

6.3 Environmental Consequences

6.3.1 Methods for Analysis

The surface water analysis addresses changes to surface waters affected by changes in SWP/CVP operations in the Delta Region and Upstream of the Delta Region caused by implementation of BDCP conveyance facilities (CM1) and other conservation measures, especially tidal marsh habitat restoration. Consistent with previous modeling analyses conducted by DWR and Reclamation, including the 2008 Biological Assessment on the Continued Long-Term Operations of the Central Valley Project and State Water Project, the modeling analyses presented in this section assumed that the SWP and CVP were solely responsible for providing any needed water for BDCP implementation. The alternatives would not modify water deliveries to non-SWP and non-CVP water rights holders, SWP Feather River Water Rights Contractors, CVP Sacramento River Water Rights Settlement Contractors, or CVP San Joaquin River Exchange Contractors~~modify the operations of the SWP/CVP facilities but would not modify the operations of water resources facilities owned or operated by other water rights holders.~~ Therefore, surface water resources on ~~many of the~~ tributaries of the Sacramento River and San Joaquin River that are not affected by SWP and CVP operations would not be affected by implementation of the alternatives. The surface waters analyzed in this chapter include Sacramento River upstream of the Delta and downstream of Keswick Dam; Trinity River downstream of Lewiston Reservoir; Feather River downstream of Thermalito Dam; American River downstream of Nimbus Dam; surface water diversions into Yolo Bypass; representative Delta channels; and San Joaquin River upstream of the Delta. All alternatives assume the same operations of the CVP New Melones Reservoir; therefore, this chapter does not analyze changes on the Stanislaus River.

6.3.1.2 Methods for Analysis of Flood Management along Major Rivers

As described above in Section 6.3.1, Methods for Analysis, the surface waters analyzed in this chapter include Sacramento River upstream of the Delta and downstream of Keswick Dam; Trinity River downstream of Lewiston Reservoir; Feather River downstream of Thermalito Dam; American River downstream of Nimbus Dam; surface water diversions into Yolo Bypass; representative Delta channels; and San Joaquin River upstream of the Delta. All alternatives assume the same operations of the CVP New Melones Reservoir; therefore, this chapter does not analyze changes on the Stanislaus River.

Specific considerations for levee conditions are discussed in Chapter 9, Geology and Seismicity, and Chapter 10, Soils.

Stormwater management on the landside of the levees is discussed in Chapter 20, Public Services and Utilities, and Chapter 14, Agricultural Resources, including use of existing stormwater channels and drainage ditches to convey flows to the river.

1 Water quality changes due to changes in surface water flows are discussed in Chapter 7.
 2 Groundwater, and Chapter 8, Water Quality.

3 **Design Criteria Assumptions for Facilities along Levees and in Yolo Bypass**

4 As described in sections 6.1.5, Delta Flood Risks, and 6.2.2, State Plans, Policies, and Regulations, the
 5 CVFPB exercises jurisdiction over the State Plan of Flood Control, including Sacramento River Flood
 6 Control Project and flood control projects in the Sacramento River and San Joaquin River
 7 watersheds. Facilities constructed under each of the alternatives will be located within the facilities
 8 addressed in the State Plan of Flood Control, including the Yolo Bypass, levees along the Sacramento
 9 River between American River confluence and Decker Island, Sutter Slough, Steamboat Slough,
 10 Georgiana Slough, and San Joaquin River and Old River near the Head of Old River. As described in
 11 Section 3.6.1.1, North Delta Intakes, facilities to be constructed along the levees would be designed to
 12 provide flood neutrality during construction and operations. Facilities located along the levees,
 13 including coffer dams at the intake locations, would be designed to provide continued flood
 14 management at the same level of flood protection as the existing levees; or if applicable, to a higher
 15 standard for flood management engineering and permitting requirements if the standards are
 16 greater than the existing levee design. New facilities would be designed to withstand the applicable
 17 flood management standards through construction of flood protection embankments or
 18 construction on engineered fill to raise the facilities to an elevation above the design flood elevation
 19 for that specific location. The levee design criteria would consider the most recent criteria, including
 20 new guidelines for urban and rural levees (DWR 2013, 2014).

