

4.3.21 Public Health

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

NEPA Effects: The potential for Alternative 4A construction and operation to increase vector-borne diseases would be the same as described for Alternative 4 because all aspects of the water conveyance facility design, construction, and operation (excluding water supply operations) and maintenance of Alt 4A would be identical to Alt 4. Although the proposed conveyance facilities will increase surface water within the study area at the intakes, intermediate forebay, and Clifton Court Forebay, it is unlikely that these water bodies would provide suitable breeding habitat for mosquitoes given that the water in these forebays would not be stagnant and would generally be too deep to support substantial mosquito habitat. Shallow edges of the forebays could provide some suitable mosquito breeding habitat if emergent vegetation or other aquatic plants (e.g., pond weed) were allowed to grow. However, as part of the regular maintenance of these forebay areas, floating vegetation such as pond weed would be harvested to maintain flow and forebay capacity. To further minimize the potential for impacts related to increasing suitable vector habitat within the study area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCs and prepare and implement MMPs, as necessary, to control mosquitoes and reduce the likelihood that construction and operation of the water conveyance facilities would require an increase in mosquito abatement activities by the local MVCs (Appendix 3B, *Environmental Commitments*, in Appendix A of this RDEIR/SDEIS). BMP activities would be consistent with the CDPH's *Best Management Practices for Mosquito Control* plan (described in Section 25.2.3.4 in the Draft EIR/EIS). Accordingly, Alternative 4A would not substantially increase suitable vector habitat, and would not substantially increase vector-borne diseases. No adverse effects on public health would result because conditions for mosquito breeding at conveyance facilities would be minimized and standard practices to control mosquitoes would be implemented.

CEQA Conclusion: The potential for construction and operation of conveyance facilities under Alternative 4A to result in an increase in exposure of people to vector-borne diseases would be identical to the impacts described for Alternative 4. Alternative 4A conveyance facilities that could create new water bodies at the intakes, intermediate forebay, and Clifton Court Forebay have the potential to provide habitat for vectors that transmit diseases (e.g., mosquitoes) because of the large volumes of water that would be held within these areas. However, during operations, the depth, design, and operation of conveyance facilities would prevent the development of suitable mosquito habitat. Specifically, the water bodies would be too deep and the constant movement of water would prevent mosquitoes from breeding and multiplying. To minimize the potential for impacts related to increasing suitable vector habitat within the study area, DWR would consult and coordinate with San Joaquin County and Sacramento-Yolo County MVCs and prepare and implement MMPs. BMPs to be implemented as part of the MMPs would help control mosquitoes during construction and operation of the sedimentation basins, solids lagoons, the expanded Clifton Court Forebay, the intermediate forebay, and the intermediate forebay inundation area. Therefore, construction and operation of Alternative 4 would not result in a substantial increase in vector-borne diseases. This impact is considered to be less than significant because conditions for mosquito breeding at conveyance facilities would be minimized and standard practices to control mosquitoes would be implemented. 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 As described in detail in Section 4.3.4, *Water Quality*, of this RDEIR/SDEIS, the analysis of bromide
5 and DOC (among other constituents) for Alternative 4A is based on modeling done for Alternative 4
6 in the ELT timeframe, which assumes implementation of Yolo Bypass Improvements and 25,000
7 acres of tidal natural communities restoration. As described in Section 4.1.2, *Description of*
8 *Alternative 4A*, of the RDEIR/SDEIS, Yolo Bypass Improvements are not a component of Alternative
9 4A and Environmental Commitment 4 would restore approximately 59 acres of tidal wetlands, as
10 opposed to the 65,000 acres contemplated under CM4. As explained in Section 4.3.4, *Water Quality*,
11 in general, the significance of this difference is that the assessment of bromide for Alternative 4A,
12 relative to Existing Conditions and the No Action Alternative (ELT), likely overestimates increases in
13 bromide that could occur, particularly in the west Delta. Regardless, there is uncertainty in the
14 results of all quantitative assessments that refer to modeling results, due to the differing
15 assumptions used in the modeling and the description of Alternative 4A and the No Action
16 Alternative (ELT).

