9 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 10 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

11 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

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:** As described for Alternative 1A, intermittent and/or short-term construction-related
 15 activities (as would occur for in-river construction) would not be anticipated to result in
 16 contaminant discharges of sufficient magnitude or duration to contribute to long-term
 17 bioaccumulation processes, or cause measureable long-term degradation. Legacy organochlorine
 18 pesticides typically bond to particulates, and do not mobilize easily. Construction and maintenance
 19 of Alternative 6B would not cause legacy organochlorine pesticides to be transported far from the
 20 source or to partition into the water column. Additionally, water supply operations under any BDCP
 21 action alternative would not be expected to change total suspended solids or turbidity levels (high,
 22 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 Water quality modeling results indicate small, insignificant changes in total mercury and
 27 methylmercury levels in water resulting from Alternative 6B water operations (Chapter 8, *Water*
 28 *Quality*, Section 8.3.3.11), as described under Impact PH-3 for Alternative 6A. These changes are not
 29 expected to result in adverse effects on beneficial uses. Similarly, changes in methylmercury
 30 concentration are expected to be relatively small.

31 Fish tissue mercury concentrations showed substantial increases in some Delta locations modeled,
 32 as described under Impact PH-3 for Alternative 6A. These changes in fish tissue mercury
 33 concentrations would make existing mercury-related impairments in the Delta measurably worse.
 34 Relative to the No Action Alternative, body burdens of mercury in fish would be measurably higher,
 35 and could thereby substantially increase the health risks to people consuming those fish.
 36 Accordingly, the potential for Alternative 6B to create a public health effect from bioaccumulation of
 37 mercury would exist and this is considered an adverse effect.

38 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
 39 Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under the
 40 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
 41 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of

1 disturbance during construction and maintenance. Additionally, OEHHA standards would continue
2 to be implemented for the consumption of study area fish and to protect people against the
3 overconsumption of fish with increased body burdens of mercury.

4 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative
5 6B would not cause legacy organochlorine pesticides to be transported far from the source or to
6 partition into the water column based on the chemical properties of the pesticides. Therefore,
7 construction and maintenance of Alternative 6B water conveyance facilities would not cause
8 increased exposure of the public to these pesticides as a result of construction and maintenance. As
9 environmental commitments, DWR would develop and implement Erosion and Sediment Control
10 Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under the
11 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
12 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of
13 disturbance.

14 Based on water quality modeling results, changes in water concentrations of mercury and
15 methylmercury would occur at some locations relative to Existing Conditions as a result of
16 operations under Alternative 6B but would not alter beneficial uses of waters in the study area.
17 However, relative to Existing Conditions, modeling results indicate that body burdens of mercury in
18 fish would be measurably higher at certain locations in the Delta, which could increase the health
19 risks to people consuming those fish. Accordingly, the potential for Alternative 6B to create a public
20 health effect from bioaccumulation of mercury would exist and this is considered a significant and
21 unavoidable impact. The estimated increases of mercury body burdens in fish are based on the
22 changes expected from the modeled blending of source waters that define CM1 for Alternative 6B,
23 and are therefore inherent to the Alternative. OEHHA standards would continue to be implemented
24 for the consumption of study area fish and to protect people against the overconsumption of fish
25 with increased body burdens of mercury.

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

29 **NEPA Effects:** As described in Table 25-8, a total of 13.49 miles of new temporary 69 kV
30 transmission lines; 36.79 miles of new permanent 69 kV transmission lines; and 16.35 miles of new
31 permanent 230 kV transmission lines would be required for this alternative. The temporary and
32 permanent transmission lines needed for Alternative 6B would be very similar in location and
33 length to those for Alternative 1B because 6B would involve the construction and operation of five
34 intakes and the primary conveyance would be a canal along the east side of the Delta, carrying water
35 to an intermediate pumping plant located approximately 3 miles south of the point where the
36 alignment crosses the San Joaquin River, on Lower Roberts Island. As with Alternative 1B, any new
37 temporary and permanent transmission lines needed for Alternative 6B would be located in rights-
38 of-way of existing transmission lines or in areas that are not densely populated and therefore would
39 not expose substantially more people to transmission lines (Figure 25-2). Table 25-8 identifies only
40 one potential new sensitive receptor (Stone Lakes National Wildlife Refuge) that is not currently
41 within 300 feet of an existing transmission line; the majority of sensitive receptors are already
42 located within 300 feet of an existing 69 kV or 230 kV transmission line. Stone Lakes National
43 Wildlife Refuge would be within 300 feet of a proposed permanent 69 kV transmission line. Visitors
44 to this area general come for walks, water recreation, and hunting, and as such, it is unlikely that

1 large groups of people would be staying in the area within 300 feet of this proposed transmission
2 line, so any EMF exposure would be limited.

3 While the current scientific evidence does not show conclusively that EMF exposure increases
4 health risks, the location and design of the new transmission lines would be conducted in
5 accordance with CPUC's EMF Design Guidelines for Electrical Facilities, as described under Impact
6 PH-4 for Alternative 1A (and in Appendix 3B, *Environmental Commitments*). Measures implemented
7 under these guidelines would reduce EMF exposure from the proposed transmission lines.
8 Therefore, operation of the transmission line corridors would not expose substantially more people
9 to transmission lines generating EMFs. Because the lines would be located in sparsely populated
10 areas and would be within 300 feet of only two potential new sensitive receptors, the proposed
11 temporary and permanent transmission lines would not substantially increase people's exposure to
12 EMFs and there would be no adverse effect on public health.

13 **CEQA Conclusion:** Under Alternative 6B, the majority of temporary and permanent transmission
14 lines would be located within the right-of-way of existing transmission lines and any new temporary
15 or 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, one
17 sensitive receptor, Stone Lakes National Wildlife Refuge, would be within 300 feet of a proposed
18 permanent 69 kV transmission line. Because visitors to this area general 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. Design and
21 implementation of new temporary or permanent transmission lines not within the right-of-way of
22 existing transmission lines would follow CPUC's EMF Design Guidelines for Electrical Facilities and
23 would implement shielding, cancelation or distance measures to reduce EMF exposure. Because
24 construction and operation of Alternative 6B would not expose substantially more people to
25 transmission lines that generate new sources of EMFs, impacts on public health would be less than
26 significant, and no mitigation is required.

27 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 28 **and CM11**

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. Although there would
31 be an increase in restored and enhanced aquatic habitat in the study area as a result of
32 implementing Alternative 6B, implementation of environmental commitments such as coordination
33 with MVCDs and implementation of BMPs under MMPs (as described under Impact PH-1 for
34 Alternative 1A and in Appendix 3B) would reduce the potential for an increase in mosquito breeding
35 habitat. Thus, a substantial increase in vector-borne diseases is unlikely to result. Furthermore,
36 habitat would be restored in areas where potentially suitable habitat for mosquitoes already exists.
37 Finally, mosquito predators (e.g., bats, spiders) would likely increase as a result of restoration and
38 enhancement, which would keep mosquito populations in check. Therefore, effects would be the
39 same under Alternative 6B as under Alternative 1A, and there would not be a substantial increase in
40 the public's risk of exposure to vector-borne diseases with implementation of CM2-CM7, CM10 and
41 CM11. Accordingly, there would be no adverse effect.

42 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
43 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described for Alternative
44 1A, Alternative 6B would require environmental commitments such as coordination with MVCDs

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

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

11 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 12 under Alternative 6B would be the same as that described for Alternative 1A. Implementation of the
 13 restoration conservation measures would support habitat types, such as wetlands and agricultural
 14 areas, that produce pathogens as a result of the biological productivity in these areas (e.g., migrating
 15 birds, application of fertilizers, waste products of animals). As exemplified by the Pathogen
 16 Conceptual Model, any potential increase in pathogens associated with the proposed habitat
 17 restoration would be localized and within the vicinity of the actual restoration. This would be
 18 similar for lands protected for agricultural uses. Depending on the level of recreational access
 19 granted by management plans, habitat restoration could increase or decrease opportunities for
 20 recreationists within the Delta region. However, effects associated with pathogens would be the
 21 same under Alternative 6B as under Alternative 1A. Recreationists would not experience a
 22 substantial increase in exposure to pathogens as a result of the restoration and no adverse effect
 23 would result.

24 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 6B
 25 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 26 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 27 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 28 off of pathogens once released into water bodies would generally prevent a substantial increase in
 29 pathogen exposure by recreationists. Therefore, impacts would be less than significant and no
 30 mitigation is required.

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

33 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 6B as
 34 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
 35 known to bioaccumulate (i.e., legacy organochlorine pesticides and methylmercury) is the potential
 36 for mobilizing contaminants sequestered in sediments of the newly inundated floodplains and
 37 marshes, as described under Alternative 1A. It is likely that the pesticide-bearing sediments would
 38 not be transported very far from the source area and would settle out with suspended particulates
 39 and be deposited close to the ROA. Further, CM2–CM22 do not include the use of pesticides known
 40 to be bioaccumulative in animals or humans.

41 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 42 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 43 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 44 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would

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

7 Therefore, implementation of CM2, CM4, CM5, and CM10 under Alternative 6B would not result in
 8 the substantial mobilization or increase of constituents known to bioaccumulate and, as such, would
 9 not result in an adverse effect on public health with respect to pesticides or 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 6B 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 **25.3.3.13 Alternative 6C—Isolated Conveyance with West Alignment and** 23 **Intakes W1–W5 (15,000 cfs; Operational Scenario D)**

24 The operation of water supply facilities under Alternative 6C would generally be the same as the
 25 operation described above for 6A. The primary difference between the two alternatives is that under
 26 Alternative 6C, the five intakes would be located on the west bank of the Sacramento River between
 27 Clarksburg and Walnut Grove; and instead of a pipeline/tunnel, the water conveyance under
 28 Alternative 6C would be a lined or unlined canal on the western side of the Delta carrying water to
 29 an intermediate pumping plant, from where it would be pumped through a dual-bore tunnel to a
 30 continuing canal to the proposed Byron Tract Forebay immediately northwest of Clifton Court
 31 Forebay. The lined versus unlined canal is not expected to have an adverse effect on public health, as
 32 discussed below. The conservation measures under Alternative 6C would be the same as those
 33 described under Alternative 1A.

34 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 35 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water** 36 **Conveyance Facilities**

37 **NEPA Effects:** As described for Alternative 1A, Alternative 6C would involve construction and
 38 operation of five north Delta intakes, up to 15 solids lagoons, and five sedimentation basins.
 39 Sedimentation basins and solids lagoons have the potential provide habitat for vectors that transmit
 40 diseases (e.g., mosquitoes) because of the large volumes of water that would be held within these
 41 areas. However, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo
 42 County MVEDs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs
 43 would help control mosquitoes. See Impact PH-1 under Alternative 1A. During operation, the depth,

1 design, and operation of the sedimentation basins and solids lagoons would prevent the
 2 development of suitable mosquito habitat (Figure 25-1). Specifically, the basins would be too deep
 3 and the constant movement of water would prevent mosquitoes from breeding and multiplying.
 4 Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons
 5 would be 165 feet long by 86 feet wide by 10 feet deep. Therefore, as described for Alternative 1A,
 6 construction and operation of the intakes, solids lagoons, and/or sedimentation basins under
 7 Alternative 6C would not substantially increase suitable vector habitat, and would not substantially
 8 increase vector-borne diseases. Accordingly, there would be no adverse effects.

9 **CEQA Conclusion:** As described for Alternative 1A, implementation of CM1 under Alternative 6C
 10 would involve construction and operation of solids lagoons and sedimentation basins areas could
 11 provide suitable habitat for vectors (e.g., mosquitoes). However, DWR would consult and coordinate
 12 with San Joaquin County and Sacramento-Yolo County MVCDs and prepare and implement MMPs.
 13 BMPs to be implemented as part of the MMPs would help control mosquitoes. See Impact PH-1
 14 under Alternative 1A. During operations, water depth and circulation would prevent the areas from
 15 substantially increasing suitable vector habitat. Therefore, construction and operation of the water
 16 conveyance facilities in Alternative 6C would not result in a substantial increase in vector-borne
 17 diseases and the impact on public health would be less than significant. No mitigation is required.

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

21 The description of water quality and public health effects related to DBPs, pesticides and trace
 22 metals for Alternative 6A also appropriately characterizes effects under this alternative.

23 **NEPA Effects:**

24 **Disinfection Byproducts**

25 Modeled long-term average DOC concentrations and, by extension, DBPs would decrease at Banks
 26 and Jones pumping plants; however, long-term average concentrations of DOC are estimated to
 27 substantially increase at Franks Tract, Rock Slough and Contra Costa Pumping Plant Number 1
 28 relative to the No Action Alternative, as described under Alternative 6B. Exceedances of water
 29 quality objectives would conflict with the Basin Plan because it would exceed Basin Plan
 30 requirements. These increases could potentially trigger substantial changes in drinking water
 31 treatment plant design or operations. In particular, assessment locations at Rock Slough and Contra
 32 Costa Pumping Plant Number 1 represent municipal intakes servicing existing drinking water
 33 treatment plants. Drinking water treatment plants obtaining water from these interior Delta
 34 locations would likely need to upgrade existing treatment systems in order to achieve EPA Stage 1
 35 Disinfectants and Disinfection Byproduct Rule action thresholds.

36 Relative to the No Action Alternative, Alternative 6C would result in increases in long-term average
 37 bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at Barker
 38 Slough. Increases would be greatest at Staten Island and at Barker Slough, as indicated under
 39 Alternative 6A. The long-term average increase predicted for Barker Slough could necessitate
 40 changes in water treatment plant operations or require treatment plant upgrades in order to
 41 maintain DBP compliance.

1 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
2 implementation of such technologies would likely require substantial investment in new or modified
3 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
4 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
5 DOC and bromide concentrations in drinking water sources would represent an increased risk for
6 adverse effects on public health from DBPs. While Mitigation Measure WQ-17 is available to partially
7 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
8 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
9 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
10 effects of increased bromide in drinking water sources at Barker Slough (implementation of this
11 measure along with a separate, non-environmental commitment as set forth in EIR/EIS Appendix
12 3B, *Environmental Commitments*, relating to the potential increased treatment costs associated with
13 bromide-related changes would reduce these effects). Further, as described for Impact PH-2 under
14 Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at Barker Slough may
15 be further minimized by implementation of the AIP. However, the overall effect on public health
16 related to potential increases in DBPs (resulting from DOC and bromide increases) at the
17 aforementioned Delta locations would still be considered adverse.

18 **Trace Metals**

19 Alternative 6C has the same diversion and conveyance operations as Alternative 6A. Because there
20 would be no difference in operations, there would be no differences between these two alternatives
21 in source fractions to various Delta locations, and hydrodynamics in the Delta. Accordingly, trace
22 metal concentrations are not expected to increase above conditions under the No Action Alternative
23 and would not result in adverse impacts on public health.

24 **Pesticides**

25 The change in source water (e.g., more San Joaquin River water) associated with Alternative 6C
26 would be sufficient in magnitude to increase the existing pesticide concentrations in the Delta,
27 resulting in an increased risk of toxicity to aquatic life at Buckley Cove, Franks Tract, Rock Slough,
28 the San Joaquin River at Antioch, and Contra Costa Pumping Plant Number 1 during certain times of
29 the year relative to the No Action Alternative. A conclusion regarding the risk to human health at
30 these locations, based on the predicted adverse effects from pesticides on aquatic life cannot be
31 made. The prediction of adverse effects of pesticides fundamentally assumes that the present
32 pattern of pesticide incidence in surface water would continue at similar levels into the future. In
33 reality, the use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for
34 concluding a substantially increased San Joaquin River source water fraction, is on the decline with
35 their replacement by pyrethroids on the rise. Furthermore, drinking water from the study area
36 would continue to be treated prior to distribution into the drinking water system, and water
37 treatment plants are required to meet drinking water requirements set forth in the California Safe
38 Drinking Water Act and the regulations adopted by CDPH. Therefore, it is not anticipated that there
39 would be adverse effects on public health from pesticides in drinking water sources.

40 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
41 operation of the water conveyance facilities under Alternative 6C would be of sufficient magnitude
42 to increase the existing pesticide concentrations in the Delta, according to water quality modeling
43 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
44 the study area (Buckley Cove, Franks Tract, Rock Slough, the San Joaquin River at Antioch, and

1 Contra Costa Pumping Plant Number 1) during certain times of the year relative to Existing
2 Conditions. A conclusion regarding the risk to human health at these locations, based on the
3 predicted adverse effects from pesticides on aquatic life, cannot be made. However, the prediction of
4 adverse effects of pesticides relative to Existing Conditions fundamentally assumes that the present
5 pattern of pesticide incidence in surface water would continue at similar levels into the future. In
6 reality, the use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for
7 concluding a substantially increased San Joaquin River source water fraction, is on the decline with
8 their replacement by pyrethroids on the rise. Furthermore, drinking water from the study area
9 would continue to be treated prior to distribution into the drinking water system, and water
10 treatment plants are required to meet drinking water requirements set forth in the California Safe
11 Drinking Water Act and the regulations adopted by CDPH. Thus, these potential increases in
12 pesticide concentrations would not significantly impact public health. The change in source water
13 would not alter trace metal concentrations in the study area to the degree that there would be an a
14 beneficial use impairment. Finally, under Alternative 6C, modeled increases in bromide
15 concentrations at Barker Slough, and in DOC concentrations at Franks Tract, Rock Slough and Contra
16 Costa Pumping Plant Number 1 (as described under Alternative 6A), may be substantial enough to
17 necessitate water treatment plant upgrades or changes in plant operations in order to maintain DBP
18 compliance. Should treatment plant upgrades not be undertaken for the affected Delta locations, a
19 change of such magnitude in long-term average DOC and bromide concentrations in drinking water
20 sources would represent an increased risk for effects on public health from DBPs, which would be a
21 significant impact.