21 Within the Yolo Bypass, as described in Section 3.6.2.1, Yolo Bypass Fisheries Enhancement, any
 22 modifications to the Yolo Bypass or other flood management facilities would be required to be
 23 designed and implemented to maintain flood management standards. Activities in the Yolo Bypass
 24 would designed, permitted, and operated in coordination with the USACE, DWR, CVFPB, and other
 25 local flood management agencies.

26 All construction activities that could result in a discharge of water or other materials to surface
 27 water would require development and implementation of a Stormwater Pollution Prevention Plan
 28 (SWPPP). The SWPPP would address risks of increased contamination in the receiving waters,
 29 including risks associated with discharge of sediments or increased sediment in the receiving waters
 30 due to soil erosion or scour, as discussed in Appendix 3B, Environmental Commitments. For
 31 example, velocity dissipation facilities, such as rock or grouted riprap, would be used to reduce
 32 velocity and energy and prevent scour where dewatering flows are discharged to the river, as
 33 discussed in Section 3.6.1, North Delta Intakes. Another example would be development and
 34 implementation of a Barge Operations Plan to minimize the effects of wakes from the barge
 35 impinging on the river banks or propeller wash causing bottom scour, as discussed in Appendix 3B,
 36 Environmental Commitments.

37 **Analysis of Potential Changes in Conditions that Could Affect Flood Management** 38 **along Major Rivers**

39 **6.3.2 Determination of Effects**

40 As described in Section 6.3.1.1, the potential for effects related to surface water resources was
 41 determined by considering direct changes in the environment as identified in CEQA guidelines.

1 Changes in water surface elevations and stream flows at certain locations in the Delta under Existing
 2 Conditions, No Action Alternative, and action Alternatives are presented in Appendix 5A, BDCP
 3 EIR/EIS Modeling Technical Appendix. Indirect effects of changes in water surface elevations and
 4 stream flows in the Delta are addressed in other chapters addressing specific resources. Effects
 5 associated with changes in velocities and water surface elevations related to riparian corridor
 6 biological resources are addressed in Chapter 11, *Fish and Aquatic Resources*, and Chapter 12,
 7 *Terrestrial Biological Resources*. Effects associated with changes in water surface hydrodynamics
 8 related to availability of water for agricultural and community uses are addressed in Chapter 14,
 9 *Agricultural Resources*, and Chapter 20, *Public Services and Utilities*, respectively. Effects associated
 10 with changes in drainage conditions in agricultural areas and communities along the waterways are
 11 addressed in Chapter 14, *Agricultural Resources*, and Chapter 20, *Public Services and Utilities*,
 12 respectively. Effects associated with navigability issues are addressed in Chapter 19, *Transportation*.
 13 Effects associated with erosion, accretion, and sedimentation are addressed in Chapter 9, *Geology*
 14 and *Seismicity*.

15 As discussed in greater detail in Chapter 5, *Water Supply*, Section 5.3.2, the NEPA No Action
 16 Alternative, which reflects an anticipated future condition in 2060, includes both sea level rise and
 17 climate change (changed precipitation patterns), and also assumes, among many other programs,
 18 projects, and policies, implementation of most of the required actions under both the December
 19 2008 USFWS BiOp and the June 2009 NMFS BiOp (inclusion of these actions is discussed in
 20 Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and*
 21 *Cumulative Impact Conditions*, Section 3D.3.2.3.1). The NEPA effects analyses in this chapter reflect
 22 these No Action Alternative assumptions.

23 ~~(described below for Surface Water Impacts 1–3). Section 6.3.2 describes t~~The potential for changes
 24 in flood management operations described in this chapter as are determined through a qualitative
 25 evaluation of CALSIM II model results (described below as Surface Water Impacts ~~4–71 and 2~~).

26 This effects analysis assumes that an action alternative would have an adverse effect under NEPA or
 27 a significant impact under CEQA if implementation would result in one of the following conditions.