17 **NEPA Effects:**

18 **Disinfection Byproducts**

19 The effects on DOC concentrations in the Delta under Alternative 4A would be similar to Alternative
20 4. Alternative 4A includes water conveyance operational criteria similar to Alternative 4
21 (Operational Scenario H), but would be limited to operations within the range of Scenarios H3 and
22 H4, as fully described in Chapter 3, *Description of Alternatives*, of the Draft EIR/EIS and in Section
23 4.1.2, *Description of Alternative 4A*, of this RDEIR/SDEIS. To the extent that habitat restoration
24 actions would alter hydrodynamics within the Delta region these effects are included in this
25 assessment. However, there would be less potential for increased DOC concentrations at western
26 Delta locations associated with habitat restoration and enhancement under this alternative because
27 very little would occur relative to Alternative 4.

28 The geographic extent of effects related to long-term average DOC concentrations within Delta
29 waters would be similar to that described for Alternative 4 but the magnitude of predicted change
30 and relative frequency of concentration exceedances would be lower. Relative to the No Action
31 Alternative (ELT), Alternative 4A would result in small increases (0.3 mg/L) in long-term average
32 DOC concentrations for the modeled 16-year period and drought period at the S. Fork Mokelumne
33 River at Staten Island, Franks Tract, Old River at Rock Slough, and Contra Costa Pumping Plant #1.
34 The increases in average DOC concentrations would correspond to more frequent concentration
35 threshold exceedances, with the greatest change occurring at Contra Costa Pumping Plant #1. The
36 change in frequency of threshold concentration exceedances at other assessment locations would be
37 similar or lower. In general, substantial change in ambient DOC concentrations would need to occur
38 before significant changes in drinking water treatment plant design or operations are triggered. The
39 increases in long-term average DOC concentrations estimated to occur at various Delta locations
40 under Alternative 4A are of sufficiently small magnitude that they would not require existing
41 drinking water treatment plants to substantially upgrade treatment for DOC removal above levels
42 currently employed. Further, modeling results for Alternative 4A indicate that there would be
43 predicted improvements in long-term average DOC concentrations at Barker Slough relative to the
44 No Action Alternative (ELT and LLT) (see Section 4.3.4, *Water Quality*, of this RDEIR/SDEIS).

1 Therefore, changes in DOC concentrations in the Delta resulting from operation of the water
2 conveyance facilities under Alternative 4A are not anticipated to contribute to increases in
3 disinfection byproducts (DBPs).

4 As described in Section 4.3.4, *Water Quality*, of the RDEIR/SDEIS, operations and maintenance of the
5 water conveyance facilities Alternative 4A, relative to the No Action Alternative (ELT and LLT),
6 would result in increases in long-term average bromide concentrations in the South Fork
7 Mokelumne River at Staten Island and the San Joaquin River at Buckley Cove, and small decreases at
8 the other assessment locations. However, there would be an increased frequency of exceedance of
9 the CALFED Drinking Water Program long-term goal of 50 µg/L and 100 µg/L bromide thresholds
10 for protecting against the formation of DBPs in treated drinking water at the South Fork Mokelumne
11 River at Staten Island, Franks Tract, Old River at Rock Slough, Sacramento River at Emmaton, San
12 Joaquin River at Antioch, and Sacramento River at Mallard Island. The use of seasonal intakes at
13 these locations is largely driven by acceptable water quality, and thus has historically been
14 opportunistic. Opportunity to use these intakes would remain, and the predicted increases in
15 bromide concentrations at Antioch and Mallard Slough would not be expected to adversely affect
16 municipal beneficial uses, or any other beneficial use, at these locations. Therefore, changes in
17 bromide concentrations in the Delta resulting from operation of the water conveyance facilities
18 under Alternative 4A are not anticipated to contribute to increases in DBPs.

19 **Trace Metals**

20 The changes in modeled trace metal concentrations of primarily human health and drinking water
21 concern (arsenic, iron, manganese) in the Delta would be similar to those described for Alternative 4
22 (see Chapter 8, *Water Quality*, Section 8.3.3.9 of the Draft EIR/EIS).