22 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
23 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
24 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
25 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
26 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
27 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
28 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
29 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
30 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
31 less-than-significant level.

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

1 significant impact in the form of increased DBP in drinking water sources could occur. Accordingly,
 2 this impact would be significant and unavoidable. If, however, all financial contributions, technical
 3 contributions, or partnerships required to avoid significant impacts prove to be feasible and any
 4 necessary agreements are completed before the project's contribution to the effect is made, impacts
 5 would be less than significant.

6 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 7 **Conditions**

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

9 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 10 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

11 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

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:** As described for Alternative 1A, intermittent and/or short-term construction-related
 15 activities (as would occur for in-river construction) would not be anticipated to result in
 16 contaminant discharges of sufficient magnitude or duration to contribute to long-term
 17 bioaccumulation processes, or cause measureable long-term degradation. Legacy organochlorine
 18 pesticides typically bond to particulates, and do not mobilize easily. Construction and maintenance
 19 of Alternative 6C would not cause legacy organochlorine pesticides to be transported far from the
 20 source or to partition into the water column. Water supply operations under any BDCP action
 21 alternative would not be expected to change total suspended solids or turbidity levels (highs, lows,
 22 typical conditions) to any substantial degree. Changes in the magnitude, frequency, and geographic
 23 distribution of legacy pesticides in water bodies of the affected environment that would result in
 24 new or more severe adverse effects on beneficial uses, relative to the No Action Alternative, would
 25 not be expected to occur.

26 Water quality modeling results indicate small, insignificant changes in total mercury and
 27 methylmercury levels in water resulting from Alternative 6C water operations (Chapter 8, *Water*
 28 *Quality*, Section 8.3.3.13), as described under Impact PH-3 for Alternative 6A. These changes are not
 29 expected to result in adverse effects on beneficial uses. Similarly, changes in methylmercury
 30 concentration are expected to be relatively small. However, fish tissue mercury concentrations
 31 showed substantial increases in some Delta locations modeled, as described under Impact PH-3 for
 32 Alternative 6A. These changes in fish tissue mercury concentrations would make existing mercury-
 33 related impairments in the Delta measurably worse. Relative to the No Action Alternative, body
 34 burdens of mercury in fish would be measurably higher, and could thereby substantially increase
 35 the health risks to people consuming those fish. Accordingly, the potential for Alternative 6C to
 36 create a public health effect from bioaccumulation of mercury would exist and this is considered an
 37 adverse effect.

38 As environmental commitments, DWR would develop and implement an Erosion and Sediment
 39 Control Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under
 40 the Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
 41 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of
 42 disturbance. Additionally, OEHHA standards would continue to be implemented for the

1 consumption of study area fish and to protect people against the overconsumption of fish with
2 increased body burdens of mercury.

3 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative
4 6C would not cause legacy organochlorine pesticides to be transported far from the source or to
5 partition into the water column based on the chemical properties of the pesticides. Therefore,
6 construction and maintenance of Alternative 6C water conveyance facilities would not cause
7 increased exposure of the public to these pesticides. As environmental commitments, DWR would
8 develop and implement Erosion and Sediment Control Plans and SWPPPs (Appendix 3B,
9 *Environmental Commitments*). BMPs implemented under the Erosion and Sediment Control Plans
10 and the SWPPPs would help reduce turbidity and keep sediment that may contain legacy
11 organochlorine pesticides and methylmercury within the area of disturbance.

12 Based on water quality modeling results, changes in water concentrations of mercury and
13 methylmercury would occur at some locations relative to Existing Conditions as a result of
14 operations under Alternative 6C but would not alter beneficial uses of waters in the study area.
15 However, relative to Existing Conditions, modeling results indicate that body burdens of mercury in
16 fish would be measurably higher at certain locations in the Delta, which could increase the health
17 risks to people consuming those fish. Accordingly, the potential for Alternative 6C to create a public
18 health effect from bioaccumulation of mercury would exist and this is considered a significant and
19 unavoidable impact. The estimated increases of mercury body burdens in fish are based on the
20 changes expected from the modeled blending of source waters that define CM1 for Alternative 6C
21 and are therefore inherent to the alternative. OEHHA standards would continue to be implemented
22 for the consumption of study area fish and to protect people against the overconsumption of fish
23 with increased body burdens of mercury.

24 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 25 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 26 **Facilities**

27 **NEPA Effects:** As described in Table 25-8, a total of 13.73 miles of new temporary 69 kV
28 transmission lines; 17.61 miles of new permanent 69 kV transmission lines; and 18.45 miles of new
29 permanent 230 kV transmission lines would be required for this alternative. The temporary and
30 permanent transmission lines needed for Alternative 6C would be very similar in location and
31 length to those described under Alternative 1C (Table 25-8). This is because Alternative 6C would
32 involve the construction and operation of five intakes on the western bank of the Sacramento River
33 between Clarskburg and Walnut Grove, a canal on the western side of the Delta to convey water
34 from intakes to the intermediate pumping plant, and a dual-bore tunnel to convey water to a
35 continuing canal to the proposed Byron Tract Forebay immediately northwest of Clifton Court
36 Forebay. The primary difference would be that Alternative 6C would eliminate the use of existing
37 South Delta intakes. As with Alternative 1C, any new temporary and permanent transmission lines
38 needed for Alternative 6C would be located in existing rights-of-way or areas that are not densely
39 populated and therefore would not expose substantially more people to transmission lines (Figure
40 25-2). Furthermore, the majority of sensitive receptors that would be within 300 feet of a new
41 transmission line are already located within 300 feet of an existing transmission line. However,
42 under this alternative, a proposed temporary 69 kV transmission line would be located within 300
43 feet of Fire Station 63 (in Walnut Grove) (Table 25-8).

1 While the current scientific evidence does not show conclusively that EMF exposure can increase
 2 health risks, the location and design of the new transmission lines would be conducted in
 3 accordance with CPUC's EMF Design Guidelines for Electrical Facilities, as described for Alternative
 4 1A. Further, this temporary transmission line would be removed once construction of the water
 5 conveyance facilities for Alternative 6C is completed. Therefore, operation of the transmission line
 6 corridors would not expose substantially more people to transmission lines generating EMFs.
 7 Because the lines would be located in sparsely populated areas and would be within 300 feet of only
 8 one potential new sensitive receptor, the proposed temporary transmission line would not
 9 substantially increase people's exposure to EMFs and there would be no adverse effect on public
 10 health.

11 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
 12 transmission lines would be located within the right-of-way of existing transmission lines and any
 13 new temporary or permanent transmission lines not within the right-of-way of existing
 14 transmission lines would, for the most part, be located in sparsely populated areas generally away
 15 from existing sensitive receptors. However, under this alternative, a temporary 69 kV transmission
 16 line would be located within 300 feet of Fire Station 63 (in Walnut Grove) (Table 25-8). While the
 17 current scientific evidence does not show conclusively that EMF exposure can increase health risks,
 18 design and implementation of new temporary or permanent transmission lines not within the right-
 19 of-way of existing transmission lines would follow CPUC's EMF Design Guidelines for Electrical
 20 Facilities and would implement shielding, cancellation, or district measures to reduce EMF exposure.
 21 Further, this temporary transmission line would be removed when construction of the water
 22 conveyance facilities for Alternative 6C is completed. Since construction and operation of
 23 Alternative 6C would not expose substantially more people to transmission lines that generate new
 24 sources of EMFs, impacts on public health would be less than significant, and no mitigation is
 25 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 6C would be the same as that described above for Alternative 1A. Although there
 30 would be an increase in restored and enhanced aquatic habitat in the study area as a result of
 31 implementing Alternative 6C, environmental commitments such as coordination with MVCDs and
 32 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 33 Appendix 3B), would reduce the potential for an increase in mosquito breeding habitat, and a
 34 substantial increase in vector-borne diseases is unlikely to result. Furthermore, habitat would be
 35 restored in areas where potentially suitable habitat for mosquitoes already exists. Finally, mosquito
 36 predators (e.g., bats, spiders) would likely increase as a result of restoration and enhancement,
 37 which would keep mosquito populations in check. Therefore, effects on public health would be the
 38 same under Alternative 6C as under Alternative 1A and there would not be a substantial increase in
 39 the public's risk of exposure to vector-borne diseases with implementation of CM2-CM7, CM10 and
 40 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, Alternative 6C would
 43 require environmental commitments such as coordination with MVCDs and implementation of
 44 BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in Appendix 3B) that
 45 would help control mosquitoes and reduce the potential for an increase in mosquito breeding

1 habitat. Furthermore, habitat would be restored where potentially suitable vector habitat already
 2 exists and habitat restoration and enhancement would likely increase the number of mosquito
 3 predators. Therefore, as described for Alternative 1A, implementation of CM2-CM7, CM10 and CM11
 4 under Alternative 6C would not substantially increase the public's risk of exposure to vector-borne
 5 diseases beyond what currently exists. Accordingly, this impact would be less than significant and
 6 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 6C would be the same as that described above for Alternative 1A. Implementation
 11 of the restoration conservation measures would support habitat types, such as wetlands and
 12 agricultural areas, that produce pathogens as a result of the biological productivity in these areas
 13 (e.g., migrating birds, application of fertilizers, waste products of animals). As exemplified by the
 14 Pathogen Conceptual Model, any potential increase in pathogens associated with the proposed
 15 habitat restoration would be localized and within the vicinity of the actual restoration. This would
 16 be similar for lands protected for agricultural uses. Depending on the level of recreational access
 17 granted by management plans, habitat restoration could increase or decrease opportunities for
 18 recreationists within the Delta region. However, effects associated with pathogens would be the
 19 same under Alternative 6C as under Alternative 1A. Recreationists would not experience a
 20 substantial increase in exposure to pathogens as a result of the restoration and no adverse effect
 21 would result.

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

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

31 **NEPA Effects:** The amount of habitat restoration would be the same under Alternative 6C as
 32 described for Alternative 1A. The primary concern with habitat restoration regarding constituents
 33 known to bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of
 34 the newly inundated floodplains and marshes, as described under Alternative 1A. It is likely that the
 35 pesticide-bearing sediments would not be transported very far from the source area and would
 36 settle out with suspended particulates and be deposited close to the ROA. Further, CM2-CM22 do
 37 not include the use of pesticides known to be bioaccumulative in animals or humans.

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

1 reduce the public's exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,
2 and CM10 under Alternative 6C is not expected to result in an adverse effect on public health with
3 respect to pesticides or methylmercury.

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

16 **25.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2,** 17 **3, and 5, and Enhanced Aquatic Conservation (9,000 cfs;** 18 **Operational Scenario E)**

19 The construction of the water conveyance facilities and implementation of CM2–CM 22 under
20 Alternative 7 would generally be the same as described under Alternative 1A. However, 20
21 additional linear miles of channel margin habitat would be enhanced for a total of 40 linear miles,
22 and an additional 10,000 acres of seasonally inundated floodplain would be restored for a total of
23 20,000 acres of seasonally inundated floodplain. The locations of these habitat enhancements would
24 be similar to those described in 1A, throughout the 11 different conservation zones and expanding
25 on existing channel margin habitat and floodplain locations. Therefore, construction effects would
26 be the same as under Alternative 1A and are summarized below for vector-borne diseases and water
27 quality concerns.

28 Alternative 7 would have two fewer intakes than Alternative 1A would have. There would be fewer
29 solids lagoons and sedimentation basins and fewer transmission lines. Water supply operations
30 under Alternative 7 would be different from Alternative 1A and would adhere to Operational
31 Scenario E criteria.

32 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 33 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water** 34 **Conveyance Facilities**

35 **NEPA Effects:** Alternative 7 would involve construction and operation of up to nine solids lagoons,
36 three sedimentation basins, and a 350-acre inundation area adjacent to the intermediate forebay;
37 however, the mechanisms for potential public health effects are similar to those described for
38 Alternative 1A. Specifically, sedimentation basins, solids and lagoons, and the inundation area have
39 the potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of the
40 large volumes of water that would be held within these areas. DWR would consult and coordinate
41 with San Joaquin County and Sacramento-Yolo County MVEDs and prepare and implement MMPs.
42 BMPs to be implemented as part of the MMPs would help control mosquitoes. See Impact PH-1
43 under Alternative 1A. Implementation of these BMPs would reduce the likelihood that BDCP

1 operations would require an increase in abatement activities by the local MVCs. During operation,
 2 the depth, design, and operation of the sedimentation basins and solids lagoons would prevent the
 3 development of suitable mosquito habitat (Figure 25-1). Specifically, the basins would be too deep
 4 and the constant movement of water would prevent mosquitoes from breeding and multiplying.
 5 Sedimentation basins would be 120 feet long by 40 feet wide by 55 feet deep, and solids lagoons
 6 would be 165 feet long by 86 feet wide by 10 feet deep. Furthermore, use of the inundation area
 7 would be limited to forebay emergency overflow situations and water would be physically pumped
 8 back to the intermediate forebay, creating circulation such that the inundation area would have a
 9 low potential for creating suitable vector habitat. Therefore, as described under Alternative 1A,
 10 construction and operation of the intakes, solids lagoons, and/or sedimentation basins under
 11 Alternative 7 would not substantially increase suitable vector habitat, and would not substantially
 12 increase vector-borne diseases. Accordingly, no adverse effects on public health would result.

13 **CEQA Conclusion:** As described for Alternative 1A, implementation of CM1 under Alternative 7
 14 would involve construction and operation of solids lagoons, sedimentation basins, and a 350-acre
 15 inundation area adjacent to the intermediate forebay. These areas could provide suitable habitat for
 16 vectors (e.g., mosquitoes). However, DWR would consult and coordinate with San Joaquin County
 17 and Sacramento-Yolo County MVCs and prepare and implement MMPs. BMPs to be implemented
 18 as part of the MMPs would help control mosquitoes. See Impact PH-1 under Alternative 1A. The
 19 inundation area would only be used during emergency overflow situations and water would be
 20 pumped back into the intermediate forebay, creating circulation that would discourage mosquito
 21 breeding. Therefore, construction and operation of the water conveyance facilities in Alternative 7
 22 would not result in a substantial increase in vector-borne diseases and the impact on public health
 23 would be less than significant. No mitigation is required.

24 **Impact PH-2: Exceedances of Water Quality Criteria for Constituents of Concern Such That** 25 **There Is an Adverse Effect on Public Health as a Result of Operation of the Water Conveyance** 26 **Facilities**

27 **NEPA Effects:**

28 **Disinfection Byproducts**

29 Under Alternative 7, the geographic extent of effects pertaining to long-term average DOC
 30 concentrations and, by extension, DBPs in the study area would be similar to that described for
 31 Alternative 1A. However, the magnitude of predicted long-term increase and relative frequency of
 32 concentration threshold exceedances would be substantially greater for Alternative 7. Exceedances
 33 of water quality objectives would conflict with the Basin Plan because it would exceed Basin Plan
 34 requirements. Modeled effects would be greatest at Franks Tract, Rock Slough, and Contra Costa
 35 Pumping Plant Number 1 relative to the No Action Alternative. Alternative 7 would lead to predicted
 36 improvements in long-term average DOC concentrations at Barker Slough, and Banks and Jones
 37 pumping plants. The increases in long-term average DOC concentrations estimated to occur at
 38 Franks Tract, Rock Slough, and Contra Costa Pumping Plant Number 1 ($\leq 26\%$ net increase) are
 39 considered substantial and could potentially trigger significant changes in drinking water treatment
 40 plant design or operations. In particular, assessment locations at Rock Slough and Contra Costa
 41 Pumping Plant No. 1 represent municipal intakes servicing existing drinking water treatment plants.
 42 Under Alternative 7, drinking water treatment plants obtaining water from these interior Delta
 43 locations would likely need to upgrade existing treatment systems in order to achieve EPA Stage 1
 44 Disinfectants and Disinfection Byproduct Rule action thresholds.

1 In addition, relative to the No Action Alternative, Alternative 7 would result in increases in long-
2 term average bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at
3 Barker Slough. Increases would be greatest at Staten Island (31%; 29% during the drought period)
4 and at Barker Slough (1%; 34% during the drought period). The long-term average increase
5 predicted for Barker Slough could necessitate changes in water treatment plant operations or
6 require treatment plant upgrades in order to maintain DBP compliance. While the increase in long-
7 term average bromide concentrations at Barker Slough is predicted to be relatively small when
8 modeled over a representative 16-year hydrologic period, increases during the modeled drought
9 period would represent a substantial change in source water quality during a season of drought.
10 These predicted drought season related increases in bromide at Barker Slough could lead to adverse
11 changes in the formation of disinfection byproducts at drinking water treatment plants such that
12 considerable water treatment plant upgrades would be necessary to achieve equivalent levels of
13 drinking water health protection.

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. While 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, non-environmental commitment as set forth in EIR/EIS Appendix
25 3B, *Environmental Commitments*, relating to the potential increased treatment costs associated with
26 bromide-related changes would reduce these effects). Further, as described for Impact PH-2 under
27 Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at Barker Slough may
28 be further minimized by implementation of the AIP. However, the overall effect on public health
29 related to potential increases in DBPs (resulting from DOC and bromide increases) at the
30 aforementioned Delta locations would still be considered adverse.