- 28 • An increase of more than 10% in number of months that the reservoir storage is close to the
 29 flood storage capacity (within 10 TAF) compared to the No Action Alternative would be
 30 interpreted as a consistently high storage condition that would reduce the flexibility for flood
 31 operations. The value of 10% is used to provide consideration of uncertainties involved due to
 32 differences of real-time flood operations and monthly model output due to simulation
 33 techniques and assumptions used in this analysis (Impact SW-1).
- 34 • An increase in ~~peak-highest~~ monthly flows when flood potential is high in the Sacramento River
 35 at Freeport, Sacramento River at Locations Upstream of Walnut Grove (downstream of north
 36 Delta intakes), San Joaquin River at Vernalis, Feather River at Thermalito Dam, or Yolo Bypass at
 37 Fremont Weir, that exceed flood capacity at these locations compared to river flows under the
 38 No Action Alternative (which is used to avoid consideration of changes in river flows caused by
 39 sea level rise and climate change). For the purposes of this analysis, a flood event is defined as
 40 an over-bank event (Impact SW-2).
- 41 • ~~Flows-Monthly flows~~ simulated with CALSIM II do not exceed flood capacity. To assess the
 42 increased risk of flooding, ~~the following methodology is used: a significance value of 10% is used~~
 43 for analyzing changes in monthly storage volumes because the effects of climate change, as
 44 determined through the comparison of storage volumes under Existing Conditions and No

Action Alternative conditions ranged up to 10%. Therefore, the potential for increased flood spills from the reservoirs due to the alternatives (not climate change) were defined as an increased average monthly storage in excess of the 10%. Similarly, a significance value of 1% is used for analyzing changes in average monthly flows in the Sacramento, Feather, and American River of was used because changes due to simulation techniques and logic in the CALSIM II model are generally about 1%. Therefore, the analysis used the following methodology:

- Average of flows with probability of exceedance of 10% or lower (top 10th percentile of flows) is calculated.
- Average of flows with probability of exceedance of 10% or lower under each Alternative is compared to the average of flows with probability of exceedance of 10% or lower under the Existing Conditions and the No Action Alternative (which is used to avoid consideration of changes in reservoir storage caused by sea level rise and climate change).
- The change in average of flows with probability of exceedance of 10% or lower with respect to the Existing conditions and the No Action Alternative is compared to the channel capacity (analysis done for each reach).
- An increase of 1% in highest flows simulated (flows with probability of exceedance of 10% or less) with respect to the channel capacity is considered significant (increase is calculated by comparing flows to Existing Conditions or No Action Alternative). The value of 1% is used to avoid consideration of minor fluctuations in model output due to simulation techniques and assumptions ~~(Impact SW-2)~~.

Potential for changes in reverse flow conditions in Old and Middle Rivers also is determined by an An-increase (more negative flow) of more than 1% in reverse flow conditions in Old and Middle River under the alternatives as compared to reverse flows under Existing Conditions and the No Action Alternative (which is used to avoid consideration of changes in reverse flows caused by sea level rise and climate change). The value of 1% is used to avoid consideration of minor fluctuations in model output due to simulation techniques and assumptions (Impact SW-3).

Substantially alter the existing drainage pattern of the site or area during construction of conveyance facilities, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite (Impact SW-4).

Substantially alter the existing drainage pattern of the site or area during construction of habitat restoration areas, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite (Impact SW-5).

Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff (Impact SW-6).

Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam (Impact SW-7).

Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the operation of habitat restoration areas (Impact SW-8).

1 Place within a 100-year flood hazard area structures that would impede or redirect flood flows, or
2 be subject to inundation by mudflow (Impact SW-9).

3 ~~Changes in water surface elevations at certain locations in the Delta under Existing Conditions, No
4 Action Alternative, and action Alternatives are presented in Appendix 5A, BDCP EIR/EIS Modeling
5 Technical Appendix. Indirect effects of changes in water surface elevations in the Delta are
6 addressed in other chapters addressing specific resources. Effects associated with changes in
7 velocities and water surface elevations related to riparian corridor biological resources are
8 addressed in Chapter 11, Fish and Aquatic Resources, and Chapter 12, Terrestrial Biological
9 Resources. Effects associated with changes in water surface hydrodynamics related to availability of
10 water for agricultural uses are addressed in Chapter 14, Agricultural Resources. Effects associated
11 with changes in drainage conditions in agricultural areas and communities along the waterways are
12 addressed in Chapter 14, Agricultural Resources, and Chapter 20, Public Services and Utilities,
13 respectively. Effects associated with navigability issues are addressed in Chapter 19, Transportation.
14 Effects associated with erosion, accretion, and sedimentation are addressed in Chapter 9, Geology
15 and Seismicity.~~