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

34 **Pesticides**

35 The changes in modeled pesticide concentrations in the Delta under Alternative 4A would be similar
36 to those described for Alternative 4 because the changes in average winter and summer flow rates
37 relative to the No Action Alternative (ELT and LLT) are expected to be similar to or less than
38 changes in flow rates under Alternative 4 in the Sacramento River at Freeport, American River at
39 Nimbus, Feather River at Thermalito and the San Joaquin River at Vernalis. The modeled changes in
40 the source water fractions of Sacramento River, San Joaquin River, and Delta agriculture water
41 under Alternative 4A would not be of sufficient magnitude to substantially affect beneficial uses of
42 the Delta. Based on the general observation that San Joaquin River, in comparison to the Sacramento
43 River, is a greater contributor of organophosphate insecticides in terms of greater frequency of
44 incidence and presence at concentrations exceeding water quality benchmarks, modeled increases

1 in Sacramento River fraction at Banks and Jones would generally represent an improvement in
2 export water quality respective to pesticides. Similarly, the flow changes in the LLT under
3 Alternative 4A would not be expected to result in affects on beneficial uses of water in the Delta due
4 to pesticides.

5 Therefore, it is not anticipated that there would be adverse effects on public health related to
6 pesticides from drinking water sources.

7 Because there would be no increases in DBPs due to increases in bromide or DOC in Delta surface
8 waters, and because the modeled changes in pesticide concentrations would not increase
9 substantially in magnitude or frequency in the Delta, there would be no adverse effect on public
10 health as a result of operation of the water conveyance facilities.

11 **CEQA Conclusion:** Under Alternative 4A, modeled long-term average pesticide levels in the Delta
12 would be similar to or slightly less that described under Alternative 4 and would not be expected to
13 increase substantially such that beneficial use impairments are made measurably worse. Long-term
14 average bromide concentrations would increase in the South Fork Mokelumne River at Staten Island
15 and decrease at all other assessment locations. However, there would be an increased frequency of
16 exceedance of the 50 µg/L and 100 µg/L bromide thresholds for protecting against the formation of
17 DBPs in treated drinking water at the S. Fork Mokelumne River at Staten Island, Franks Tract, Old
18 River at Rock Slough, Sacramento River at Emmaton, San Joaquin River at Antioch, and Sacramento
19 River at Mallard Island. The use of seasonal intakes at these locations is largely driven by acceptable
20 water quality, and thus has historically been opportunistic. Opportunity to use these intakes would
21 remain, and the predicted increases in bromide concentrations at Antioch and Mallard Slough would
22 not be expected to adversely affect municipal beneficial uses, or any other beneficial use, at these
23 locations, and therefore would not be expected to contribute substantially to DBP formation.
24 Operations and maintenance activities under Alternative 4A would not cause a substantial long-
25 term change in DOC concentrations in the Delta, although there would be relatively small increases
26 in long-term average DOC concentrations at some interior Delta locations. However, the increases
27 are of sufficiently small magnitude that they would not require existing drinking water treatment
28 plants to substantially upgrade treatment for DOC above levels currently employed, and therefore
29 these increases would not be expected to contribute substantially to DBP formation. Further, there
30 would be predicted improvements in long-term average DOC concentrations at Barker Slough
31 relative to Existing Conditions. Average concentrations of trace metals in the Delta are not expected
32 to increase substantially under Alternative 4A in the primary source water. Therefore, this
33 alternative is not expected to cause additional exceedances of applicable water quality objectives by
34 frequency, magnitude, and geographic extent such that significant impacts on any beneficial uses of
35 waters in the affected environment would occur.

36 Because there would be no increases in DBPs due to increases in bromide or DOC in Delta surface
37 waters, and because the modeled changes in trace metals pesticide concentrations would not
38 increase substantially in magnitude or frequency in the Delta, there would be no significant impact
39 on public health as a result of operation of the water conveyance facilities.

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

42 **NEPA Effects:** As described in Ch. 8, *Water Quality*, of the Draft EIR/EIS, modeling scenarios included
43 assumptions regarding how certain habitat restoration activities (CM2 and CM4) would affect Delta
44 hydrodynamics. The amount of tidal habitat restoration completed under Alternative 4A

1 (Environmental Commitment 4) would be substantially less than under Alternative 4 CM4. To the
2 extent that restoration actions alter hydrodynamics within the Delta region, which affects mixing of
3 source waters, these effects are included in this assessment of operations-related water quality
4 changes due to operation of the water conveyance facilities.