31 **Trace Metals**

32 Alternative 7 would not result in substantial increases in trace metal (arsenic, iron, or manganese)
33 concentrations in the Delta relative to conditions under the No Action Alternative. Throughout much
34 of the south Delta, San Joaquin River water would replace Sacramento River water, with the future
35 trace metals profile largely reflecting that of the San Joaquin River (see Appendix 8D, *Source Water*
36 *Fingerprinting*). However, trace metal concentration profiles between the San Joaquin and
37 Sacramento Rivers are very similar and currently meet Basin Plan objectives and CTR criteria. While
38 the change in trace metal concentrations in the south Delta would likely be measurable, Alternative
39 7 would not be expected to substantially increase the frequency with which applicable Basin Plan
40 objectives would be exceeded in the Delta or substantially degrade the quality of Delta waters with
41 regard to trace metals. Accordingly, no adverse effect on public health related to the trace metals
42 arsenic, iron, or manganese from drinking water sources is anticipated.

1 Pesticides

2 Under Alternative 7, the distribution and mixing of Delta source waters would change. Relative to
3 the No Action Alternative, the change in source water (e.g., more San Joaquin River water)
4 associated with Alternative 7 would be sufficient in magnitude to increase the existing pesticide
5 concentrations in the Delta, resulting in an increased risk of toxicity to aquatic life in certain areas
6 (Franks Tract, Rock Slough, the San Joaquin River at Antioch, and Contra Costa Pumping Plant
7 Number 1) during certain times of the year. Further, there would be modeled increases in risk of
8 toxicity to aquatic life at Buckley Cove during July and August; however, these changes are not
9 considered to be substantial.

10 A conclusion regarding the risk to human health at these locations, based on the predicted adverse
11 effects from pesticides on aquatic life, cannot be made. The prediction of adverse effects of
12 pesticides fundamentally assumes that the present pattern of pesticide incidence in surface water
13 would continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon
14 pesticides, the two pesticides that serve as the basis for concluding a substantially increased San
15 Joaquin River source water fraction, is on the decline with their replacement by pyrethroids on the
16 rise. Furthermore, drinking water from the study area would continue to be treated prior to
17 distribution into the drinking water system, and water treatment plants are required to meet
18 drinking water requirements set forth in the California Safe Drinking Water Act and the regulations
19 adopted by CDPH. Therefore, it is not anticipated that there would be adverse effects on public
20 health from pesticides in drinking water sources.

21 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
22 operation of the water conveyance facilities under Alternative 7 would be of sufficient magnitude to
23 increase the existing pesticide concentrations in the Delta, according to water quality modeling
24 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
25 the study area relative to Existing Conditions (Franks Tract, Rock Slough, the San Joaquin River at
26 Antioch, and Contra Costa Pumping Plant Number 1) during certain times of the year relative to
27 Existing Conditions. A conclusion regarding the risk to human health at these locations, based on the
28 predicted adverse effects from pesticides on aquatic life, cannot be made. However, the prediction of
29 adverse effects of pesticides relative to Existing Conditions fundamentally assumes that the present
30 pattern of pesticide incidence in surface water would continue at similar levels into the future. In
31 reality, the use of chlorpyrifos and diazinon pesticides, the two pesticides that serve as the basis for
32 concluding a substantially increased San Joaquin River source water fraction, is on the decline with
33 their replacement by pyrethroids on the rise. Furthermore, drinking water from the study area
34 would continue to be treated prior to distribution into the drinking water system, and water
35 treatment plants are required to meet drinking water requirements set forth in the California Safe
36 Drinking Water Act and the regulations adopted by CDPH. Thus, these potential increases in
37 pesticide concentrations would not significantly impact public health. The change in source water
38 would not alter trace metal concentrations in the study area to the degree that there would be an a
39 beneficial use impairment. Finally, under Alternative 7, modeled increases in bromide
40 concentrations (34% relative increase) at Barker Slough (during the drought period only), and in
41 DOC concentrations at Franks Tract, Rock Slough, and Contra Costa Pumping Plant Number 1 ($\leq 30\%$
42 increase), may be substantial enough to necessitate water treatment plant upgrades or changes in
43 plant operations in order to maintain DBP compliance. Should treatment plant upgrades not be
44 undertaken for the affected Delta locations, a change of such magnitude in long-term average DOC
45 and bromide concentrations in drinking water sources would represent an increased risk for effects
46 on public health from DBPs, which would be a significant impact.

1 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
 2 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
 3 quality by using an alternative surface water intake on the Sacramento River. 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. Mitigation Measure WQ-17 would reduce the potential
 9 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
 10 less-than-significant level. Additionally,

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

31 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 32 **Conditions**

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

34 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 35 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

36 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

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

39 **NEPA Effects:** Alternative 7 would have the two fewer intakes than Alternative 1A would have, for a
 40 total of three intakes; however, they would be constructed and operated in a similar manner to
 41 intakes under Alternative 1A.

1 As described under Alternative 1A, sediment-disturbing activities during construction and
2 maintenance of the water conveyance facilities under Alternative 7 could result in the disturbance of
3 existing constituents, such as legacy organochlorine pesticides or methylmercury, in sediment.
4 Therefore, the public health effects associated with pesticides and methylmercury for construction
5 and maintenance of the water conveyance facilities under this alternative would be similar,
6 although, slightly less, than those associated with Alternative 1A. Intermittent and/or short-term
7 construction-related activities (as would occur for in-river construction) would not be anticipated to
8 result in contaminant discharges of sufficient magnitude or duration to contribute to long-term
9 bioaccumulation processes, or cause measureable long-term degradation, as described under
10 Alternative 1A. Legacy organochlorine pesticides typically bond to particulates, and do not mobilize
11 easily. Construction and maintenance of Alternative 7 would not cause legacy organochlorine
12 pesticides to be transported far from the source or to partition into the water column, as described
13 for Alternative 1A. Water supply operations under any BDCP action alternative would not be
14 expected to change total suspended solids or turbidity levels (highs, lows, typical conditions) to any
15 substantial degree. Changes in the magnitude, frequency, and geographic distribution of legacy
16 pesticides in water bodies of the affected environment that would result in new or more severe
17 adverse effects on beneficial uses, relative to the No Action Alternative, would not be expected to
18 occur.

19 Water quality modeling results indicate that the percentage change in assimilative capacity of
20 waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark for this alternative
21 would decrease by 6.6% at Old River at Rock Slough and Contra Costa Pumping Plant relative to the
22 No Action Alternative. These changes are not expected to result in adverse effects on beneficial uses.
23 Similarly, changes in methylmercury concentration are expected to be relatively small.

24 Fish tissue estimates showed substantial increases in exceedance quotients at some Delta locations
25 modeled. The greatest change in exceedance quotients relative to the No Action Alternative would
26 occur at the Contra Costa Pumping Plant (30-39% increase) and Old River at Rock Slough (32-45%
27 increase). These changes in fish tissue mercury concentrations would make existing mercury-
28 related impairments in the Delta measurably worse. Relative to the No Action Alternative, body
29 burdens of mercury in fish would be measurably higher, and could thereby substantially increase
30 the health risks to people consuming those fish. Accordingly, the potential for Alternative 7 to create
31 a public health effect from bioaccumulation of mercury would exist and this is considered an
32 adverse effect.

33 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
34 Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under the
35 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
36 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of
37 disturbance during construction and maintenance. Additionally, OEHHA standards would continue
38 to be implemented for the consumption of study area fish and to protect people against the
39 overconsumption of fish with increased body burdens of mercury.

40 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative 7
41 would not cause legacy organochlorine pesticides to be transported far from the source or to
42 partition into the water column based on the chemical properties of the pesticides. Therefore, there
43 would be no increased exposure of the public to these pesticides as a result of construction and
44 maintenance. As environmental commitments, DWR would develop and implement Erosion and
45 Sediment Control Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs

1 implemented under the Erosion and Sediment Control Plans and the SWPPPs would help reduce
2 turbidity and keep sediment that may contain legacy organochlorine pesticides and methylmercury
3 within the area of disturbance.

4 Based on water quality modeling results, changes in water concentrations of mercury and
5 methylmercury would occur at some locations relative to Existing Conditions as a result of
6 operations under Alternative 7. Specifically, the analysis of percentage change in assimilative
7 capacity of waterborne total mercury of Alternative 7 relative to the 25 ng/L ecological risk
8 benchmark as compared to Existing Conditions showed a 6.7% reduction at Old River at Rock
9 Slough and Contra Costa Pumping Plant. Changes in methylmercury concentrations are expected to
10 be small. The beneficial uses of waters in the study area would not be adversely affected by these
11 changes. However, relative to Existing Conditions, modeling results indicate that body burdens of
12 mercury in fish would be measurably higher at the Contra Costa Pumping Plant (30-39% increase)
13 and in Old River at Rock Slough (32-45% increase). This could increase the health risks to people
14 consuming those fish. Accordingly, the potential for Alternative 7 to create a public health effect
15 from bioaccumulation of mercury would exist and this is considered a significant and unavoidable
16 impact. The estimated increases of mercury body burdens in fish are based on the changes expected
17 from the modeled blending of source waters that define CM1 for Alternative 7 and are therefore
18 inherent to the Alternative. OEHHA standards would continue to be implemented for the
19 consumption of study area fish and to protect people against the overconsumption of fish with
20 increased body burdens of mercury.

21 **Impact PH-4: Expose Substantially More People to Transmission Lines Generating New** 22 **Sources of EMFs as a Result of the Construction and Operation of the Water Conveyance** 23 **Facilities**

24 **NEPA Effects:** As described in Table 25-8, a total of 24.71 miles of new temporary 69 kV
25 transmission lines; 7.03 miles of new permanent 69 kV transmission lines; and 42.68 miles of new
26 permanent 230 kV transmission lines would be required for this alternative. The new temporary
27 and permanent transmission lines needed for Alternative 7 would be in locations similar to those in
28 Alternative 1A as depicted in Figure M3-1 (Mapbook volume). As with Alternative 1A, any new
29 temporary and permanent transmission lines needed for Alternative 7 would be located in rights-of-
30 way of existing transmission lines or in areas that are not densely populated and, therefore, would
31 not expose substantially more people to transmission lines (Figure 25-2). Furthermore, the majority
32 of sensitive receptors that would be within 300 feet of a new transmission line are already located
33 within 300 feet of an existing transmission line. However, as indicated in Table 25-8, Stone Lakes
34 National Wildlife Refuge would be within 300 feet of a proposed temporary 69 kV transmission line.
35 Visitors to this area generally come for walks, water recreation, and hunting, and as such, it is
36 unlikely that large groups of people would be staying in the area within 300 feet of this proposed
37 transmission line, so any EMF exposure would be limited. Further, this line would be removed when
38 construction of the water conveyance facility features near this area is completed, so there would be
39 no potential permanent effects. Therefore, this temporary transmission line would not substantially
40 increase people's exposure to EMFs.

41 While the current scientific evidence does not show conclusively that EMF exposure can increase
42 health risks, the location and design of the new transmission lines would be conducted in
43 accordance with CPUC's EMF Design Guidelines for Electrical Facilities to minimize health risks
44 associated with power lines. Therefore, operation of the transmission line corridors would not
45 expose substantially more people to transmission lines generating EMFs. Because the lines would be

1 located in sparsely populated areas and would be within 300 feet of only one potential new sensitive
2 receptor, the proposed temporary and permanent transmission lines would not substantially
3 increase people's exposure to EMFs, and there would be no adverse effect on public health.

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

20 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing CM2-CM7, CM10** 21 **and CM11**

22 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
23 under Alternative 7 would be similar to that described above for Alternative 1A. However, under
24 Alternative 7 there would be an additional 10,000 acres of seasonally inundated floodplain (CM5).
25 Although there would be an increase in restored and enhanced aquatic habitat in the study area as a
26 result of implementing Alternative 7, implementation of environmental commitments such as
27 coordination with MVCDs and implementation of BMPs under MMPs (as described under Impact
28 PH-1 for Alternative 1A and in Appendix 3B) reduce the potential for an increase in mosquito
29 breeding habitat, and a substantial increase in vector-borne diseases is unlikely to result.
30 Furthermore, habitat would be restored in areas where potentially suitable habitat for mosquitoes
31 already exists. Finally, mosquito predators (e.g., bats, spiders) would likely increase as a result of
32 restoration and enhancement, which would keep mosquito populations in check. Therefore, effects
33 would be the same under Alternative 7 as under Alternative 1A and there would not be a substantial
34 increase in the public's risk of exposure to vector-borne diseases with implementation of CM2-CM7,
35 CM10 and CM11. Accordingly, there would be no adverse effect.

36 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
37 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described in Alternative
38 1A, Alternative 7 would require environmental commitments, such as coordination with MVCDs and
39 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
40 Appendix 3B) that would help control mosquitoes and reduce the potential for an increase in
41 mosquito breeding habitat. Furthermore, habitat would be restored where potentially suitable
42 vector habitat already exists and habitat restoration and enhancement would likely increase the
43 number of mosquito predators. Therefore, as described for Alternative 1A, implementation CM2-
44 CM7, CM10 and CM11 under Alternative 7 would not substantially increase the public's risk of

1 exposure to vector-borne diseases beyond what currently exists. Accordingly, this impact would be
 2 less than significant and no mitigation is required.

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

5 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 6 under Alternative 7 would be the similar to that described above for Alternative 1A. However, under
 7 Alternative 7 there would be an additional 10,000 acres of seasonally inundated floodplain (CM5).
 8 Implementation of the restoration conservation measures would support habitat types, such as
 9 wetlands and agricultural areas, 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). As
 11 exemplified by the Pathogen Conceptual Model, any potential increase in pathogens associated with
 12 the habitat restoration would be localized and within the vicinity of the actual restoration. This
 13 would be similar for lands protected for agricultural uses. Depending on the level of recreational
 14 access granted by management plans, habitat restoration could increase or decrease opportunities
 15 for recreationists within the Delta region. However, effects associated with pathogens would be the
 16 same under Alternative 7 as under Alternative 1A. Recreationists would not experience a substantial
 17 increase in exposure to pathogens as a result of the restoration and no adverse effect on public
 18 health would result.

19 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 7
 20 would support habitat types, such as wetlands and agricultural areas that produce pathogens as a
 21 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 22 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 23 off of pathogens once released into water bodies would generally prevent substantial pathogen
 24 exposure to recreationists. Accordingly, impacts on public health would be less than significant and
 25 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 amount of habitat restoration under Alternative 7 would be similar to Alternative
 29 1A. However, under Alternative 7 there would be an additional 10,000 acres of seasonally inundated
 30 floodplain (CM5). 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, as described under Alternative 1A. It is likely that the pesticide-
 33 bearing sediments would not be transported very far from the source area and would settle out with
 34 suspended particulates and be deposited close to the ROA. Further, CM2–CM22 do not include the
 35 use of pesticides known to be bioaccumulative in animals or humans.

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

1 and CM10 under Alternative 7 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 of
12 Alternative 7 would not substantially mobilize or substantially increase the public's exposure to
13 constituents known to bioaccumulate and this impact would be less than significant. No mitigation is
14 required.

15 **25.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,** 16 **3, and 5, and Increased Delta Outflow (9,000 cfs; Operational** 17 **Scenario F)**

18 Alternative 8 water conveyance facilities would be structurally identical to those in Alternative 7,
19 but the operational guidelines under Operational Scenario F would ensure a greater Delta outflow.
20 The amount and location of habitat restoration and enhancement that would occur under
21 Alternative 8 would generally be the same as that described above for Alternative 1A. However, it
22 may result in different acreages of restored, protected and enhanced habitat, as described in Chapter
23 3, *Description of Alternatives* (Section 3.5.15). The location of these areas would be similar to those
24 described in 1A throughout the 11 different conservation zones and expanding on existing channel
25 margin habitat and floodplain locations.

26 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of** 27 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water** 28 **Conveyance Facilities**

29 **NEPA Effects:** Alternative 8 would involve CM1 construction and operation of three intakes, up to
30 nine solids lagoons, three sedimentation basins, and a 350-acre inundation area adjacent to the
31 intermediate forebay. Alternative 8 would have two fewer intakes than Alternative 1A would have.
32 Accordingly, there would be fewer solids lagoons and sedimentation basins and fewer transmission
33 lines.

34 Sedimentation basins, solids lagoons, and the inundation area have the potential to provide habitat
35 for vectors that transmit diseases (e.g., mosquitoes) because of the large volumes of water that
36 would be held within these areas. However, DWR would consult and coordinate with San Joaquin
37 County and Sacramento-Yolo County MVEDs and prepare and implement MMPs. BMPs to be
38 implemented as part of the MMPs would help control mosquitoes. See Impact PH-1 under
39 Alternative 1A. During operation, the depth, design, and operation of the sedimentation basins and
40 solids lagoons would prevent the development of suitable mosquito habitat (Figure 25-1).
41 Specifically, the basins would be too deep and the constant movement of water would prevent
42 mosquitoes from breeding and multiplying. Sedimentation basins would be 120 feet long by 40 feet
43 wide by 55 feet deep, and solids lagoons would be 165 feet long by 86 feet wide by 10 feet deep.

1 Furthermore, use of the inundation area adjacent to the intermediate forebay would be limited to
 2 forebay emergency overflow situations and water would be physically 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. Therefore, construction and operation of the intakes, solids
 5 lagoons, and/or sedimentation basins under Alternative 8 would not substantially increase suitable
 6 vector habitat, and would not substantially increase vector-borne diseases. Accordingly, no adverse
 7 effects would result.