16 ~~As discussed in greater detail in Chapter 5, Water Supply, Section 5.3.2, the NEPA No Action
17 Alternative, which reflects an anticipated future condition in 2060, includes both sea level rise and
18 climate change (changed precipitation patterns), and also assumes, among many other programs,
19 projects, and policies, implementation of most of the required actions under both the December
20 2008 USFWS BiOp and the June 2009 NFMS BiOp (inclusion of these actions is discussed in
21 Appendix 3D, Defining Existing Conditions, No Action Alternative, No Project Alternative, and
22 Cumulative Impact Conditions, Section 3D.3.2.3.1). The NEPA effects analyses in this chapter reflect
23 these No Action assumptions.~~

24 **6.3.3 Effects and Mitigation Approaches**

25 **6.3.3.1 No Action Alternative**

26 **Reverse Flows in Old and Middle River**

27 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

28 Reverse flow conditions for Old and Middle River flows on a long-term average basis under the No
29 Action Alternative ~~at Year 2060 (LLT)~~ are ~~similar more positive as compared~~ to Existing Conditions,
30 except in ~~July through November~~ April and May. In these months, Old and Middle River flows are less
31 negative due to reduced south Delta exports because of the sea level rise and climate change,
32 increased demands in north of the Delta, and operations to comply with Fall X2 (Figure 6-23).

33 **CEQA Conclusion:** There would be less reverse flows in Old and Middle Rivers under the No Action
34 Alternative ~~at Year 2060 (LLT)~~ compared to Existing Conditions in June through March, due to
35 reduced south Delta exports because of sea level rise and climate change, increased demands north
36 of the Delta, and operations to comply with Fall X2. Reverse flows would become more negative in
37 April and May under the No Action Alternative at Year 2060 (LLT) compared to Existing Conditions.

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

Reverse Flows in Old and Middle River

Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers

CEQA Conclusion: Alternative 1A would provide positive changes related to reducing reverse flows in Old and Middle Rivers in June through March and negative changes in the form of increased reverse flow conditions in October, April and May, compared to Existing Conditions. Determination of the significance of this impact is related to impacts on water quality and aquatic resources. These impacts are considered significant because the increase (more negative) in reverse flow conditions in April and May is greater than 1%. The significance of the impact to beneficial use of the surface water for water supplies and aquatic resources, and appropriate Mitigation Measures for those impacts on beneficial uses. The significance of these impacts is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries and Aquatic Resources*.

Impact SW-4: Substantially Alter the Existing Drainage Pattern or Substantially Increase the Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding during Construction of Conveyance Facilities

Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation

BDCP proponents will have to demonstrate no-net-increase in runoff due to construction activities during peak flows. To achieve this, proponents will implement measures to prevent an increase in runoff volume and rate from land-side construction areas and to prevent an increase in sedimentation in the runoff from the construction area as compared to Existing Conditions. To reduce the potential for adverse impacts from large amounts of runoff from paved and impervious surfaces during construction, operations, or maintenance, the proponents will design and implement onsite drainage systems in areas where construction drainage is required. Drainage studies will be prepared for each construction location to assess the need for, and to finalize, other drainage-related design measures, such as a new onsite drainage system or new cross drainage facilities. Based on study findings, if it is determined that onsite stormwater detention storage is required, detention facilities will be located within the existing construction area.

To avoid changes in the courses of waterbodies, the BDCP proponents will design measures to prevent a net increase in sediment discharge or accumulation in water-bodies compared to Existing Conditions to avoid substantially affecting river hydraulics during peak conditions. A detailed sediment transport study for all water-based facilities will be conducted and a sediment management plan will be prepared and implemented during construction. The sediment management plan will include periodic and long-term sediment removal actions.

Prior to use of existing stormwater channels, drainage ditches, or irrigation canals for conveyance of dewatering flows, a hydraulic analysis of the existing channels will be completed to determine available capacity for conveyance of anticipated dewatering flows. If the conveyance capacity is not adequate, new conveyance facilities or methods for discharge into the groundwater will be developed. In accordance with NPDES requirements and requirements

1 of the SWPPP, water quality analyses of the dewatering flows will be conducted to avoid water
 2 quality contamination.