5 Three intakes would be constructed and operated under Alternative 4A. Sediment-disturbing
6 activities during construction and maintenance of these intakes and other water conveyance
7 facilities proposed near or in surface waters under this alternative could result in the disturbance of
8 existing constituents in sediment, such as pesticides or methylmercury. In-channel construction
9 activities, such as pile driving during the construction of cofferdams at the intakes and pier
10 construction at the barge unloading facilities, which would occur over a period of 5 months, would
11 result in the localized disturbance of river sediment. In addition, maintenance of the three proposed
12 north Delta intakes and the intermediate forebay would entail periodic dredging for sediment
13 removal at these locations. Sediment accumulation in both the northern and southern portion of the
14 expanded Clifton Court Forebay is expected to be minimal in the ELT period as the need for dredging
15 is anticipated to be every 50 years given the design. However, it is anticipated that there may be
16 some sediment accumulation at the inlet structure of the northern portion of Clifton Court Forebay.
17 Therefore, while overall sediment accumulation in this forebay is not expected to be substantial,
18 some dredging may be required at the inlet structure to maintain an even flow path.

19 **Pesticides**

20 Legacy pesticides, such as organochlorines, have low water solubility; they do not readily volatilize
21 and have a tendency to bond to particulates (e.g., soil and sediment), settle out into the sediment,
22 and not be transported far from the source. If present in sediment within in-water construction
23 areas, legacy pesticides would be disturbed locally and would not be expected to partition into the
24 water column to any substantial degree. Therefore, no significant adverse effect on public health
25 would result from construction.

26 Numerous pesticides are currently used throughout the affected environment. While some of these
27 pesticides may be bioaccumulative, those present-use pesticides for which there is sufficient
28 evidence of their presence in waters affected by SWP and CVP operations (i.e., organophosphate
29 pesticides, such as diazinon, chlorpyrifos, diuron, and pyrethroids) are not considered
30 bioaccumulative. Thus, changes in their concentrations would not directly cause bioaccumulative
31 problems in aquatic life or humans. The effects of Alternative 4A on pesticide levels in surface
32 waters upstream of the Delta, in the Delta, and in the SWP/CVP Export Service Areas relative to
33 Existing Conditions and the No Action Alternative (ELT and LLT) would be similar to or slightly less
34 than those described for the Alternative 4. Alternative 4A would not result in increased tributary
35 flows that would mobilize organochlorine pesticides in sediments. Thus, the change in source water
36 in the Delta associated with the change in water supply operations is not expected to adversely
37 affect public health with respect to bioaccumulation of pesticides.

38 **Methylmercury**

39 If mercury is sequestered in sediments at water facility construction sites, it could become
40 suspended in the water column during construction activities, opening up a new pathway into the
41 food chain. Construction activities (e.g., pile driving and cofferdam installation) at intake sites or
42 barge landing locations would result in a localized, short-term resuspension of sediment and an
43 increase in turbidity that may contain elemental or methylated forms of mercury. Please see Chapter

1 8, Section 8.1.3.9, *Mercury*, of the Draft EIR/EIS for a discussion of methylmercury concentrations in
2 sediments.

3 Changes in methylmercury concentrations under Alternative 4A are expected to be small. The
4 greatest annual average methylmercury concentration for drought conditions would be 0.166 ng/L
5 for the San Joaquin River at Buckley Cove (all scenarios) which was slightly lower than the No Action
6 Alternative (ELT) (0.168 ng/L). Fish tissue estimates show only small or no increases in mercury
7 concentrations based on long-term annual average concentrations for mercury at the Delta
8 locations, but they would be different relative to the No Action Alternative (ELT). Under Operational
9 Scenario H3 (Equation 2—see Chapter 8, *Water Quality*, of the Draft EIR/EIS) there would be 11% to
10 12% percent increases at Staten Island and Rock Slough relative to the No Action Alternative (ELT)
11 in all modeled years. Under Operational Scenario H4 there would be an 11% decrease relative to the
12 No Action Alternative (ELT) for drought years. These changes are expected to be within the
13 uncertainty inherent in the modeling approach (see Section 4.3.4, *Water Quality*, of this
14 RDEIR/SDEIS for a discussion of the uncertainty associated with bioaccumulation models), and
15 would likely not be measurable in the environment. Therefore, modeled changes in mercury in the
16 Delta and in fish tissues due to operation of Alternative 4A would not be expected to adversely affect
17 public health. In the LLT, the primary difference would be changes in the Delta source water
18 fractions to hydrologic effects from climate change and higher water demands. These effects would
19 occur regardless of the implementation of Alternative 4A and, therefore, at the LLT the effects of the
20 alternative on mercury are expected to be similar to those described above.