8 **CEQA Conclusion:** As described for Alternative 7 and Alternative 1A, implementation of CM1 under
 9 Alternative 8 would involve construction and operation of solids lagoons, sedimentation basins, and
 10 a 350-acre inundation area adjacent to the intermediate forebay, areas that could provide suitable
 11 habitat for vectors (e.g., mosquitoes). However, DWR would consult and coordinate with San
 12 Joaquin County and Sacramento-Yolo County MVEDs and prepare and implement MMPs. BMPs to be
 13 implemented as part of the MMPs would help control mosquitoes. See Impact PH-1 under
 14 Alternative 1A. During operations, water depth and circulation would prevent the areas from
 15 substantially increasing suitable vector habitat. Therefore, construction and operation of the water
 16 conveyance facilities in Alternative 8 would not result in a substantial increase in vector-borne
 17 diseases and the impact on public health would be less than significant. No mitigation is required.

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

21 **NEPA Effects:**

22 **Disinfection Byproducts**

23 Under Alternative 8, the geographic extent of effects pertaining to long-term average DOC
 24 concentrations and, by extension, DBPs in the study area would be similar to that described for
 25 Alternative 1A. However, the magnitude of predicted long-term increase and relative frequency of
 26 concentration threshold exceedances would be substantially greater for Alternative 8. Exceedances
 27 of water quality objectives would conflict with the Basin Plan because it would exceed Basin Plan
 28 requirements. Modeled effects would be greatest at Franks Tract, Rock Slough, and Contra Costa
 29 Pumping Plant Number 1 relative to the No Action Alternative. The increases in long-term average
 30 DOC concentrations ($\leq 27\%$) estimated to occur at Franks Tract, Rock Slough, and Contra Costa
 31 Pumping Plant Number 1 are considered substantial and could potentially trigger significant
 32 changes in drinking water treatment plant design or operations. In particular, assessment locations
 33 at Rock Slough and Contra Costa Pumping Plant No. 1 represent municipal intakes servicing existing
 34 drinking water treatment plants. Under Alternative 8, drinking water treatment plants obtaining
 35 water from these interior Delta locations would likely need to upgrade existing treatment systems in
 36 order to achieve EPA Stage 1 Disinfectants and Disinfection Byproduct Rule action thresholds.

37 Relative to the No Action Alternative, Alternative 6A would result in increases in long-term average
 38 bromide concentrations at Buckley Cove, Staten Island and the North Bay Aqueduct at Barker
 39 Slough. Increases would be greatest at Staten Island (33%; 30% during the drought period) and at
 40 Barker Slough (8%; 50% during the drought period). The long-term average increase predicted for
 41 Barker Slough could necessitate changes in water treatment plant operations or require treatment
 42 plant upgrades in order to maintain DBP compliance. Operation and maintenance activities, the
 43 increases in bromide concentrations at Barker Slough, source of the North Bay Aqueduct, would

1 cause substantial degradation to water quality; resultant substantial change in long-term average
2 bromide at Barker Slough could necessitate changes in water treatment plant operations or require
3 treatment plant upgrades to maintain DBP compliance.

4 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
5 implementation of such technologies would likely require substantial investment in new or modified
6 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
7 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
8 DOC and bromide concentrations in drinking water sources would represent an increased risk for
9 adverse effects on public health from DBPs. Mitigation Measure WQ-17 is available to partially
10 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
11 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
12 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
13 effects of increased bromide in drinking water sources at Barker Slough (implementation of this
14 measure along with a separate, non-environmental commitment as set forth in EIR/EIS Appendix
15 3B, *Environmental Commitments*, relating to the potential increased treatment costs associated with
16 bromide-related changes would reduce these effects). Further, as described for Impact PH-2 under
17 Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at Barker Slough may
18 be further minimized by implementation of the AIP. However, the overall effect on public health
19 related to potential increases in DBPs (resulting from DOC and bromide increases) at the
20 aforementioned Delta locations would still be considered adverse.

21 **Trace Metals**

22 Under Alternative 8, throughout much of the south Delta, San Joaquin River water would replace
23 Sacramento River water, with the future trace metals profile largely reflecting that of the San
24 Joaquin River. Trace metal concentration profiles between the San Joaquin and Sacramento Rivers
25 are very similar and currently meet Basin Plan objectives and CTR criteria. While the change in trace
26 metal concentrations in the south Delta relative to the No Action Alternative would likely be
27 measurable under Alternative 8, it would not be expected to substantially increase the frequency
28 with which applicable Basin Plan objectives or CTR criteria would be exceeded in the Delta, or
29 substantially degrade the quality of Delta waters with regard to trace metals. Accordingly, no
30 adverse effect on public health related to the trace metals arsenic, iron, or manganese from drinking
31 water sources is anticipated.

32 **Pesticides**

33 Under Alternative 8, the distribution and mixing of Delta source waters would change. Relative to
34 the No Action Alternative, the change in source water (e.g., more San Joaquin River water)
35 associated with Alternative 8 would be sufficient in magnitude to increase the existing pesticide
36 concentrations in the Delta, resulting in an increased risk of toxicity to aquatic life in certain areas
37 (Franks Tract, Rock Slough, and Contra Costa Pumping Plant Number 1) during certain times of the
38 year. A conclusion regarding the risk to human health at these locations, based on the predicted
39 adverse effects from pesticides on aquatic life, cannot be made. The prediction of adverse effects of
40 pesticides fundamentally assumes that the present pattern of pesticide incidence in surface water
41 would continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon
42 pesticides, the two pesticides that serve as the basis for concluding a substantially increased San
43 Joaquin River source water fraction, is on the decline with their replacement by pyrethroids on the
44 rise. Furthermore, drinking water from the study area would continue to be treated prior to

1 distribution into the drinking water system, and water treatment plants are required to meet
2 drinking water requirements set forth in the California Safe Drinking Water Act and the regulations
3 adopted by CDPH. Therefore, it is not anticipated that there would be adverse effects on public
4 health from pesticides in drinking water sources.

5 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
6 operation of the water conveyance facilities under Alternative 8 would be of sufficient magnitude to
7 increase the existing pesticide concentrations in the Delta, according to water quality modeling
8 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
9 the study area (Franks Tract, Rock Slough, and Contra Costa Pumping Plant Number 1) during
10 certain times of the year relative to Existing Conditions. A conclusion regarding the risk to human
11 health at these locations, based on the predicted adverse effects from pesticides on aquatic life,
12 cannot be made. However, the prediction of adverse effects of pesticides relative to Existing
13 Conditions fundamentally assumes that the present pattern of pesticide incidence in surface water
14 would continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon
15 pesticides, the two pesticides that serve as the basis for concluding a substantially increased San
16 Joaquin River source water fraction, is on the decline with their replacement by pyrethroids on the
17 rise. Furthermore, drinking water from the study area would continue to be treated prior to
18 distribution into the drinking water system, and water treatment plants are required to meet
19 drinking water requirements set forth in the California Safe Drinking Water Act and the regulations
20 adopted by CDPH. Thus, these potential increases in pesticide concentrations would not significantly
21 impact public health. The change in source water would not alter trace metal concentrations in the
22 study area to the degree that there would be an a beneficial use impairment. Finally, under
23 Alternative 8, modeled long-term average bromide concentrations would increase at Staten Island
24 (29%; 26% during the drought period) and Barker Slough (4%; 50% during the drought period)
25 relative to Existing Conditions. Modeled long-term average DOC concentrations would increase by
26 $\leq 32\%$ at Franks Tract, Rock Slough and Contra Costa Pumping Plant Number 1 relative to Existing
27 Conditions. These increases in bromide and DOC at these locations may be substantial enough to
28 necessitate water treatment plant upgrades or changes in plant operations in order to maintain DBP
29 compliance. Should treatment plant upgrades not be undertaken for the affected Delta locations, a
30 change of such magnitude in long-term average DOC and bromide concentrations in drinking water
31 sources would represent an increased risk for effects on public health from DBPs, which would be a
32 significant impact.

33 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
34 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
35 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
36 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
37 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
38 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
39 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
40 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
41 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
42 less-than-significant level.

43 In addition to and to supplement Mitigation Measure WQ-5, the BDCP proponents have incorporated
44 into the BDCP, as set forth in EIR/EIS Appendix 3B, *Environmental Commitments*, a separate, non-
45 environmental commitment to address the potential increased water treatment costs that could
46 result from bromide-related concentration effects on municipal water purveyor operations.

1 Potential options for making use of this financial commitment include funding or providing other
 2 assistance towards implementation of the North Bay Aqueduct AIP, acquiring alternative water
 3 supplies, or other actions to indirectly reduce the effects of elevated bromide and DOC in existing
 4 water supply diversion facilities. Please refer to Appendix 3B, *Environmental Commitments*, for the
 5 full list of potential actions that could be taken pursuant to this commitment in order to reduce the
 6 water quality treatment costs associated with water quality effects relating to chloride, electrical
 7 conductivity, and bromide. Because the BDCP proponents cannot ensure that the results of
 8 coordinated actions with water treatment entities will be fully funded or implemented successfully
 9 prior to the project's contribution to the impact, the ability to fully mitigate this impact is uncertain.
 10 If a solution that is identified by the BDCP proponents and an affected water purveyor is not fully
 11 funded, constructed, or implemented before the project's contribution to the impact is made, a
 12 significant impact in the form of increased DBP in drinking water sources could occur. Accordingly,
 13 this impact would be significant and unavoidable. If, however, all financial contributions, technical
 14 contributions, or partnerships required to avoid significant impacts prove to be feasible and any
 15 necessary agreements are completed before the project's contribution to the effect is made, impacts
 16 would be less than significant.

17 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
 18 **Conditions**

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

20 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
 21 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

22 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

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

25 **NEPA Effects:** As described under Alternative 1A, sediment-disturbing activities during construction
 26 and maintenance of the water conveyance facilities under Alternative 8 could result in the
 27 disturbance of existing constituents, such as legacy pesticides or methylmercury, in sediment.
 28 Therefore, the public health effects associated with pesticides and methylmercury under Alternative
 29 8 would be similar to, although slightly less than, those associated with Alternative 1A. Intermittent
 30 and/or short-term construction-related activities (as would occur for in-river construction) would
 31 not be anticipated to result in contaminant discharges of sufficient magnitude or duration to
 32 contribute to long-term bioaccumulation processes, or cause measureable long-term degradation, as
 33 described under Alternative 1A. Legacy organochlorine pesticides typically bond to particulates, and
 34 do not mobilize easily. Construction and maintenance of Alternative 8 would not cause legacy
 35 organochlorine pesticides to be transported far from the source or to partition into the water
 36 column, as described for Alternative 1A. Water supply operations under any BDCP action alternative
 37 would not be expected to change total suspended solids or turbidity levels (highs, lows, typical
 38 conditions) to any substantial degree. Changes in the magnitude, frequency, and geographic
 39 distribution of legacy pesticides in water bodies of the affected environment that would result in
 40 new or more severe adverse effects on beneficial uses, relative to the No Action Alternative, would
 41 not be expected to occur.

1 Water quality modeling results indicate that the percentage change in assimilative capacity of
2 waterborne total mercury relative to the 25 ng/L Ecological Risk Benchmark for this alternative
3 showed the greatest decrease (6.9%) at the Contra Costa Pumping Plant relative to the No Action
4 Alternative. These changes are not expected to result in adverse effects on beneficial uses. Similarly,
5 changes in methylmercury concentration are expected to be relatively small.

6 Fish tissue estimates showed a substantial increase concentration and exceedance quotients at the
7 North Bay Aqueduct pump site at Barker Slough relative to the No Action Alternative (221-224%.
8 The Sacramento River at Emmaton site also shows a relatively large percentage increase (122-
9 124%) in tissue mercury concentrations over conditions under the No Action Alternative. Thus,
10 relative to the No Action Alternative, body burdens of mercury in fish would be measurably higher,
11 and could thereby substantially increase the health risks to people consuming those fish.
12 Accordingly, the potential for Alternative 8 to create a public health effect from bioaccumulation of
13 mercury would exist and this is considered an adverse effect.

14 As environmental commitments, DWR would develop and implement Erosion and Sediment Control
15 Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under the
16 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
17 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of
18 disturbance, as described under Alternative 1A for Impact PH-3. Additionally, OEHHA standards
19 would continue to be implemented for the consumption of study area fish and to protect people
20 against the overconsumption of fish with increased body burdens of mercury.

21 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative 8
22 would not cause legacy organochlorine pesticides to be transported far from the source or to
23 partition into the water column based on the chemical properties of the pesticides. Therefore,
24 construction and maintenance of Alternative 8 water conveyance facilities would not cause
25 increased exposure of the public to these pesticides. As environmental commitments, DWR would
26 develop and implement Erosion and Sediment Control Plans and SWPPPs (Appendix 3B,
27 *Environmental Commitments*). BMPs implemented under the Erosion and Sediment Control Plans
28 and the SWPPPs would help reduce turbidity and keep sediment that may contain legacy
29 organochlorine pesticides and methylmercury within the 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 8. Specifically, the analysis of percentage change in assimilative
33 capacity of waterborne total mercury of Alternative 8 relative to the 25 ng/L ecological risk
34 benchmark as compared to Existing Conditions showed the greatest decrease of 7% for the Contra
35 Costa Pumping Plant. Similarly, changes in methylmercury concentrations are expected to be
36 relatively small. Beneficial uses of waters in the study area would not be adversely affected due to
37 these changes. However, relative to Existing Conditions, modeling results indicate that body burdens
38 of mercury in fish would be measurably higher at the North Bay Aqueduct pump site at Barker
39 Slough (221-224%) and the Sacramento River at Emmaton (122-124%). This could increase the
40 health risks to people consuming those fish. Accordingly, the potential for this alternative to create a
41 public health effect from bioaccumulation of mercury would exist and this is considered a significant
42 and unavoidable impact. The estimated increases of mercury body burdens in fish are based on the
43 changes expected from the modeled blending of source waters that define CM1 for Alternative 8 and
44 are therefore inherent to the Alternative. OEHHA standards would continue to be implemented for

1 the consumption of study area fish and to protect people against the overconsumption of fish with
2 increased body burdens of mercury.

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:** As described in Table 25-8, a total of 24.71 miles of new temporary 69 kV
7 transmission lines; 7.03 miles of new permanent 69 kV transmission lines; and 42.68 miles of new
8 permanent 230 kV transmission lines would be required for this alternative. New temporary and
9 permanent transmission lines needed for Alternative 8 would be the same as those for Alternative 7.
10 Any new temporary and permanent transmission lines needed for Alternative 8 would be located in
11 rights-of-way of existing transmission lines or in areas that are not densely populated and,
12 therefore, would not expose substantially more people to transmission lines (Figure 25-2).
13 Furthermore, the majority of sensitive receptors that would be within 300 feet of a new
14 transmission line are already located within 300 feet of an existing transmission line. However, as
15 indicated in Table 25-8, Stone Lakes National Wildlife Refuge would be within 300 feet of a
16 proposed temporary 69 kV transmission line. Visitors to this area generally come for walks, water
17 recreation, and hunting, and as such, it is unlikely that large groups of people would be staying in the
18 area within 300 feet of this proposed transmission line, so any EMF exposure would be limited.
19 Further, this line would be removed when construction of the water conveyance facility features
20 near this area is completed, so there would be no potential permanent effects. Therefore, this
21 temporary transmission line would not substantially increase people's exposure to EMFs. While the
22 current scientific evidence does not show conclusively that EMF exposure can increase health risks,
23 the location and design of the new transmission lines would be conducted in accordance with
24 CPUC's EMF Design Guidelines for Electrical Facilities to minimize health risks associated with
25 power lines. Therefore, operation of the transmission line corridors would not expose substantially
26 more people to transmission lines generating EMFs. Because the lines would be located in sparsely
27 populated areas and would be within 300 feet of only one potential new sensitive receptors, the
28 proposed temporary and permanent transmission lines would not substantially increase people's
29 exposure to EMFs, and there would be no adverse effect on public health.