3 As described in Section 3.6.1.1, North Delta Intakes, facilities to be constructed along the levees
 4 would be designed to provide flood neutrality during construction and operations. Facilities
 5 located along the levees, including cofferdams at the intake locations, would be designed to
 6 provide continued flood management at the same level of flood protection as the existing levees;
 7 or if applicable, to a higher standard for flood management engineering and permitting
 8 requirements if the standards are greater than the existing levee design. New facilities would be
 9 designed to withstand the applicable flood management standards through construction of flood
 10 protection embankments or construction on engineered fill to raise the facilities to an elevation
 11 above the design flood elevation for that specific location. The levee design criteria would
 12 consider the most recent criteria, including new guidelines for urban and rural levees (DWR
 13 2013, 2014).

14 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**
 15 **Involving Flooding Due to the Construction of New Conveyance Facilities**

16 As described under Impact SW-4, facilities under Alternative 1A would be designed to avoid
 17 increased flood potential compared to Existing Conditions or the No Action Alternative in
 18 accordance with the requirements of USACE, CVFPB, and DWR. As described under Impact SW-1,
 19 Alternative 1A would not increase flood potential on the Sacramento River, San Joaquin River, or
 20 Yolo Bypass.

21 USACE, CVFPB, and DWR would require that any construction that would disturb existing levees to
 22 be designed in a manner that would not adversely affect existing flood protection. As described in
 23 Section 3.6.1.1, North Delta Intakes, facilities to be constructed along the levees would be designed to
 24 provide flood neutrality during construction and operations. Facilities located along the levees,
 25 including cofferdams at the intake locations, would be designed to provide continued flood
 26 management at the same level of flood protection as the existing levees; or if applicable, to a higher
 27 standard for flood management engineering and permitting requirements if the standards are
 28 greater than the existing levee design. The levee design criteria would consider the most recent
 29 criteria, including new guidelines for urban and rural levees (DWR 2013, 2014). The design flood
 30 elevation would need to consider sea level rise to reduce impacts.

31 Additionally, DWR would consult with local reclamation districts to ensure that construction
 32 activities would not conflict with reclamation district flood protection measures. Facilities
 33 construction would include temporary cofferdams, stability analyses, monitoring, and slope
 34 remediation, as described in Chapter 3, *Description of Alternatives*. For the excavation of the existing
 35 levee for the Sacramento River intake structures, sheet pile wall installation would minimize effects
 36 on slope stability during construction. For excavation of the existing levee for the Byron Tract
 37 Forebay, tie-back wall installation and dewatering to maintain slope stability and control seepage
 38 would minimize effects on slope stability associated with construction of the forebay and approach
 39 channel embankments. Providing tunnel shaft support would minimize the effects on slope stability
 40 from excavation adjacent to Clifton Court Forebay during excavation of the main tunnel shaft
 41 adjacent to the Clifton Court Forebay embankment. Dewatering inside the cofferdam or adjacent to
 42 the existing levees would remove waterside slope resistance and lead to slope instability. Slopes
 43 would be constructed in accordance with existing engineering standards, as described in Chapter 3,
 44 *Description of Alternatives*.

1 Facilities constructed within the floodplain, including pumping plants, sedimentation basins,
 2 substations, forebays, and conveyance facilities would be designed to be protected from flooding.
 3 New facilities would be designed to withstand the applicable flood management standards through
 4 construction of flood protection embankments or construction on engineered fill to raise the
 5 facilities to an elevation above the design flood elevation for that specific location, as described in
 6 Appendix 3C, Construction Assumptions for Water Conveyance Facilities. The design flood elevation
 7 would need to consider sea level rise to reduce impacts.

8 Some project facilities could require rerouting of access roads and waterways that could be used
 9 during times of evacuation or emergency response.

10 **NEPA Effects:** Alternative 1A would not result in increased exposure of people or structures to
 11 flooding due to construction of the conveyance facilities because the BDCP proponents would be
 12 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential
 13 and levee failure due to construction and operation of the facilities, as described in Section 6.2.2.4.
 14 Determination of design flood elevations would need to consider sea level rise to reduce impacts.

15 **CEQA Conclusion:** Alternative 1A would not result in an increase to exposure of people or structures
 16 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 17 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 18 potential and levee failure due to construction and operation of the facilities, as described in Section
 19 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these
 20 impacts are considered less than significant. Mitigation Measure SW-57 would reduce this impact to
 21 a less-than-significant level.

22 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

23 Determination of design flood elevation will consider the effects of sea level rise for the lifetime
 24 of the project, as determined by USACE, CVFPB, and DWR. A 200-year level of flood protection
 25 will be provided for all new facilities. For levee modifications, the level of flood protection will
 26 be the same as required for the modified levee without the new facilities.