21 In summary, operation of the water conveyance facilities under Alternative 4A would not alter
22 bioaccumulative pesticide concentrations or mercury concentrations in the Delta such that there
23 was an effect on public health. As such, there would be no adverse effect.

24 **CEQA Conclusion:** Operation of the water conveyance facilities under Alternative 4A is not expected
25 to cause additional exceedance of applicable water quality objectives/criteria by frequency,
26 magnitude, and geographic extent that would cause adverse effects on any beneficial uses of waters
27 in the affected environment. Because mercury concentrations are not expected to increase
28 substantially relative to the Existing Conditions (see Section 4.3.4, *Water Quality*, of this
29 RDEIR/SDEIS), no long-term water quality degradation is expected to occur and, thus, no adverse
30 effects to beneficial uses would occur. Because any increases in mercury or methylmercury
31 concentrations are not likely to be measurable, changes in mercury concentrations or fish tissue
32 mercury concentrations would not make any existing mercury-related impairment measurably
33 worse. Construction activities (e.g., pile driving and cofferdam installation) at intake sites or barge
34 landing locations would result in a localized, short-term resuspension of sediment and an increase
35 in turbidity that may contain elemental or methylated forms of mercury.

36 The effects of Alternative 4A on bioaccumulative pesticide levels in the Delta would be similar to or
37 slightly less than those described for the Alternative 4. Alternative 4A would not result in increased
38 tributary flows that would mobilize organochlorine pesticides in sediments. Thus, the change in
39 source water in the Delta associated with the change in water supply operations is not expected to
40 adversely affect public health with respect to bioaccumulation of pesticides. If present in sediment
41 within in-water construction areas, legacy pesticides would be disturbed locally and would not be
42 expected to partition into the water column to any substantial degree.

1 For these reasons, there would be no significant impact on public health due to mercury or
2 bioaccumulative pesticides as a result of construction of or operation of the water conveyance
3 facilities under Alternative 4A.

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:** The potential for Alternative 4A transmission line construction and operation to
8 expose people to new sources of EMFs would be identical to impacts described under Alternative 4.
9 As described for Alternative 4, this effect would not be adverse because transmission lines would
10 generally not be located in populated areas or within 300 feet of sensitive receptors and CPUC's EMF
11 design guidelines would be implemented for any new temporary or new permanent transmission
12 lines constructed and operated under Alternative 4A.

13 **CEQA Conclusion:** The potential for Alternative 4A transmission line construction and operation to
14 expose people to new sources of EMFs would be identical to impacts described under Alternative 4.
15 Under Alternative 4A, the majority of proposed temporary (69 kV and 230 kV) and permanent (230
16 kV) transmission lines would be located within the rights-of-way of existing transmission lines; any
17 new temporary or permanent transmission lines not within the right-of-way of existing
18 transmission lines would, for the most part, be located in sparsely populated areas generally away
19 from existing sensitive receptors. None of the proposed temporary or permanent transmission lines
20 would be within 300 feet of sensitive receptors. Further, the temporary transmission lines would be
21 removed when construction of the water conveyance facility features is completed, so there would
22 be no potential permanent effects. Therefore, these transmission lines would not substantially
23 increase people's exposure to EMFs. This impact is considered to be less than significant because
24 transmission lines would generally not be located in populated areas or within 300 feet of sensitive
25 receptors and CPUC's EMF design guidelines would be implemented for any new temporary or
26 permanent transmission lines constructed and operated under Alternative 4A. No mitigation is
27 required.

28 **Impact PH-5: Increase in Vector-Borne Diseases as a Result of Implementing Environmental**
29 **Commitments 3, 4, 6-11**

30 Effects of Alternative 4A related to the potential for increase in vector-borne diseases from
31 implementing these Environmental Commitments would be similar to those described for
32 Alternative 4. However, as described under Section 4.1, *Introduction*, of this RDEIR/SDEIS,
33 Alternative 4A would restore up to 15,548 acres of habitat under Environmental Commitments 3, 4,
34 and 6–10 as compared with 83,800 acres under Alternative 4. Conservation Measures 2 and 5 would
35 not be implemented as part of this alternative. Therefore, the potential for vector-borne disease
36 effects under Alternative 4A would likely be less than the potential associated with Alternative 4.