30 **CEQA Conclusion:** In general, the proposed temporary (69 kV) and permanent (69 kV and 230 kV)
31 transmission lines would be located in rights-of-way of existing transmission lines or in sparsely
32 populated areas generally away from existing sensitive receptors. However, one sensitive receptor,
33 Stone Lakes National Wildlife Refuge, would be within 300 feet of a proposed temporary 69 kV
34 transmission line. Because visitors to this area generally come for walks, water recreation, and
35 hunting, it is unlikely that large groups of people would be staying in the area within 300 feet of this
36 proposed transmission line, so any EMF exposure would be limited. Further, this line would be
37 removed when construction of the water conveyance facility features near this area is completed, so
38 there would be no potential permanent effects. Therefore, this temporary transmission line would
39 not substantially increase people's exposure to EMFs. Design and implementation of new temporary
40 or permanent transmission lines not within the right-of-way of existing transmission lines would
41 follow CPUC's EMF Design Guidelines for Electrical Facilities and would implement shielding,
42 canceling, or distance measures to reduce EMF exposure. Because construction and operation of
43 Alternative 8 would not expose substantially more people to transmission lines that provide new
44 sources of EMFs, impacts would be less than 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 8 would be similar to that described for Alternative 1A. Although there would be
 5 an increase in restored and enhanced habitat in the study area as a result of implementing
 6 Alternative 8, implementation of 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) would reduce the potential for an increase in mosquito breeding habitat, and a
 9 substantial increase in vector-borne diseases is unlikely to result. Furthermore, habitat would be
 10 restored in areas where potentially suitable habitat for mosquitoes already exists. Finally, mosquito
 11 predators (e.g., bats, spiders) would likely increase as a result of restoration and enhancement,
 12 which would keep mosquito populations in check. Therefore, effects would be the same under
 13 Alternative 8 as under Alternative 1A and there would not be a substantial increase in the public's
 14 risk of exposure to vector-borne diseases with implementation of CM2-CM7, CM10 and CM11.
 15 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 in Alternative
 18 1A, Alternative 8 would require environmental commitments, such as coordination with MVCDs and
 19 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 20 Appendix 3B) that would help control mosquitoes and reduce the potential for an increase in
 21 mosquito breeding habitat. Furthermore, habitat would be restored where potentially suitable
 22 vector habitat already exists and habitat restoration and enhancement would likely increase the
 23 number of mosquito predators. Therefore, as described for Alternative 1A, implementation of CM2-
 24 CM7, CM10 and CM11 under Alternative 8 would not substantially increase the public's risk of
 25 exposure to vector-borne diseases beyond what currently exists. Accordingly, this impact would be
 26 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 8 would be the similar to that described above for Alternative 1A. Implementation
 31 of the restoration conservation measures would support habitat types, such as wetlands and
 32 agricultural areas, that produce pathogens as a result of the biological productivity in these areas
 33 (e.g., migrating birds, application of fertilizers, waste products of animals). As exemplified by the
 34 Pathogen Conceptual Model, any potential increase in pathogens associated with the 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 8 as under Alternative 1A. Recreationists would not experience a substantial
 40 increase in exposure to pathogens as a result of the restoration and no adverse effect on public
 41 health would result.

42 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 8
 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 pathogens once released into water bodies would generally prevent substantial pathogen
 3 exposure to recreationists. Accordingly, impacts on public health would be less than significant and
 4 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 under Alternative 8 would be the same as
 8 Alternative 1A. The primary concern with habitat restoration regarding constituents known to
 9 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
 10 inundated floodplains and marshes, as described under Alternative 1A. It is likely that the pesticide-
 11 bearing sediments would not be transported very far from the source area and would settle out with
 12 suspended particulates and be deposited close to the ROA. Further, CM2–CM22 do not include the
 13 use of pesticides known to be bioaccumulative in animals or humans.

14 Methylmercury generation rates are ultimately dependent on the concentrations of mercury in the
 15 soils, and on the specific biogeochemistry of the system. The biogeochemistry and fate and transport
 16 of mercury and methylmercury are very complex. Restoration would involve inundation of areas
 17 where mercury has been sequestered in soils, and, if methylation occurs, the methylmercury would
 18 be mobilized into the aquatic system. While there would likely be an increase in mobilization and
 19 bioaccumulation of methylmercury in the study area’s aquatic systems (e.g., fish and water) during
 20 the near-term, CM12 *Methylmercury Management* and existing OEHHA standards would serve to
 21 reduce the public’s exposure to contaminated fish. Therefore, implementation of CM2, CM4, CM5,
 22 and CM10 under Alternative 8 is not expected to result in an adverse effect on public health with
 23 respect to pesticides or methylmercury.

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

36 **25.3.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs;**
 37 **Operational Scenario G)**

38 While operation of Alternative 9 would be very similar to Alternative 1A with respect to water
 39 exports, Alternative 9 does not involve construction of major new water conveyance facilities.
 40 Rather, there would be four basic corridors utilizing existing channels, two dedicated to water
 41 conveyance and two to fish migration: (1) the north Delta separate water supply corridor that
 42 conveys water from the Sacramento River to Middle River; (2) the south Delta separate water
 43 supply corridor along Middle River and Victoria Canal that conveys water from San Joaquin River to

1 Clifton Court Forebay; (3) the San Joaquin separate fish movement corridor that provides for fish
 2 migration from upper San Joaquin River to the lower San Joaquin River downstream of Franks Tract;
 3 and (4) the Mokelumne separate fish movement corridor that diverts from the Mokelumne River
 4 through Lost Slough and Meadows Slough to the Sacramento River. Alternative 9 includes
 5 construction of two new fish-screened intakes without pumping plants, operable barriers (several
 6 with boat locks), approximately 2 miles of canals, and approximately 1 mile of new levees.
 7 Temporary cofferdams would be needed during construction. A detailed description of the
 8 alternative is provided in Chapter 3, *Description of the Alternatives* (Section 3.5.16); a depiction of
 9 the physical components is provided in Figure M3-5 in the Mapbook Volume.

10 With respect to public health, there are three main differences between Alternative 9 and
 11 Alternative 1A.

- 12 • Conveyance facilities would consist of operable barriers in existing channels, and channel
 13 enlargement.
- 14 • One intake would be located at Delta Cross Channel, and one intake at Georgiana Slough.
- 15 • There would be potentially different amounts and types of restoration to accommodate the
 16 proposed operable barriers and channel enlargements.

17 The amount and location of habitat restoration and enhancement that would occur under
 18 Alternative 9 would generally be the same as that described under Alternative 1A. However, under
 19 Alternative 9, changes in the south Delta would be made to accommodate the modified corridors.
 20 The location of these habitat restoration and enhancement areas would be similar to those
 21 described in 1A throughout the 11 different conservation zones and would expand on existing
 22 channel margin habitat and floodplain locations.

23 **Impact PH-1: Increase in Vector-Borne Diseases as a Result of Construction and Operation of**
 24 **the Intakes, Solids Lagoons, and/or Sedimentation Basins Associated with the Water**
 25 **Conveyance Facilities**

26 **NEPA Effects:** Alternative 9 would not have solids lagoons or sedimentation basins. Should
 27 construction activities create temporary areas of standing water that could provide suitable habitat
 28 for mosquitoes to breed, DWR would consult and coordinate with San Joaquin County and
 29 Sacramento-Yolo County MVCDs and prepare and implement MMPs. BMPs to be implemented as
 30 part of the MMPs would help control mosquitoes. See Impact PH-1 under Alternative 1A. Activities
 31 would include, but not be limited to: testing for mosquito larvae during the high mosquito season
 32 (June through September), introducing biological controls such as mosquitofish if mosquitoes are
 33 present, and introducing physical controls (e.g., discharging water more frequently or increasing
 34 circulation) if mosquitoes are present. Therefore, Alternative 9 would not significantly increase the
 35 public's risk of exposure to vector-borne diseases. Accordingly, adverse effects on public health
 36 would not result.

37 **CEQA Conclusion:** Because solid lagoons or sedimentation basins would not be constructed or
 38 operated, there would be no impacts. If necessary, DWR would consult and coordinate with San
 39 Joaquin County and Sacramento-Yolo County MVCDs and prepare and implement MMPs. BMPs to be
 40 implemented as part of the MMPs would help control mosquitoes. See Impact PH-1 under
 41 Alternative 1A. Therefore, construction and operation of the water conveyance facilities in
 42 Alternative 9 would not result in a substantial increase in vector-borne diseases and the impact on
 43 public health would be less than 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:**

5 **Disinfection Byproducts**

6 Under Alternative 9, the geographic extent of effects pertaining to long-term average DOC and
7 bromide concentrations and, by extension, DBPs in the study area would be similar to that described
8 for Alternative 1A. However, the magnitude of predicted long-term increase and relative frequency
9 of concentration threshold exceedances would be substantially greater. Modeled effects would be
10 greatest at Franks Tract, Rock Slough, and Contra Costa Pumping Plant Number 1 for Alternative 9
11 relative to the No Action Alternative. Maximum net increases would be $\leq 24\%$ at these locations
12 relative to the No Action Alternative. Exceedances of water quality objectives would conflict with the
13 Basin Plan because it would exceed Basin Plan requirements. Drinking water treatment plants
14 obtaining water from these interior Delta locations would likely need to upgrade existing treatment
15 systems in order to achieve EPA Stage 1 Disinfectants and Disinfection Byproduct Rule action
16 thresholds.

17 In addition, relative to the No Action Alternative, Alternative 9 would result in increases in long-
18 term average bromide concentrations at Buckley Cove (during the drought period only), Emmaton,
19 and Barker Slough (Chapter 8, *Water Quality*, Section 8.3.3.16). The increase in long-term average
20 bromide concentrations at Barker Slough (23%; 87% increase during the drought period) would be
21 substantial enough to potentially necessitate changes in water treatment plant operations or require
22 treatment plant upgrades in order to maintain DBP compliance.

23 While treatment technologies sufficient to achieve the necessary DOC and bromide removal exist,
24 implementation of such technologies would likely require substantial investment in new or modified
25 infrastructure. Should treatment plant upgrades not be undertaken for these predicted increases in
26 DOC and bromide for the affected Delta locations, a change of such magnitude in long-term average
27 DOC and bromide concentrations in drinking water sources would represent an increased risk for
28 adverse effects on public health from DBPs. While Mitigation Measure WQ-17 is available to partially
29 reduce the effect of DOC, the feasibility and effectiveness of this mitigation measure are uncertain,
30 and, therefore, it is not known if its implementation would reduce the severity of this effect such that
31 it would not be adverse. Similarly, Mitigation Measure WQ-5 is available to reduce the potential
32 effects of increased bromide in drinking water sources at Barker Slough (implementation of this
33 measure along with a separate, non-environmental commitment as set forth in EIR/EIS Appendix
34 3B, *Environmental Commitments*, relating to the potential increased treatment costs associated with
35 bromide-related changes would reduce these effects). Further, as described for Impact PH-2 under
36 Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at Barker Slough may
37 be further minimized by implementation of the AIP. However, the overall effect on public health
38 related to potential increases in DBPs (resulting from DOC and bromide increases) at the
39 aforementioned Delta locations would still be considered adverse.

40 **Trace Metals**

41 Alternative 9 would not result in substantial increases in trace metal concentrations in the Delta
42 relative to the No Action Alternative. However, substantial changes in source water fraction would
43 occur in the south Delta. Throughout much of the south Delta, San Joaquin River water would

1 replace Sacramento River water, with the future trace metals profile largely reflecting that of the San
2 Joaquin River. Alternative 9 would not be expected to substantially increase the frequency with
3 which applicable Basin Plan objectives or CTR criteria would be exceeded in the Delta or
4 substantially degrade the quality of Delta waters with regard to trace metals. Therefore, adverse
5 effects on public health would not result.

6 Pesticides

7 Locations in the Delta that would receive a substantially greater fraction of San Joaquin River water
8 under Alternative 9, such as Franks Tract, Rock Slough and Contra Costa Pumping Plant Number 1,
9 would change considerably over the calendar year. As a result, the long-term risk of pesticide-
10 related toxicity to aquatic life at these locations during certain times of the year could substantially
11 increase relative to the No Action Alternative (Chapter 8, *Water Quality*, Section 8.3.3.16).
12 Additionally, the potential for increased incidence of pesticide-related toxicity could include
13 pesticides such as chlorpyrifos and diazinon for which 303(d) listings exist for the Delta, and, thus,
14 existing beneficial use impairment could be made discernibly worse. The prediction of adverse
15 effects of pesticides relative to the No Action Alternative fundamentally assumes that the present
16 pattern of pesticide incidence in surface water would continue at similar levels into the future. In
17 reality the makeup and character of the pesticide use market during the late long-term would not be
18 exactly as it is today. Use of chlorpyrifos and diazinon is on the decline with their replacement by
19 pyrethroids on the rise. Yet, in this assessment it is the apparent greater incidence of diazinon and
20 chlorpyrifos in the San Joaquin River that serves as the basis for concluding that substantially
21 increased San Joaquin River source water fraction would correspond to an increased risk of
22 pesticide-related toxicity to aquatic life. However, drinking water from the study area would
23 continue to be treated prior to distribution into the drinking water system, and water treatment
24 plants are required to meet drinking water requirements set forth in the California Safe Drinking
25 Water Act and the regulations adopted by CDPH. Therefore, it is not anticipated that there would be
26 adverse effects on public health from pesticides.

27 **CEQA Conclusion:** The change in source water (e.g., more San Joaquin River water) associated with
28 operation of the water conveyance facilities under Alternative 9 would be of sufficient magnitude to
29 increase the existing pesticide concentrations in the Delta, according to water quality modeling
30 results. This increase could result in an increased risk of toxicity to aquatic life at some locations in
31 the study area (Franks Tract, Rock Slough, and Contra Costa Pumping Plant Number 1) during
32 certain times of the year relative to Existing Conditions. A conclusion regarding the risk to human
33 health at these locations, based on the predicted adverse effects from pesticides on aquatic life,
34 cannot be made. However, the prediction of adverse effects of pesticides relative to Existing
35 Conditions fundamentally assumes that the present pattern of pesticide incidence in surface water
36 would continue at similar levels into the future. In reality, the use of chlorpyrifos and diazinon
37 pesticides, the two pesticides that serve as the basis for concluding a substantially increased San
38 Joaquin River source water fraction, is on the decline with their replacement by pyrethroids on the
39 rise. Furthermore, drinking water from the study area would continue to be treated prior to
40 distribution into the drinking water system, and water treatment plants are required to meet
41 drinking water requirements set forth in the California Safe Drinking Water Act and the regulations
42 adopted by CDPH. Thus, these potential increases in pesticide concentrations would not significantly
43 impact public health. The change in source water would not alter trace metal concentrations in the
44 study area to the degree that there would be a beneficial use impairment. Finally, under Alternative
45 9, modeled average long-term bromide concentrations would increase at Buckley Cove (during the

1 drought period only [21%]), Emmaton ($\leq 30\%$), and Barker Slough (19%; 88% during the drought
2 period) relative to Existing Conditions. Modeled long-term DOC concentrations would increase to
3 the greatest extent at Franks Tract, Rock Slough, and Contra Costa Pumping Plant Number 1 ($\leq 28\%$
4 net increase). These increases in bromide and DOC at these locations may be substantial enough to
5 necessitate water treatment plant upgrades or changes in plant operations in order to maintain DBP
6 compliance. Should treatment plant upgrades not be undertaken for the affected Delta locations, a
7 change of such magnitude in long-term average DOC and bromide concentrations in drinking water
8 sources would represent an increased risk for effects on public health from DBPs, which would be a
9 significant impact.

10 Implementation of the AIP may reduce water quality effects due to bromide increases at Barker
11 Slough by allowing operators of the North Bay Aqueduct to largely avoid periods of poor water
12 quality by using an alternative surface water intake on the Sacramento River. Assuming the adverse
13 water quality effects on the North Bay Aqueduct at Barker Slough may be avoided or minimized by
14 implementation of the AIP, the potential adverse water quality effects on the municipal beneficial
15 uses potentially provided in Barker Slough would remain significant. While Mitigation Measure WQ-
16 5 may reduce this impact, the feasibility and effectiveness of this mitigation measure are uncertain
17 based on currently available information. Mitigation Measure WQ-17 would reduce the potential
18 impacts associated with DOC; however, it is unknown if this mitigation would reduce impacts to a
19 less-than-significant level.

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*, a separate, non-
22 environmental 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*, for the
28 full list of potential actions that could be taken pursuant to this commitment in order to reduce the
29 water quality treatment costs associated with water quality effects relating to chloride, electrical
30 conductivity, and bromide. Because the BDCP proponents cannot ensure that the results of
31 coordinated actions with water treatment entities will be fully funded or implemented successfully
32 prior to the project's contribution to the impact, the ability to fully mitigate this impact is uncertain.
33 If a solution that is identified by the BDCP proponents and an affected water purveyor is not fully
34 funded, constructed, or implemented before the project's contribution to the impact is made, a
35 significant impact in the form of increased DBP in drinking water sources could occur. Accordingly,
36 this impact would be significant and unavoidable. If, however, all financial contributions, technical
37 contributions, or partnerships required to avoid significant impacts prove to be feasible and any
38 necessary agreements are completed before the project's contribution to the effect is made, impacts
39 would be less than significant.

40 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality** 41 **Conditions**

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

1 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
2 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

3 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

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:** Under Alternative 9, intermittent and/or short-term construction-related activities
7 (as would occur for in-river construction) would not be anticipated to result in contaminant
8 discharges of sufficient magnitude or duration to contribute to long-term bioaccumulation
9 processes, or cause measureable long-term degradation, as described under Alternative 1A. Legacy
10 organochlorine pesticides typically bond to particulates, and do not mobilize easily. Construction
11 and maintenance of Alternative 5 would not cause legacy organochlorine pesticides to be
12 transported far from the source or to partition into the water column as described for Alternative
13 1A. Water supply operations under any BDCP action alternative would not be expected to change
14 total suspended solids or turbidity levels (highs, lows, typical conditions) to any substantial degree.
15 Changes in the magnitude, frequency, and geographic distribution of legacy pesticides in water
16 bodies of the affected environment that would result in new or more severe adverse effects on
17 beneficial uses, relative to the No Action Alternative, would not be expected to occur.

18 Furthermore, based on water quality modeling results presented in Chapter 8, *Water Quality*
19 (Section 8.3.3.16), operation of water conveyance facilities under Alternative 9 would not
20 substantially alter mercury or methylmercury concentrations in the Sacramento River or San
21 Joaquin River. The analysis of percentage change in assimilative capacity of waterborne total
22 mercury of Alternative 9 relative to the 25 ng/L Ecological Risk Benchmark Conditions showed the
23 greatest decrease (10.1%) at Old River at Rock Slough, relative to the No Action Alternative.
24 Similarly, increases in long term annual average methylmercury concentration are expected to be
25 greatest at the Contra Costa Pumping Plant relative to the No Action Alternative.