27 **6.3.3.3 Alternative 1B—Dual Conveyance with East Alignment and** 28 **Intakes 1–5 (15,000 cfs; Operational Scenario A)**

29 **Reverse Flows in Old and Middle River**

30 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

31 **NEPA Effects:** Effects on Old and Middle River flows under Alternative 1B would be identical to
 32 those described for Impact SW-3 under Alternative 1A because the operations of the facilities would
 33 be identical.

34 **CEQA Conclusion:** Alternative 1B would provide positive changes related to reducing reverse flows
 35 in Old and Middle Rivers in June through March and negative changes related to increased reverse
 36 flow conditions in April and May, compared to Existing Conditions. These impacts are considered
 37 significant because the increase (more negative) in reverse flow conditions in April and May is
 38 greater than 1%. The significance of the impact to beneficial use of the surface water for water
 39 supplies and aquatic resources, and appropriate Mitigation Measures for those impacts on beneficial
 40 uses. Determination of the significance of this effect is related to effects on water quality and aquatic

resources. Accordingly, the significance of these effects is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries and Aquatic Resources*.

Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding Due to the Construction of New Conveyance Facilities

NEPA Effects: Increased exposure of people or structures to flood risks under Alternative 1B would be similar to those described for Impact SW-7 under Alternative 1A because provisions to avoid adverse effects related to flood potential would be the same, and the BDCP proponents would be required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due to construction and operation of the facilities; as described in Section 6.2.2.4. Additionally, DWR would consult with local reclamation districts to ensure that construction activities would not conflict with reclamation district flood protection measures. Determination of design flood elevations would need to consider sea level rise to reduce impacts.

CEQA Conclusion: Alternative 1B would not result in increased exposure of people or structures to flooding due to construction of the conveyance facilities because the BDCP proponents would be required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood potential and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-significant level.

Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage

Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

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

Reverse Flows in Old and Middle River

Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers

NEPA Effects: Effects on Old and Middle River flows under Alternative 1C would be identical to those described for Impact SW-3 under Alternative 1A because the operations of the facilities would be identical.

CEQA Conclusion: Alternative 1C would provide positive changes related to reducing reverse flows in Old and Middle Rivers in June through March and negative changes related to increased reverse flow conditions in April and May compared to Existing Conditions. These impacts are considered significant because the increase (more negative) in reverse flow conditions is greater than 1%. The significance of the impact to beneficial use of the surface water for water supplies and aquatic resources, and appropriate Mitigation Measures for those impacts on beneficial uses, Determination of the significance of this effect is related to effects on water quality and aquatic resources. Therefore, the significance of these effects is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries and Aquatic Resources*.

1 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**
 2 **Involving Flooding Due to the Construction of New Conveyance Facilities**

3 **NEPA Effects:** Increased exposure of people or structures to flood risks under Alternative 1C would
 4 be similar to those described for Impact SW-7 under Alternative 1A because provisions to avoid
 5 adverse effects related to flood potential would be the same, and the BDCP proponents would be
 6 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential
 7 and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4.
 8 Additionally, DWR would consult with local reclamation districts to ensure that construction
 9 activities would not conflict with reclamation district flood protection measures. Determination of
 10 design flood elevations would need to consider sea level rise to reduce impacts.

11 **CEQA Conclusion:** Alternative 1C would not result in an increase to exposure of people or structures
 12 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 13 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 14 potential and levee failure due to construction and operation of the facilities as described in Section
 15 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
 16 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
 17 significant level.

18 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

19 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

20 **6.3.3.5 Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five**
 21 **Intakes (15,000 cfs; Operational Scenario B)**

22 **Reverse Flows in Old and Middle River**

23 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

24 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 2A on a
 25 long-term average basis except in April, as shown in Figure 6-23. Compared to flows under both
 26 Existing Conditions and the No Action Alternative, Old and Middle River flows would be less positive
 27 in April under Alternative 2A because Alternative 2A does not include inflow/export ratio criteria
 28 for the San Joaquin River in those months. Therefore, Alternative 2A would result in reduced reverse
 29 flow conditions in Old and Middle Rivers in May through March and increased reverse flow
 30 conditions in April.