37 **NEPA Effects:** Implementation of portions of Environmental Commitments 3, 4, and 6-11 under
38 Alternative 4A would involve protecting and restoring wetland habitat that could potentially
39 increase suitable mosquito habitat within the study area. This potential effect would not be adverse
40 because the total wetland restoration acreage implemented under Alternative 4A would be
41 substantially less than under Alternative 4, habitat creation would generally not be located near
42 densely populated areas, and management plans under Environmental Commitment 11, *Natural*
43 *Communities Enhancement and Management*, would be performed in consultation with the

1 appropriate MVCDs to ensure MMPs are implemented to reduce mosquito breeding. Additionally,
2 BMPs from the guidelines outlined in Appendix 3B, *Environmental Commitments*, in Appendix A of
3 this RDEIR/SDEIS, would be incorporated into Alternative 4A and executed to maintain proper
4 water circulation and flooding during appropriate times of the year (e.g., fall) to prevent stagnant
5 water and habitat for mosquitoes. This consultation would occur when specific restoration and
6 enhancement projects and locations are identified.

7 **CEQA Conclusion:** The potential for impacts related to increases of vector-borne disease from
8 mosquitos during construction, operation, and maintenance of portions of Environmental
9 Commitment 3, 4, and 6–11 is considered less than significant because the total wetland restoration
10 acreage implemented under Alternative 4A would be substantially less than under Alternative 4,
11 habitat creation would generally not be located near densely populated areas, and management
12 plans under Environmental Commitment 11 *Natural Communities Enhancement and Management*,
13 would be performed in consultation with the appropriate MVCDs to ensure MMPs are implemented
14 to reduce mosquito breeding. Additionally, BMPs from the guidelines outlined in Appendix 3B,
15 *Environmental Commitments*, in Appendix A of this RDEIR/SDEIS, would be incorporated into
16 Alternative 4A and executed to maintain proper water circulation and flooding during appropriate
17 times of the year (e.g., fall) to prevent stagnant water and habitat for mosquitoes. No mitigation is
18 required.

19 **Impact PH-6: Substantial Increase in Recreationists' Exposure to Pathogens as a Result of** 20 **Implementing the Restoration Environmental Commitments**

21 Effects of Alternative 4A related to the potential for increase in recreationists' exposure to
22 pathogens from implementing portions of the habitat restoration environmental commitments
23 would be similar to those described for Alternative 4. However, as described under Section 4.1,
24 *Introduction*, of this RDEIR/SDEIS, Alternative 4A would restore up to 15,548 acres of habitat under
25 Environmental Commitments 3, 4, and 6–11 as compared with 83,800 acres under Alternative 4.
26 Conservation Measures 2 and 5 would not be implemented as part of this alternative. Therefore, the
27 potential for exposure of recreationists to pathogens under Alternative 4A would likely be
28 substantially less than the potential associated with Alternative 4.

29 **NEPA Effects:** The study area currently supports habitat types, such as tidal habitat, upland
30 wetlands, and agricultural lands that produce pathogens as a result of the biological productivity in
31 these areas (e.g., migrating birds, application of fertilizers, waste products of animals). The study
32 area does not currently have pathogen concentrations that rise to the level of adversely affecting
33 beneficial uses of recreation. However, as described for Alternative 4, any potential increase in
34 pathogens associated with the proposed habitat restoration and enhancement would be localized
35 and within the vicinity of the actual restoration. This localized increase is not expected to be of
36 sufficient magnitude and duration to result in adverse effects on recreationists because these areas
37 would generally not support livestock and most areas would not have public access.

38 **CEQA Conclusion:** The potential for an increase in recreationists' exposure to pathogens under
39 Alternative 4A is considered less than significant because of the reduced amount of restored habitat
40 conducive to pathogens that would be implemented under this alternative compared to Alternative
41 4, the localized nature of pathogens, and because the rapid die-off of pathogens in water would not
42 create sufficient magnitudes of pathogen generation that could affect recreational beneficial uses. No
43 mitigation is required.

1 **Impact PH-7: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate**
2 **as a Result of Implementing Environmental Commitments 4 and 10**

3 Effects of Alternative 4A related to the potential to mobilize contaminants known to bioaccumulate
4 (pesticides and methylmercury) from implementing portions of the restoration environmental
5 commitments would be similar to those described for Alternative 4. However, as described under
6 Section 4.1, *Introduction*, of this RDEIR/SDEIS, Alternative 4A would restore up to 1,067 acres of
7 habitat under Environmental Commitments 4 and 10 as compared with 66,200 acres under
8 Alternative 4. Conservation Measures 2 and 5 would not be implemented as part of this alternative.
9 Therefore, the potential for mobilization of contaminants under Alternative 4A would likely be
10 substantially less than the potential associated with Alternative 4.