26 Fish tissue mercury estimates show some substantial percentage increases in concentration and
27 exceedance quotients at some Delta locations; the greatest change (59% increase) would be at Old
28 River at Rock Slough relative to the No Action Alternative. Similar, but changes are predicted at the
29 Contra Costa Pumping Plant. Therefore, body burdens of mercury in fish would be measurably
30 higher, and could thereby substantially increase the health risks to people consuming those fish.
31 Accordingly, the potential for Alternative 9 to create a public health effect from bioaccumulation of
32 mercury would exist and this is considered an adverse effect.

33 **CEQA Conclusion:** Construction and maintenance of water conveyance facilities under Alternative 9
34 would not cause legacy organochlorine pesticides to be transported far from the source or to
35 partition into the water column based on the chemical properties of the pesticides. Therefore,
36 construction and maintenance of Alternative 9 water conveyance facilities would not cause
37 increased exposure of the public to these pesticides as a result of construction and maintenance. As
38 environmental commitments, DWR would develop and implement Erosion and Sediment Control
39 Plans and SWPPPs (Appendix 3B, *Environmental Commitments*). BMPs implemented under the
40 Erosion and Sediment Control Plans and the SWPPPs would help reduce turbidity and keep
41 sediment that may contain legacy organochlorine pesticides and methylmercury within the area of
42 disturbance.

1 Based on water quality modeling results, changes in water concentrations of mercury and
 2 methylmercury would occur at some locations relative to Existing Conditions as a result of
 3 operations under Alternative 9. Specifically, the analysis of percentage change in assimilative
 4 capacity of waterborne total mercury of Alternative 9 relative to the 25 ng/L Ecological Risk
 5 Benchmark as compared to Existing Conditions showed the greatest decrease of 10.2% at Old River
 6 at Rock Slough. This change would not alter beneficial uses of waters in the study area. However,
 7 relative to Existing Conditions, modeling results indicate that body burdens of mercury in fish would
 8 be measurably higher at Old River at Rock Slough (66% increase) and at the Contra Costa Pumping
 9 Plant (62% increase). This could increase the health risks to people consuming those fish.
 10 Accordingly, the potential for Alternative 9 to create a public health effect from bioaccumulation of
 11 mercury would exist and this is considered a significant and unavoidable impact. The estimated
 12 increases of mercury body burdens in fish are based on the changes expected from the modeled
 13 blending of source waters that define CM1 for Alternative 9 and are therefore inherent to the
 14 alternative. OEHHA standards would continue to be implemented for the consumption of study area
 15 fish and to protect people against the overconsumption of fish with increased body burdens of
 16 mercury.

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:** As described in Table 25-9, Alternative 9 would not require the construction of any
 21 new 69 kV or 230 kV transmission lines. Therefore, substantially more people would not be exposed
 22 to transmission lines generating new sources of EMFs under this alternative. There would be no
 23 effects.

24 **CEQA Conclusion:** Since Alternative 9 does not require the construction of new temporary or
 25 permanent transmission lines, there would be no impacts on public health from new sources of
 26 EMFs, and no mitigation is required.

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

29 **NEPA Effects:** The amount and location of habitat restoration and enhancement that would occur
 30 under Alternative 9 would be similar to that described for Alternative 1A. Although there would be
 31 an increase in restored and enhanced aquatic habitat in the study area as a result of implementing
 32 Alternative 9, implementation of environmental commitments such as coordination with MVCDs and
 33 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
 34 Appendix 3B) would reduce the potential for an increase in mosquito breeding habitat, and a
 35 substantial increase in vector-borne diseases is unlikely to result. Furthermore, habitat would be
 36 restored in areas where potentially suitable habitat for mosquitoes already exists. Finally, mosquito
 37 predators (e.g., bats, spiders, etc.) would likely increase as a result of restoration and enhancement,
 38 which would keep mosquito populations in check. Therefore, effects would be the same under
 39 Alternative 9 as under Alternative 1A there would not be a substantial increase in the public's risk of
 40 exposure to vector-borne diseases with implementation of CM2-CM7, CM10 and CM11. Accordingly,
 41 there would be no adverse effect.

42 **CEQA Conclusion:** Habitat restoration and enhancement would result in an increased amount of
 43 land potentially suitable for vector habitat (e.g., mosquitoes). However, as described above in

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

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

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

25 **CEQA Conclusion:** Implementation of the restoration conservation measures under Alternative 9
 26 would support habitat types, such as wetlands and agricultural areas, that produce pathogens as a
 27 result of the biological productivity in these areas (e.g., migrating birds, application of fertilizers,
 28 waste products of animals). However, the localized nature of pathogen generation and the quick die-
 29 off of pathogens once released into water bodies would generally prevent substantial pathogen
 30 exposure to recreationists. Therefore, impacts would be less than significant and no mitigation is
 31 required.

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

34 **NEPA Effects:** The amount of habitat restoration under Alternative 9 would be the same as
 35 Alternative 1A. However, it is expected that different locations for restoration or enhancement
 36 activities could be chosen in the south Delta based on the creation of separate corridors with
 37 differing purposes. 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, as described under Alternative 1A. It is likely that the pesticide-
 40 bearing sediments would not be transported very far from the source area and would settle out with
 41 suspended particulates and be deposited close to the ROA. Further, CM2–CM22 do not include the
 42 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. Therefore, implementation of CM2, CM4, CM5,
 7 and CM10 under Alternative 9 is not expected to result in an adverse effect on public health with
 8 respect to pesticides or methylmercury.

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 of
 18 Alternative 9 would not substantially mobilize or substantially increase the public's exposure to
 19 constituents known to bioaccumulate and this impact would be less than significant. No mitigation is
 20 required.

21 25.4 Cumulative Analysis

22 25.4.1.1 Assessment Methodology

23 This cumulative impact analysis considers past, present, and reasonably foreseeable future projects
 24 that could affect the same resources and, where relevant, occur within the same time frame as the
 25 BDCP action alternatives. The effects of the BDCP action alternatives, as they relate to public health,
 26 considered in connection with the potential effects of projects (listed in Appendix 3D, *Defining*
 27 *Existing Conditions, the No Action/No Project, and Cumulative Impact Conditions*, as Table 3D-5) that
 28 may occur in the study area, could be cumulatively adverse. It is expected that some changes related
 29 to public health would take place, even though it is assumed that reasonably foreseeable future
 30 projects would include typical design and construction practices to avoid or minimize potential
 31 impacts.

32 The potential public health effects resulting from the BDCP action alternatives as addressed in this
 33 chapter are related to the following.

- 34 • Drinking water quality as related specifically to humans.
- 35 • Bioaccumulation of toxicants in fish and aquatic organisms that are consumed by humans.
- 36 • Pathogens in recreational waters.
- 37 • Vectors—specifically, disease-carrying mosquitoes.
- 38 • EMFs from transmission lines affecting the public.

1 These effects could occur during construction or operation of the BDCP, and they primarily would be
2 localized.

3 When the effects of any of the BDCP alternatives are considered in combination with the effects of
4 initiatives listed in Table 25-10, the cumulative effects on public health are potentially adverse. The
5 specific programs, projects, and policies are identified below for each impact category based on the
6 potential to contribute to a BDCP impact that could be deemed cumulatively considerable. For a
7 complete list of such projects, consult Appendix 3D, *Defining Existing Conditions, No Action*
8 *Alternative, No Project Alternative, and Cumulative Impact Conditions*. The potential for cumulative
9 impacts on public health is described for effects related to the construction and operation of the
10 water conveyance facilities (CM1) and effects stemming from the long-term implementation of
11 CM2–CM22.

12 **Table 25-10. Effects on Public Health from the Plans, Policies, and Programs Considered for Cumulative**
13 **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.

Agency	Program/ Project	Status	Description of Program/Project	Effects 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, 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 (SMP)	Final EIS/EIR 2011	The SMP is intended to balance the benefits of tidal wetland restoration with other habitat uses in the 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.
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.
California Department of Water Resources and U.S. Bureau of Reclamation	Franks Tract Project	Delayed (DWR 2012)	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.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
Semitropic Water District	Delta Wetlands Project	Final EIR 2011.	Flood storage and habitat restoration project on three Delta islands.	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.
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, 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, 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.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
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	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.
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.

1

2 If the cumulative public health effects (which includes implementation of the BDCP along with past,

3 present, and reasonably foreseeable future projects, population growth, and climate change) for any

4 of the five identified impacts listed above is determined not to be adverse (or significant under

5 CEQA), then no further assessment is required. No further assessment is required because a non-

1 adverse cumulative condition demonstrates that the alternative would not have adverse effects that
2 are individually less than significant but that would “cumulate” or “be additive” with those of other
3 past, present, and reasonably foreseeable projects to result in an adverse cumulative effect. In this
4 case, because the cumulative condition would not be adverse, and the alternative implemented
5 would not contribute considerably to an adverse cumulative condition, no mitigation would be
6 triggered from this cumulative impact assessment finding. Conversely, if the cumulative condition
7 for public health is determined to be adverse, then further assessment is provided to determine if
8 the incremental contribution of the alternatives would contribute considerably to that adverse
9 cumulative condition. If an alternative’s implementation would not contribute considerably to the
10 adverse cumulative effects identified, then no mitigation is required. However, if an alternative’s
11 implementation would contribute considerably to the adverse cumulative effects identified, then
12 mitigation for the alternative’s contribution to the identified adverse cumulative public health
13 effects is proposed.

14 ***No Action Alternative***

15 Under the cumulative condition, the No Action Alternative would entail construction and/or
16 operation and maintenance of the projects in Table 25-9. These projects could result in adverse
17 effects on the public health by lowering drinking water quality due to exceedances of water quality
18 criteria for constituents of concern (trace metals of human health/drinking water concern, DBP, and
19 non-bioaccumulative pesticides); exposing sensitive receptors (e.g., hospitals, schools, parks) to
20 EMF from new transmission lines; increasing the public’s risk of exposure to vector-borne diseases;
21 increasing bioaccumulation of persistent toxicants (e.g., mercury) in fish consumed by people; and
22 exposing the public to pathogens in recreational waters. Additionally, there would be a change in
23 various source waters throughout the Delta (i.e., upstream water, Bay water, agricultural return
24 flow) due to potential changes in inflows, particularly from the Sacramento River watershed
25 because of increased water demands or changes to climate and precipitation levels which could
26 expose the public to pathogens in recreational waters.

27 However, implementation of any projects would conform with federal, state, and local regulatory
28 agency standards (e.g., CPUC design criteria and guidelines regarding EMFs; drinking water quality
29 standards; existing MVCDS) and these projects in the cumulative No Action scenario would require
30 its own separate environmental compliance process to ensure effects were minimized. Therefore,
31 there would be no cumulative adverse effects on public health under the No Action Alternative
32 related to drinking water quality due to exceedances of water quality criteria for constituents of
33 concern; EMF exposure; vector-borne diseases; bioaccumulation of persistent toxicants; or
34 pathogens in recreational waters.

35 The Delta and vicinity are within a highly active seismic area, with a generally high potential for
36 major future earthquake events along nearby and/or regional faults, and with the probability for
37 such events increasing over time. Based on the location, extent and non-engineered nature of many
38 existing levee structures in the Delta area, the potential for significant damage to, or failure of, these
39 structures during a major local seismic event is generally moderate to high. In the instance of a large
40 seismic event, levees constructed on liquefiable foundations are expected to experience large
41 deformations (in excess of 10 feet) under a moderate to large earthquake in the region. A major
42 earthquake event could result in breaching/failure of existing levees within the Delta area, with a
43 substantial number of these structures exhibiting moderate to high failure probabilities. The most
44 immediate and significant effect to water quality under such a scenario would be the influx of large
45 volumes of seawater and/or brackish water into the Delta, which would alter the “normal” balance

1 of freshwater/seawater flows and result in flooding of the associated islands. The corresponding
 2 shift in Delta water quality conditions would be characterized by an increase in salinity levels,
 3 including specific associated constituents such as bromide (which affects total dissolved solids
 4 concentrations and can contribute to the formation of undesirable chemical byproducts in treated
 5 drinking water). (See Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water*
 6 *Supplies* for more detailed discussion). Flooding caused by levee failure could result in a substantial
 7 increase in the public's risk of exposure to vector-borne diseases due to large bodies of standing
 8 water prior to flood waters being pumped off inundated Delta islands. Additionally, flood events
 9 could cause exceedance(s) of water quality criteria for constituents of concern such that an adverse
 10 effect would occur to public health from drinking water sources. While similar risks would occur
 11 under implementation of the action alternatives, these risks may be reduced by BDCP-related levee
 12 improvements along with those projects identified in Table 25-10.

13 **Impact PH-8: Cumulative Impact on Public Health from Constituents of Concern (DBPs and** 14 **Pesticides)**

15 *NEPA Effects:*

16 **Alternatives 1A–1C, 2A–2C, 3, 4, 5, 6A–6C, 7, 8, and 9 (Pesticides)**

17 Currently, other projects that could affect drinking water include the projects listed in Table 25-10.
 18 These projects may result in changes to flow in the Plan Area and thus could alter surface water
 19 pesticide concentrations in the study area. While factors such as TMDLs and future development of
 20 more target-specific and less-toxic pesticides would ultimately influence the future cumulative
 21 condition for pesticides, forecasting whether these various efforts would ultimately be successful at
 22 resolving current pesticide related impairments requires considerable speculation. Accordingly, it is
 23 conservatively assumed that the cumulative condition would be adverse with respect to pesticides.
 24 Construction and operation of the water conveyance facilities for Alternatives 1A–1C are not
 25 expected to contribute considerably to the adverse cumulative condition associated with increases
 26 in pesticide concentrations in surface water and, consequently, in drinking water. Further, although
 27 there would be forecasted increases in pesticide concentrations in surface water at various Delta
 28 locations in the study area, according to modeling results for water supply operations for some
 29 proposed BDCP action alternatives (as previously indicated under Impact PH-2 for Alternatives 2A–
 30 2C, 3–5, 6A–6C, and 7–9), the prediction of adverse effects (the long-term risk of pesticide-related
 31 toxicity to aquatic life) fundamentally assumes that the present pattern of pesticide incidence in
 32 surface water would continue at similar levels into the future. In reality the makeup and character of
 33 the pesticide use market during the late long-term would not be exactly as it is today. Use of
 34 chlorpyrifos and diazinon is on the decline with their replacement by pyrethroids on the rise. Yet, in
 35 this assessment it is the apparent greater incidence of diazinon and chlorpyrifos in the San Joaquin
 36 River that serves as the basis for concluding that substantially increased San Joaquin River source
 37 water fraction would correspond to an increased risk of pesticide-related toxicity to aquatic life.
 38 However, drinking water from the study area would continue to be treated prior to distribution into
 39 the drinking water system, and water treatment plants are required to meet drinking water
 40 requirements set forth in the California Safe Drinking Water Act and the regulations adopted by
 41 CDPH. Therefore, it is not anticipated that there would be a cumulatively considerable contribution
 42 to adverse effects on public health from pesticides in drinking water due to implementation of BDCP
 43 action alternatives; nor would implementation of the BDCP action alternatives in combination with
 44 any of the projects listed in Table 25-10 be expected to result in a cumulative adverse effect on
 45 public health with regards to pesticides in drinking water in the study area associated with DOC.

1 Therefore, these BDCP alternatives would not have substantially adverse cumulative effects on
2 DOC/DPBs and pesticides. Implementing the projects listed in Table 25-10 in combination with any
3 of these BDCP alternatives is not anticipated to result in the potential for increases in public health
4 concerns because changes in existing concentrations of DBPs, trace metals, or pesticides affecting
5 water quality could occur from cumulative project actions that affect the location, timing, and
6 amount of water diversions; but the changes in flows would not be considerable.

7 **Alternatives 1A–1C, 2A–2C, 3, 4, 5, 6A–6C, 7, 8, and 9 (DBPs) [from increases in bromide**
8 **concentrations]**

9 Currently, other projects that could affect concentrations of constituents of concern in drinking
10 water include the projects listed in Table 25-10. These projects may result in changes to flow in the
11 study area and thus could alter DBP concentrations (from increases in bromide concentrations in
12 surface water drinking sources). The BDCP action alternatives are anticipated to result in the
13 potential for public health concerns because the changes in flow associated with the water
14 conveyance facilities operations would increase the concentrations of bromide at various modeled
15 Delta locations, with the greatest increase projected to occur at the North Bay Aqueduct at Barker
16 Slough. This increase could necessitate drinking water treatment plant upgrades or operational
17 changes in order to maintain DBP compliance. While treatment technologies sufficient to achieve the
18 necessary bromide removal exist, implementation of such technologies would likely require
19 substantial investment in new or modified infrastructure. Should treatment plant upgrades not be
20 undertaken, a change of such magnitude in long-term average bromide concentrations in drinking
21 water sources would represent an increased risk for adverse effects on public health from DBP in
22 drinking water sources. Further, as described for Impact PH-2 under Alternative 1A, the adverse
23 water quality effects on the North Bay Aqueduct at Barker Slough may be further minimized by
24 implementation of the AIP. However, when these potential effects of the BDCP on public health are
25 considered in connection with the potential effects of projects listed in Table 25-10 and in Appendix
26 3D, *Defining Existing Conditions, the No Action Alternative, No Project Alternative, and Cumulative*
27 *Impact Conditions*, the potential cumulative effects are anticipated to be substantially adverse.