11 **NEPA Effects:** The primary concern with habitat restoration regarding constituents known to
12 bioaccumulate is the potential for mobilizing contaminants sequestered in sediments of the newly
13 inundated floodplains and marshes. The mobilization depends on the presence of the constituent
14 and the biogeochemical behavior of the constituent to determine whether it could re-enter the
15 water column or be reintroduced into the food chain. This potential effect would not be adverse
16 because the total tidal and nontidal habitat restoration acreage implemented under Alternative 4A
17 would be substantially less than under Alternative 4; bioaccumulation of pesticides and/or
18 methylmercury in the tidal and nontidal restoration areas are not expected to substantially affect
19 public health because of the limited extent of restored habitat under Alternative 4A; the localized
20 nature of pesticide bioaccumulation; and because current OEHHA standards would be enforced.
21 Environmental Commitment 12, *Methylmercury Management*, would be implemented to reduce
22 methylmercury production in restored habitats.

23 **CEQA Conclusion:** The potential for public health impacts related to mobilization of pesticides and
24 methylmercury in habitat restoration areas related to Environmental Commitments 4 and 10 is
25 considered less than significant because the total wetland restoration acreage implemented under
26 Alternative 4A would be substantially less than under Alternative 4A. Bioaccumulation of pesticides
27 and/or methylmercury in the tidal and nontidal restoration areas are not expected to substantially
28 affect public health because of the limited extent of restored habitat under Alternative 4A; the
29 localized nature of pesticide bioaccumulation; and because current OEHHA standards would be
30 enforced. Environmental Commitment 12, *Methylmercury Management*, would be implemented to
31 reduce methylmercury production in restored habitats. No mitigation is required.

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

34 **NEPA Effects:** Any modified reservoir operations under Alternative 4A are not expected to promote
35 *Microcystis* production upstream of the Delta relative to the No Action Alternative (ELT and LLT)
36 since large reservoirs upstream of the Delta are typically low in nutrient concentrations and
37 phytoplankton outcompete cyanobacteria, including *Microcystis*. Further, in the rivers and streams
38 of the Sacramento River watershed, watersheds of the eastern tributaries (Cosumnes, Mokelumne,
39 and Calaveras Rivers), and the San Joaquin River upstream of the Delta, bloom development would
40 be limited by high water velocity and low hydraulic residence times. These conditions would not be
41 expected to change under Alternative 4A relative to the No Action Alternative (ELT and LLT)

42 Conditions in the Export Service Areas with implementation of water supply operations under
43 Alternative 4A are not expected to become more conducive to *Microcystis* bloom formation relative
44 to the No Action Alternative (ELT and LLT) because the fraction of water flowing through the Delta

1 that would reach the existing south Delta intakes is not expected to be adversely affected by
2 *Microcystis* blooms.

3 As indicated in Section 4.3.4, *Water Quality*, of this RDEIR/SDEIS, there was not modeling available
4 that adequately accounted for the effects of operation of the water conveyance facilities and the
5 hydrodynamic impacts of the environmental commitments on long-term average residence times in
6 the Delta for Alternative 4A. Accordingly, the hydrodynamic effects of Alternative 4A on *Microcystis*
7 were determined qualitatively and the effects discussed for the Delta are related entirely to
8 operations and maintenance and not the hydrodynamic effects of the restoration actions. Although
9 there is uncertainty, water supply operations under Alternative 4A are not expected to increase
10 water residence times or ambient water temperatures throughout the Delta, including Banks and
11 Jones pumping plants, relative to the No Action Alternative (ELT and LLT), and therefore Delta
12 waters are not expected to be adversely affected by *Microcystis* blooms.

13 **CEQA Conclusion:** Relative to Existing Conditions, operation of the water conveyance facilities under
14 Alternative 4A is not expected to promote *Microcystis* bloom formation in the reservoirs and
15 watersheds upstream of the Delta because large reservoirs upstream are typically low in nutrient
16 concentrations and phytoplankton outcompete cyanobacteria, including *Microcystis*, and high water
17 velocity and low hydraulic residence times in the upstream area limit the development of
18 *Microcystis* blooms.