28 **Alternatives 6A–C, 7, 8, and 9 (DBPs [from increases in DOC concentrations])**

29 Currently, other projects that could affect drinking water include the projects listed in Table 25-10.
30 These projects may result in changes to flow in the study area and thus could alter DOC/DBP
31 concentrations in the study area. Furthermore, since the Bay-Delta is currently known to have
32 elevated DOC levels exceeding standards, the cumulative condition generated from past and present
33 projects is already considered adverse.

34 Alternatives 6A–6C and 7–9 could have substantially adverse effects on public health associated
35 with DBPs in drinking water as a result of increases in DOC concentrations at certain Delta locations.
36 Operation of the water conveyance facilities under these alternatives would result in increased DOC
37 levels at Franks Tract, Rock Slough and Contra Costa Pumping Plant No. 1. Under these alternatives,
38 long-term average DOC concentration could increase by up to 41%, relative to the No Action
39 Alternative. This increase could necessitate drinking water treatment plant upgrades or operational
40 changes in order to maintain DBP compliance. Thus, the DOC contributions at Franks Tract, Rock
41 Slough, and Contra Costa Pumping Plant No. 1 from these proposed BDCP action alternatives are
42 determined to contribute considerably to the adverse cumulative condition for DOC in the Delta and
43 potentially DBPs in drinking water, which could result in an adverse effect on public health. While
44 Mitigation Measure WQ-17 is available to reduce impacts associated with DOC, it is unknown

1 whether it would reduce potential adverse effects entirely. Therefore, this impact would be
2 cumulatively considerable.

3 **CEQA Conclusion:** Operation of cumulative projects within the Delta could result in cumulative
4 impacts on public health related to increases in DBPs in drinking water. DOC concentrations could
5 increase by up to 46% at Franks Tract, Rock Slough and Contra Costa Pumping Plant No. 1 relative to
6 Existing Conditions under Alternatives 6A–6C and 7–9. This cumulative impact is considered
7 significant and the incremental contribution from the BDCP action alternatives discussed would be
8 cumulatively considerable. Mitigation Measure WQ-5 is available to reduce these effects
9 (implementation of this measure along with a separate, non-environmental commitment as set forth
10 in EIR/EIS Appendix 3B, *Environmental Commitments*, relating to the potential increased treatment
11 costs associated with bromide-related changes would reduce these effects). While Mitigation
12 Measures WQ-5 and implementation of the AIP may reduce impacts associated with increase
13 bromide concentrations at Barker Slough, and Mitigation Measure WQ-17 may reduce impacts
14 associated with DOC, it is unknown to what level of reduction (i.e., below significance).

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

35 **Mitigation Measure WQ-5: Avoid, Minimize, or Offset, as Feasible, Adverse Water Quality**
36 **Conditions**

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

38 **Mitigation Measure WQ-17: Consult with Delta Water Purveyors to Identify Means to**
39 **Avoid, Minimize, or Offset Increases in Long-Term Average DOC Concentrations**

40 Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A.

1 **Impact PH-9: Cumulative Impact from Substantial Mobilization of or Increase in Constituents**
2 **Known to Bioaccumulate as a Result of Construction, Operation or Maintenance of the Water**
3 **Conveyance Facilities or as a Result of Implementing the Restoration Conservation Measures**

4 **NEPA Effects:**

5 **Alternatives 1A– 5**

6 Numerous regulatory efforts have been implemented to control and reduce mercury loading to the
7 Delta, which include a Delta mercury TMDL and its implementation strategies, increased restrictions
8 on point-source discharges such as publically owned treatment works (POTWs), greater restrictions
9 on suction dredging in Delta tributary watersheds, and continued clean-up actions on mine drainage
10 in the upper watersheds. A key challenge surrounds the pool of mercury deposited in the sediments
11 of the Delta, which cannot be readily or rapidly reduced despite efforts to reduce loads in Delta
12 tributaries, and which serves as a source for continued methylation and bioaccumulation of
13 methylmercury by Delta biota. Consequently, mercury levels in Delta waters are considered to be an
14 adverse cumulative condition.

15 Projects shown in Table 25-10 could affect constituents known to bioaccumulate, such as
16 methylmercury. These projects are not anticipated to substantially increase methylmercury
17 concentrations in the study area because they are not anticipated to have actions that would
18 mobilize such a constituent. Once operational, the habitat restoration projects could result in an
19 increase of methylmercury in the study area as a result of biogeochemical processes and sediment
20 conditions established in tidal wetlands. However, it is expected these projects either have
21 evaluated or would evaluate the potential for methylmercury production and would implement
22 measures to monitor and adaptively manage methylmercury production. For example, the Suisun
23 Marsh Plan EIR/EIS evaluated the potential for methylmercury production due to tidal restoration
24 and determined it would result in less-than-significant impacts and that monitoring and other
25 measures would be incorporated into the adaptive management plan to manage methylmercury
26 concerns. Therefore, the habitat restoration projects that would occur under the No Action
27 Alternative are not likely to adversely affect public health. However, because the existing condition
28 is already considered cumulatively adverse, the cumulative effect of these tidal restoration projects
29 would be considered adverse.

30 Based on water quality modeling results, water conveyance facilities operation and maintenance
31 (CM1) for Alternatives 1A–5 would not be expected to substantially alter the existing adverse
32 cumulative condition for mercury and the mercury impairment in the Delta. Therefore, the
33 incremental contribution to the existing adverse cumulative condition would not be considered
34 significant. In addition, CM12 *Methylmercury Management* would seek to manage and reduce
35 methylmercury mobilization levels in the Delta, and existing OEHHA standards would reduce the
36 public's exposure to mercury-contaminated fish. However, implementation of CM4 (tidal wetland
37 habitat), CM5 (floodplain habitat), CM10 (nontidal marsh habitat), and possibly CM 2 (Yolo Bypass
38 fisheries enhancements) could create conditions resulting in increased methylation of mercury
39 within the Delta per unit time, increased biotic exposure to and uptake of methylmercury, and result
40 in increased mercury bioaccumulation in fish tissues. The incremental contribution of implementing
41 these conservation measures in combination with projects shown in Table 25-10 could make a
42 cumulatively considerable contribution to methylation of mercury in these restored wetland
43 habitats and to the existing cumulative condition for mercury in the Delta. Because the existing
44 condition is already considered cumulatively adverse, the cumulative effect would be adverse.

1 **Alternatives 6A–C and 7–9**

2 Water quality modeling results for Alternatives 6A–C and 7–9 water supply operations indicate that
 3 there may be small, insignificant increases in waterborne mercury and methylmercury
 4 concentrations at various modeled Delta locations within the study area; these increases are not
 5 expected to substantially alter the existing adverse cumulative condition for mercury and the
 6 mercury impairment in the Delta. Therefore, the incremental contribution to the existing adverse
 7 cumulative condition for waterborne mercury in the study area would not be considered adverse.

8 However, under Alternatives 6A–6C and 7–9, modeling results indicated that water supply
 9 operations would result in substantial increases in fish tissue mercury concentrations at certain
 10 Delta locations (see Impact PH-3 for Alternatives 6A–6C and 7–9) relative to the No Action
 11 Alternative. Thus, body burdens of mercury in fish would be measurably higher, and could thereby
 12 substantially increase the health risks to people consuming those fish. The incremental contribution
 13 of operating the water conveyance facilities under these action alternatives to increasing fish tissue
 14 mercury concentrations in fish, and thus contributing to potential public health effects from
 15 mercury bioaccumulation in the study area is considered cumulatively considerable and
 16 cumulatively adverse.

17 Further, as would occur for implementation of Alternatives 1A–5, implementation of CM4 (tidal
 18 wetland habitat), CM5 (floodplain habitat), CM10 (nontidal marsh habitat), and possibly CM 2 (Yolo
 19 Bypass fisheries enhancements) could create conditions resulting in increased methylation of
 20 mercury within the Delta per unit time, increased biotic exposure to and uptake of methylmercury,
 21 and result in increased mercury bioaccumulation in fish tissues. The incremental contribution of
 22 implementing these conservation measures in combination with projects shown in Table 25-10
 23 could make a cumulatively considerable contribution to methylation of mercury in these restored
 24 wetland habitats and to the existing cumulative condition for mercury in the Delta. Because the
 25 baseline condition is already considered cumulatively adverse, the cumulative effect would be
 26 adverse.

27 **CEQA Conclusion:** Water conveyance facilities operations and maintenance under Alternatives 1A–9
 28 would not be expected to substantially alter the existing adverse cumulative condition for mercury
 29 and the Delta’s mercury impairment. However, water quality modeling results indicate that water
 30 supply operations for Alternatives 6A–6C and 7–9 would result in substantial increases in fish tissue
 31 mercury concentrations at certain Delta locations. Additionally, implementing CM4, CM5, CM10, and
 32 possibly CM2 could create conditions resulting in increased methylation of mercury within the Delta
 33 per unit time, increased biotic exposure to and uptake of methylmercury, and result in increased
 34 mercury bioaccumulation in fish tissues. These potential increases in the bioaccumulation of
 35 mercury by fish in the study area could increase the health risks to people consuming those fish. As
 36 such, this would result in a significant cumulative impact and the incremental contribution to this
 37 impact of the BDCP action alternatives would be cumulatively considerable.

38 **Impact PH-10: Cumulative Impact on Public Health from Construction, Operation or** 39 **Maintenance of the BDCP Alternatives with Respect to Pathogens, Trace Metals, Vectors, and** 40 **EMFs**

41 **NEPA Effects:** When the effects of implementing any one of the BDCP Alternatives 1A–9 on
 42 pathogens and trace metals (including the new water conveyance facilities, fish screens, gates, and
 43 other physical structures and their operations and maintenance activities) are considered together
 44 with the potential effects of projects listed in Table 25-10 and Appendix 3D, *Defining Existing*

1 *Conditions, the No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, the
2 cumulative water quality condition in the study area for the pathogens and trace metals is not
3 considered to be adverse. Primary sources of trace metals to Delta waters include acid mine
4 drainage (e.g., zinc, cadmium, copper, lead) from abandoned and inactive mines (i.e., Iron Mountain
5 and Spring Creek mines) in the Shasta watershed area, which enter the Sacramento River system
6 through Shasta Lake and Keswick Reservoir; agriculture (e.g., copper and zinc); POTW discharges
7 (e.g., copper, zinc, and aluminum); and urban runoff (e.g., zinc, copper, lead, cadmium). Continued
8 efforts to control acid mine drainage into the Sacramento River system and increasingly stringent
9 regulations are expected in the future. Monitoring and regulatory controls on agricultural runoff,
10 POTW discharges, and urban runoff are anticipated to prevent trace metal concentration under the
11 cumulative condition from becoming adverse.

12 There are numerous potential sources of disease-causing pathogens in the Delta, including urban
13 runoff, wastewater treatment discharges, agricultural discharges, and wetlands. Tidal wetland
14 creation, which would occur under several of the cumulative projects and the BDCP, could
15 encourage increased coliform presence because of the aquatic, terrestrial, and avian wildlife that
16 would be drawn to these areas. However, the localized nature of pathogen generation and the quick
17 die-off of pathogens once released into water bodies would generally prevent substantial pathogen
18 exposure to recreationists and the cumulative effect would not be considerable or adverse.
19 Accordingly, the incremental contribution of the BDCP would not be cumulatively considerable.

20 Although the cumulative projects could result in an increase in potential mosquito habitat (e.g.,
21 more standing shallow water), vector habitat is already present in the study area and programs to
22 prevent mosquitoes from breeding and multiplying are in place. With any BDCP alternative,
23 implementation of environmental commitments, such as coordination with MVCDs and
24 implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in
25 Appendix 3B), would help control mosquitoes and reduce the potential for an increase in mosquito
26 breeding habitat, and a cumulatively considerable increase in vector-borne diseases is unlikely to
27 result. Furthermore, predators on mosquitoes would likely increase as result as restoration and
28 enhancement actions undertaken for the cumulative projects, including the BDCP. Therefore a BDCP
29 alternative's incremental impacts associated with vectors would not be cumulatively considerable
30 or adverse.

31 Past, present and reasonably foreseeable future projects have resulted in the development and
32 operation of transmission lines in the study area that expose existing populations and sensitive
33 receptors to EMFs. Although existing populations and sensitive receptors are exposed to EMFs, it is
34 not considered a cumulatively considerable condition because current scientific evidence does not
35 show conclusively that EMF exposure can increase health risks. Design and implementation of new
36 temporary or permanent transmission lines under BDCP alternatives would follow CPUC's EMF
37 Design Guidelines for Electrical Facilities, which includes shielding, cancellation, and measures to
38 reduce EMF exposure. Accordingly, although BDCP alternatives (except for Alternative 9) would
39 have new EMF-generating facilities, they would not be a cumulatively considerable incremental
40 contribution. There would not be a cumulative or adverse effect with respect to an increase in public
41 exposure to EMFs.

42 **CEQA Conclusion:** Construction, and operation and maintenance of cumulative projects within the
43 Delta would not result in cumulative impacts on public health related to pathogens, trace metals,
44 disease vectors, or electromagnetic fields. This cumulative impact is not considered significant and
45 the incremental contribution from BDCP alternatives would not be cumulatively considerable.

25.5 References Cited

- Ackerman, J. T. and C. A. Eagles-Smith. 2010. Agricultural Wetlands as Potential Hotspots for Mercury Bioaccumulation: Experimental Evidence Using Caged Fish. *Environmental Science & Technology*. 44(4):1451-1457.
- Alameda County. 2000. *East County Area Plan*. Oakland, CA. Environmental Health and Safety Element. Adopted May 1994. Modified by passage of Measure D, effective December 22, 2000. Oakland, California. Available: <<http://www.acgov.org/cda/planning/generalplans/>>. Accessed: January 12, 2012.
- Alameda County Mosquito Abatement District. 2011. *The Alameda County Mosquito Abatement District Control Program*. Hayward, CA. Available: <<http://www.mosquitoes.org/downloads/ControlProgramRevised-Small.pdf>>. Accessed: June 28, 2012
- Alameda County Vector Control Services District. 2009. Available: <<http://www.acvcسد.org/introduction.htm>>. Accessed: May 11, 2010.
- Alpers, C. N., C. Eagles-Smith, C. Foe, S. Klasing, M. C. Marvin-DiPasquale, D. G. Slotton, and L. Windham-Myers. 2008. *Sacramento-San Joaquin Delta Regional Ecosystem Restoration Implementation Plan, Ecosystem Conceptual Model: Mercury*. January. Sacramento, CA.
- Bay Delta and Tributaries Project. 2009. *Bay Delta and Tributaries Project*. Available: <<http://bdat.ca.gov/index.html>>. Accessed: March 2, 2009.
- CALFED Bay-Delta Program. 2000. *Final Programmatic Environmental Impact Statement/Environmental Impact Report*. July. Prepared for the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, Natural Resources Conservation Service, U.S. Army Corps of Engineers, and California Resources Agency. Sacramento, CA. State Clearinghouse # 96032083.
- . 2008. *The State of Bay-Delta Science, 2008*. CALFED Science Program.
- California Department of Public Health. 1999. *Short Fact Sheet on EMF*. Sacramento, CA. Available: <<http://www.ehib.org/emf/shortfactsheet.PDF>>. Accessed: April 13, 2012.
- . 2008. *Maximum Contaminant Levels and Regulatory Dates for Drinking Water. U.S. EPA vs. California*. November. Available: <<http://www.cdph.ca.gov/certlic/drinkingwater/Documents/DWdocuments/EPAandCDPH-11-28-2008.pdf>>. Accessed: March 7, 2012.
- . 2010a. *Mosquito-Borne Encephalitis/Encephalomyelitis*. Available: <<http://www.cdph.ca.gov/healthinfo/discond/Pages/MosquitoBorneEncephalitisEncephalomyelitis.aspx>>. Accessed: March 15, 2012.
- . 2010b. *West Nile Virus Activity by County*. Available: <http://westnile.ca.gov/case_counts.php?year=2010&limit_week=50&option=print>. Accessed: December 18, 2011.
- California Department of Water Resources. 2008. *Draft FloodSAFE Strategic Plan*. May. Sacramento, CA.

- 1 ———. 2009. *California Water Plan Update 2009, Volume 3*. Sacramento, CA.
- 2 California Office of Environmental Health Hazard Assessment. 2007. *Fish, Safe Eating Guidelines*.
3 Available: <http://www.oehha.ca.gov/fish/so_cal/index.html>. Accessed: March 8, 2012.
- 4 ———. 2008. *Development of Fish Contaminant Goals and Advisory Tissue Levels for Common*
5 *Contaminants in California Sport Fish: Chlordane, DDTs, Dieldrin, Methylmercury, PCBs, Selenium,*
6 *and Toxaphene*. June. Sacramento, CA.
- 7 California Public Utilities Commission. 2006. *EMF Design Guidelines for Electrical Facilities*. Available:
8 <[ftp://ftp.cpuc.ca.gov/puc/energy/environment/electromagnetic+fields/california+guidelines+](ftp://ftp.cpuc.ca.gov/puc/energy/environment/electromagnetic+fields/california+guidelines+for+electrical+facilities+072106+published.pdf)
9 [for+electrical+facilities+072106+published.pdf](ftp://ftp.cpuc.ca.gov/puc/energy/environment/electromagnetic+fields/california+guidelines+for+electrical+facilities+072106+published.pdf)>. Accessed: March 6, 2012.
- 10 ———. 2007. *What are EMF's?* Available: <[http://www.cpuc.ca.gov/PUC/](http://www.cpuc.ca.gov/PUC/energy/Environment/ElectroMagnetic+Fields/what_are_emf.htm)
11 [energy/Environment/ElectroMagnetic+Fields/what_are_emf.htm](http://www.cpuc.ca.gov/PUC/energy/Environment/ElectroMagnetic+Fields/what_are_emf.htm)>. Accessed: March 9, 2012.
- 12 ———. 2011. *Transmission Siting and Environmental Permitting*. Available:
13 <<http://www.cpuc.ca.gov/PUC/energy/Environment/index.htm>>. Accessed: December 10,
14 2011.
- 15 CalSurv. 2012. *California Vectorborne Disease Surveillance System*. Available:
16 <<http://www.calsurv.org/node/47>>. Accessed: March 9, 2012.
- 17 Central Valley Regional Water Quality Control Board. 2007. *Fourth Edition of the Water Quality*
18 *Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins*. October.
19 Sacramento, CA.
- 20 ———. 2008a. *Amendments to the Water Quality Control Plan for the Sacramento River and San*
21 *Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento–San*
22 *Joaquin Delta Estuary*. Staff report. February. Sacramento, CA.
- 23 ———. 2008b. *Sacramento–San Joaquin Delta Estuary TMDL for Methylmercury*. Staff report.
24 February. Sacramento, CA.
- 25 ———. 2010. Central Valley Pesticide TMDL and Basin Plan Amendment – Water Quality Criteria
26 Method Development; Phase III Reports. Available: <[http://www.waterboards.ca.gov/](http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/central_valley_pesticides/criteria_method/index.shtml)
27 [centralvalley/water_issues/tmdl/central_valley_projects/central_valley_pesticides/criteria_met](http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/central_valley_pesticides/criteria_method/index.shtml)
28 [hod/index.shtml](http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/central_valley_pesticides/criteria_method/index.shtml)>. Accessed April 2010.
- 29 Centers for Disease Control and Prevention. 2005. *Fact Sheet: Western Equine Encephalitis*. Available:
30 <<http://www.cdc.gov/ncidod/dvbid/arbor/weefact.htm>>. Accessed: April 21, 2012.
- 31 ———. 2011. *St. Louis Encephalitis - Epidemiology & Geographic Distribution*. Available:
32 <<http://www.cdc.gov/sle/technical/epi.html>>. Accessed: April 21, 2012.
- 33 Contra Costa Mosquito and Vector Control District. 2011. *Contra Costa Mosquito and Vector Control*
34 *District*. Available: <<http://www.ccmvcd.dst.ca.us/>>. Accessed: March 9, 2012.
- 35 Davis, J. A., B. K. Greenfield, G. Ichikawa, and M. Stephenson. 2008. Mercury in Sport Fish from the
36 Sacramento–San Joaquin Delta Region, California, USA. *Science of the Total Environment* 39:66–
37 75.

- 1 Desmarais, T. R., H. M. Solo-Gabriele, and C. J. Palmer. 2001. Influence of Soil on Fecal Indicator
2 Organisms in a Tidally Influenced Subtropical Environment. *Applied Environmental Microbiology*
3 68:1165–1172.
- 4 deVlaming, V. 2008. *Organochlorine Pesticides and Polychlorinated Biphenyls (PCB) Concentrations in*
5 *Muscle Tissue of Fish Collected from the San Joaquin River and Sacramento River Watersheds and*
6 *Delta During 2005*. March. Davis, CA. Prepared for Central Valley Regional Water Quality Control
7 Board, Rancho Cordova, CA.
- 8 Evanson, M. and R. F. Ambrose. 2006. Sources and Growth Dynamics of Fecal Indicator Bacteria in a
9 Coastal Wetland System and Potential Impacts to Adjacent Waters. *Water Research* 40:475–486.
- 10 Foe, C. 2003. *Mercury Mass Balance for the Freshwater Sacramento–San Joaquin Bay-Delta Estuary*.
11 Available: <[http://mercury.mlml.calstate.edu/wp-content/uploads/2008/12/finalrpt-task-1a-](http://mercury.mlml.calstate.edu/wp-content/uploads/2008/12/finalrpt-task-1a-1b-foe-final-calfed-hg-report.pdf)
12 [1b-foe-final-calfed-hg-report.pdf](http://mercury.mlml.calstate.edu/wp-content/uploads/2008/12/finalrpt-task-1a-1b-foe-final-calfed-hg-report.pdf)>. Accessed: March 15, 2012.
- 13 Foe, C., S. Louie, and D. Bosworth. 2008. *Methylmercury Concentrations and Loads in the Central*
14 *Valley and Freshwater Delta*. Final Report. Prepared for the CALFED Bay-Delta Program for the
15 Transport, Cycling and Fate of Mercury and Monomethylmercury in the San Francisco Delta and
16 Tributaries Project Task 2. Available: <<http://mercury.mlml.calstate.edu/reports/reports/>>.
17 Accessed: September 28, 2011.
- 18 Goodard, L., A. E. Roth, W. K. Reisen, and T. W. Scott. 2002. Vector Competence of California
19 Mosquitoes for West Nile Virus. *Emerging Infectious Diseases* 8 (12):1385–1390.
- 20 Grant, S. B., B. F. Sanders, A. B. Boehm, J. A. Redman, J. H. Kim, R. D. Mrše, A. K. Chu, M. Gouldin, C. D.
21 McGee, N. A. Gardiner, B. H. Jones, J. Svejksky, G. V. Leipzig, and A. Brown. 2001. Generation of
22 Enterococci Bacteria in a Coastal Saltwater Marsh and its Impact on Surf Zone Water Quality.
23 *Environmental Science and Technology* 35:2407–2416.
- 24 Kramer, V. L., J. N. Collins, and C. Beesley. 1992. Reduction of Salt Marsh Mosquitos by Enhancing
25 Tidal Action. *Proceedings of the Contra Costa Mosquito and Vector Control District 60th Annual*
26 *Conference* 60:21–25.
- 27 Kramer, V. L., J. N. Collins, K. Malamud-Roam, and C. Beesley. 1995. Reduction of *Aedes Dorsalis* by
28 Enhancing Tidal Action in a Northern California Marsh. *Journal of the American Mosquito Control*
29 *Association* 11(4):389–395.
- 30 Kwansy, Dean C., Mike Wolder, and Craig R. Isola. 2004. *Technical Guide to Best Management*
31 *Practices for Mosquito Control in Managed Wetlands*. June. Sacramento, CA. Prepared for Central
32 Valley Joint Venture, Sacramento, CA.
- 33 Marin/Sonoma Mosquito and Vector Control District. 2009. *Marin/Sonoma Mosquito & Vector*
34 *Control District: Vectors*. Available: <<http://www.msosquito.com>>. Accessed: July 8, 2009.
- 35 Napa County Mosquito Abatement District. 2006. *Napa County Mosquito Abatement: Mosquitoes*.
36 Available: <<http://napamosquito.org>>. Accessed: March 9, 2012.
- 37 National Institute of Environmental Health Sciences and National Institutes of Health. 2002. *EMF*
38 *Questions and Answers: Electric and Magnetic Fields Associated with the Use of Electric Power*.
39 June. Washington, DC.

- 1 Pacific Gas and Electric Company. 2011a. *EMF Frequently Asked Questions*. Available:
2 <<http://www.pge.com/myhome/edusafety/systemworks/electric/emf/faqs/>>. Accessed:
3 November 22, 2011.
- 4 ———. 2011b. *Electric Preliminary Statement Part Y*. Available:
5 <http://www.pge.com/tariffs/tm2/pdf/ELEC_PRELIM_Y.pdf>. Accessed: November 22, 2011.
- 6 ———. 2011c. *Understanding Electric and Magnetic Field*. Available:
7 <<http://www.pge.com/myhome/edusafety/systemworks/electric/emf/>>. Accessed: November
8 22, 2011.
- 9 Reisen, W. 1993. The Western Encephalitis Mosquito, *Culex tarsalis*. *Wing Beats* 4(2):16.
- 10 Reiter, P. 2001. Climate Change and Mosquito-Borne Disease. *Environmental Health Perspectives* 109
11 (1):141–161.
- 12 Sacramento County. 2011. *Sacramento County General Plan of 2005–2030*. Amended and adopted
13 November 9. Community Planning and Development Department. Sacramento, CA. Available:
14 <<http://www.msa2.saccounty.net/planning/Pages/GeneralPlan.aspx>>. Accessed: January 24,
15 2012.
- 16 Sacramento-Yolo Mosquito and Vector Control District. 2008. *Mosquito Reduction Best Management*
17 *Practices*. Available:
18 <http://fightthebite.net/download/ecomangement/SYMVCD_BMP_Manual.pdf>. Accessed:
19 November 6, 2011.
- 20 ———. 2009. Sacramento-Yolo Mosquito & Vector Control District: Mosquitoes.
21 Available:<<http://www.fightthebite.net/mosquitos/>>. Accessed: March 9, 2012.
- 22 San Francisco Bay Regional Water Quality Control Board. 2008. Order No. R2-2008-0012. *Amending*
23 *the Water Quality Control Plan for the San Francisco Bay Region to Establish a Total Maximum*
24 *Daily Load and Implementation Plan for PCBs in the San Francisco Bay*. Available:
25 <http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/sfbay_pcb/r2_2008_00
26 12.pdf>. Accessed: January 31, 2011.
- 27 ———. 2011. *San Francisco Bay Basin (Region 2) Water Quality Control Plan*. Available:
28 <http://www.swrcb.ca.gov/rwqcb2/basin_planning.shtml>. Accessed: March 9, 2012.
- 29 San Joaquin County Mosquito and Vector Control District. 2009. *San Joaquin County Mosquito &*
30 *Vector Control District: Vectors*. Available: <<http://sjmosquito.org/>>. Accessed: June 30, 2009.
- 31 Santa Cruz County Government Environmental Health Services. 2011. *Most Important Mosquito*
32 *Species in Santa Cruz County*. Available: <[http://sccounty01.co.santa-](http://sccounty01.co.santa-cruz.ca.us/eh/Medical_Waste/mosquito_species.htm)
33 [cruz.ca.us/eh/Medical_Waste/mosquito_species.htm](http://sccounty01.co.santa-cruz.ca.us/eh/Medical_Waste/mosquito_species.htm)>. Accessed: December 12, 2011.
- 34 Semple, K. T., K. J. Doick, K. C. Jones, P. Burauel, A. Craven, and H. Harms. 2004. Defining
35 Bioavailability and Bioaccessibility of Contaminated Soil and Sediment is Complicated.
36 *Environmental Science Technology* 38:228A–231A.
- 37 Slotton, D. G., S. M. Ayers, and R. D. Weyand. 2007. *CBDA Biosentinel Mercury Monitoring Program*.
38 Second Year Draft Data Report. May. Davis, CA. Prepared by the Department of Environmental
39 Science and Policy, University of California, Davis.

- 1 Solano County Mosquito Abatement District. 2005. *Solano County Mosquito Abatement District:*
2 *Mosquitoes*. Available: <<http://www.solanomosquito.com/>>. Accessed: March 5, 2012.
- 3 ———. 2013. *About Us*. Available: <<http://www.solanomosquito.com/aboutus.html>>. Accessed:
4 June 28, 2013.
- 5 State Water Resources Control Board. 2007. *Bioaccumulation of Pollutants in California Waters*.
6 Surface Water Ambient Monitoring Program. October. Available:
7 <http://www.swrcb.ca.gov/water_issues/programs/swamp/bop.shtml>. Accessed: March 7,
8 2012.
- 9 ———. 2008. *San Francisco Bay Mercury TMDL Approval and Implementation*.
10 <http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaymerc
11 [urytmdl.shtml](http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaymerc)>. Accessed: March 7, 2012.
- 12 Stephenson, M., C. Foe, G. Gill, and K. H. Coale. 2007. *Transport, Cycling, and Fate of Mercury and*
13 *Monomethyl Mercury in the San Francisco Delta and Tributaries: An Integrated Mass Balance*
14 *Assessment and Approach*. CALFED Mercury Project Annual Report. April. Sacramento, CA.
- 15 Sutter-Yuba Mosquito Vector Control District. 2012a. *Other Vector-Borne Diseases: Hantavirus*.
16 Available: <<http://www.sutter-yubamvcd.org/>>. Accessed: April 16, 2012.
- 17 ———. 2012b. *Other Vector-Borne Diseases: Plague*. Available: <<http://www.sutter->
18 [yubamvcd.org/](http://www.sutter-yubamvcd.org/)>. Accessed: April 16, 2012.
- 19 ———. 2012c. *Other Vector-Borne Diseases: Rabies*. Available: <<http://www.sutter-yubamvcd.org/>>.
20 Accessed: April 16, 2012.
- 21 Tetra Tech. 2007. *Conceptual Model for Pathogen Indicators in the Central Valley and Sacramento-San*
22 *Joaquin Delta*. August. Prepared for the Central Valley Drinking Water Policy Group.
- 23 U.S. Environmental Protection Agency. 1999. *Cryptosporidiosis: Guidance for People with Severely*
24 *Weakened Immune Systems*. June. EPA 816-F-99-005. Washington, DC.
- 25 ———. 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. Final.
26 January. (EPA-823-R-01-001.) Washington, DC. Available:
27 <[http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/pollutants/methylmercu](http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/pollutants/methylmercury/upload/mercury2010.pdf)
28 [ry/upload/mercury2010.pdf](http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/pollutants/methylmercury/upload/mercury2010.pdf)>. Accessed: March 28, 2012
- 29 ———. 2006. *An Inventory of Sources and Environmental Releases of Dioxin-like Compounds in the*
30 *United States for the Years 1987, 1995, and 2000*. EPA/600/P-03/002F. Washington, DC: National
31 Center for Environmental Assessment.
- 32 ———. 2012a. *Drinking Water Contaminants*. Available:
33 <<http://www.safewater.org/PDFS/knowthefacts/RegulatedContaminants.pdf>>. Accessed:
34 March 28, 2012.
- 35 ———. 2012b. *Basic Information about Lead in Drinking Water*. Available:
36 <<http://water.epa.gov/drink/contaminants/basicinformation/lead.cfm>>. Last updated: March
37 6, 2012. Accessed: April 16, 2012.
- 38 ———. 2013. *Basic Information about Pathogens and Indicators in Drinking Water*. Last updated
39 January 24, 2013. Available:

- 1 <<http://water.epa.gov/drink/contaminants/basicinformation/pathogens.cfm>>. Accessed: June
2 28, 2013.
- 3 U.S. Fish and Wildlife Service. 1992. *Stone Lakes National Wildlife Refuge Project, Sacramento County,*
4 *CA. Final Environmental Impact Statement. (JSA 91-047). With technical assistance provided by*
5 *Jones & Stokes Associates, Inc., Sacramento, CA.*
- 6 U.S. Food and Drug Administration. 2011. *What you Need to Know About Mercury in Fish and*
7 *Shellfish.* Available: <[http://www.fda.gov/Food/FoodSafety/Product-](http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FoodbornePathogensContaminants/Methylmercury/ucm115662.htm)
8 [SpecificInformation/Seafood/FoodbornePathogensContaminants/Methylmercury/ucm115662.](http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FoodbornePathogensContaminants/Methylmercury/ucm115662.htm)
9 [htm](http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FoodbornePathogensContaminants/Methylmercury/ucm115662.htm)>. Accessed: March 12, 2012.
- 10 U.S. Geological Survey. 1995. Conversion Factors and Abbreviated Water Quality Units. In Meade,
11 Robert H. (ed.), *Contaminants in the Mississippi River.* USGS Circular 1133. Reston, VA. Available:
12 <<http://pubs.usgs.gov/circ/circ1133/conversion-factors.html>>. Accessed: July 3, 2012.
- 13 Werner, I., S. Anderson, K. Larsen, and J. Oram. 2008. *Sacramento–San Joaquin Delta Regional*
14 *Ecosystem Restoration Implementation Plan Ecosystem Conceptual Model: Chemical Stressors in*
15 *the Sacramento–San Joaquin Delta.* Sacramento, CA.
- 16 Williams, P. and P. Faber. 2004. *Design Guidelines for Tidal Wetland Restoration in San Francisco Bay.*
17 The Bay Institute and California State Coastal Conservancy, Oakland, CA. Available:
18 <http://www.wrmp.org/design/Guidelines_Report-Final.pdf>. Accessed: November 6, 2011.
- 19 Windham-Myers, L., M. Marvin-Dipasquale, D. P. Krabbenhoft, J. L. Agee, M. H. Cox, P. Heredia-
20 Middleton, C. Coates, and E. Kakouros. 2009. Experimental Removal of Wetland Emergent
21 Vegetation Leads to Decreased Methylmercury Production in Surface Sediment. *Journal of*
22 *Geophysical Research-Biogeosciences* 114:1–14.
- 23 Wood, M., C. Foe, J. Cooke, and L. Stephen. 2010. *Sacramento–San Joaquin Delta Estuary TMDL for*
24 *Methylmercury.* Final Staff Report. April. Prepared for California Regional Water Quality Control
25 Board Central Valley Region, Rancho Cordova, CA.
- 26 World Health Organization. 2012. *What are Electromagnetic Fields?* Available: <[www.who.int/peh-](http://www.who.int/peh-emf/about/WhatisEMF/en/print.html)
27 [emf/about/WhatisEMF/en/print.html](http://www.who.int/peh-emf/about/WhatisEMF/en/print.html)>. Accessed: March 14, 2012.
- 28 Zucker, Jane R. 1996. Changing Patterns of Autochthonous Malaria Transmission in the United
29 States: A Review of Recent Outbreaks. *Emerging Infectious Diseases* 2(1):37–43.