19 The potential for *Microcystis* blooms in the Export Service Areas under Alternative 4A would be less
20 than under Alternative 4, but source waters to the south Delta intakes could be affected by
21 *Microcystis* due to an increase in Delta water temperatures associated with climate change and from
22 an increase in water residence times. The impacts from increased water residence times in the Delta
23 would be mostly related to tidal habitat restoration and improvements to the Yolo Bypass, which are
24 assumed to occur separate from Alternative 4A, as well as to climate change and sea level rise. The
25 combined effect of these factors on increasing *Microcystis* in source waters to the south Delta intakes
26 would likely be a greater influence than that of Alternative 4A operations.

27 Water supply operations under the two Alternative 4A scenarios could result in localized increases
28 in Delta residence times in some locations and decreased residence times in other Delta locations. As
29 indicated in Section 4.3.4, *Water Quality*, of this RDEIR/SDEIS, there is substantial uncertainty
30 regarding the extent that Alternative 4A operations and maintenance would result in a net increase
31 in water residence times relative to Existing Conditions. Regardless of this uncertainty, it is likely
32 that these potential effects under Alternative 4A would be relatively small compared to the
33 combined effects of tidal habitat restoration and Yolo Bypass improvements unrelated to Alternative
34 4A, and sea level rise and climate change. Climate change in the ELT is expected to result in a 1.3-
35 2.5°F increase in ambient Delta water temperatures relative to Existing Conditions. Given the
36 combined effects of restoration activities unrelated to Alternative 4A, climate change, and sea level
37 rise on increased water residence time, as well as the effects of climate change on Delta water
38 temperatures, it is possible that *Microcystis* blooms in the Delta would increase in frequency,
39 magnitude, and geographic extent, relative to Existing Conditions. However, although there is
40 considerable uncertainty regarding this impact, while long-term water quality degradation may
41 occur and, thus, impacts on beneficial uses could occur, these impacts are not related to
42 implementation of Alternative 4A. Therefore, the effects on *Microcystis* due to operations under
43 Alternative 4A would be less than significant. No mitigation is required.

1 **Impact PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing**
2 **Environmental Commitment 4.**

3 **NEPA Effects:** Under Alternative 4A, Yolo Bypass Fisheries Enhancement would not occur, unlike
4 under Alternative 4. However, improvements in the Yolo Bypass, as well as restoration of 8,000
5 acres of tidal habitat, would be implemented under a plan separate and distinct from Alternative 4A
6 (see Section 4.1.2, *Description of Alternative 4A*, of this RDEIR/SDEIS). These activities are assumed
7 to occur under both Alternative 4A and the No Action Alternative. Similar to Alternative 4 (under CM
8 4), there would be tidal habitat restoration in the Delta under Alternative 4A with implementation of
9 Environmental Commitment 4. However, the 59 acres of tidal habitat restored under this alternative
10 would be substantially fewer than under Alternative 4. As discussed in Section 4.3.4, *Water Quality*,
11 of this RDEIR/SDEIS, implementation of Environmental Commitment 4 under Alternative 4A would
12 have negligible effects in terms of the potential for creating conditions conducive to *Microcystis*
13 bloom in the Delta relative to what could result from the development of 8,000 acres of tidal habitat
14 and improvements in the Yolo Bypass in the ELT, which could increase water temperatures and
15 hydraulic residence times relative to the No Action Alternative (LLT). Therefore, implementation of
16 Environmental Commitment 4 under Alternative 4A would not be adverse because it would not
17 increase *Microcystis* bloom formation.

18 **CEQA Conclusion:** Implementation of Environmental Commitment 4 (*Tidal Natural Communities*
19 *Restoration*) under Alternative 4A would result in 59 acres of tidal restoration within the Delta. This
20 would have a negligible effect on creating conditions conducive to *Microcystis* bloom formation,
21 particularly relative to the development of 8,000 acres of tidal habitat and improvements to the Yolo
22 Bypass in the ELT—activities separate and distinct from Alternative 4A. These activities would
23 create shallow backwater areas that could result in a measureable increase in water temperatures
24 and water residence times in the Delta, and therefore *Microcystis*, relative to Existing Conditions.
25 Thus, implementation of Environmental Commitment 4 under Alternative 4A would be less than
26 significant.