31 **NEPA Effects:** A comparison with reverse flow conditions under the No Action Alternative provides
 32 an indication of the potential change due to Alternative 2A without the effects of sea level rise and
 33 climate change and the results show that reverse flow conditions under Alternative 2A would be
 34 reduced on a long-term average basis except in April as compared to No Action Alternative.

35 **CEQA Conclusion:** Alternative 2A would provide positive changes related to reducing reverse flows
 36 in Old and Middle Rivers in May-June through March and negative changes in the form of less
 37 positive flows in wetter years and increased reverse flow conditions in drier years during April and
 38 May, compared to Existing Conditions. These impacts are considered significant because the
 39 increase (more negative) in reverse flow conditions is greater than 1%. The significance of the
 40 impact to beneficial use of the surface water for water supplies and aquatic resources, and

1 ~~appropriate Mitigation Measures for those impacts on beneficial uses, Determination of the~~
 2 ~~significance of this impact is related to impacts on water quality and aquatic resources. The~~
 3 ~~significance of these impacts are~~ described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*
 4 *and Aquatic Resources*.

5 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 6 **Involving Flooding Due to the Construction of New Conveyance Facilities**

7 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 2A
 8 would be identical to those described under Alternative 1A because the facilities would be identical.
 9 Alternative 2A would not result in an increase to exposure of people or structures to flooding due to
 10 construction of the conveyance facilities because the BDCP proponents would be required to comply
 11 with the requirements of USACE, CVFPB, and DWR to avoid increased flood potential and levee
 12 failure due to construction and operation of the facilities as described in Section 6.2.2.4 as described
 13 in Section 6.2.2.4. Additionally, DWR would consult with local reclamation districts to ensure that
 14 construction activities would not conflict with reclamation district flood protection measures.

15 Determination of design flood elevations would need to consider sea level rise to reduce impacts.

16 **CEQA Conclusion:** Alternative 2A would not result in an increase to exposure of people or structures
 17 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 18 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 19 potential and levee failure due to construction and operation of the facilities as described in Section
 20 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
 21 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
 22 significant level.

23 Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage

24 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

25 **6.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five** 26 **Intakes (15,000 cfs; Operational Scenario B)**

27 **Reverse Flows in Old and Middle River**

28 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

29 **NEPA Effects:** Effects on Old and Middle River flows under Alternative 2B would be identical to
 30 those described for Impact SW-3 under Alternative 2A because the operations of the facilities would
 31 be identical.

32 **CEQA Conclusion:** Alternative 2B would provide positive changes related to reducing reverse flows
 33 in Old and Middle Rivers in May-June through March and negative changes in the form of less
 34 positive flows in wetter years and increased reverse flow conditions in drier years during April and
 35 May as compared to Existing Conditions. These impacts are considered significant because the
 36 increase (more negative) in reverse flow conditions is greater than 1%. The significance of the
 37 impact to beneficial use of the surface water for water supplies and aquatic resources, and
 38 appropriate Mitigation Measures for those impacts on beneficial uses, Determination of the
 39 significance of this effect is related to effects on water quality and aquatic resources. Therefore, the

1 ~~significance of these effects is are~~ described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*
2 *and Aquatic Resources*.

3 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 4 **Involving Flooding Due to the Construction of New Conveyance Facilities**

5 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 2B
6 would be identical to those described under Alternative 1B because the facilities would be identical.
7 Alternative 2B would not result in an increase to exposure of people or structures to flooding due to
8 construction of the conveyance facilities because the BDCP proponents would be required to comply
9 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due
10 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR
11 would consult with local reclamation districts to ensure that construction activities would not
12 conflict with reclamation district flood protection measures. However, increased wind fetch near
13 open water areas of habitat restoration could cause potential damage to adjacent levees.

14 **CEQA Conclusion:** Alternative 2B would not result in increased exposure of people or structures to
15 flooding due to construction of the conveyance facilities because the BDCP proponents would be
16 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
17 potential and levee failure due to construction and operation of the facilities as described in Section
18 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
19 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
20 significant level.

21 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

22 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

23 **6.3.3.7 Alternative 2C—Dual Conveyance with West Alignment and** 24 **Intakes W1–W5 (15,000 cfs; Operational Scenario B)**

25 **Reverse Flows in Old and Middle River**

26 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

27 **NEPA Effects:** Effects on Old and Middle River flows under Alternative 2C would be identical to
28 those described for Impact SW-3 under Alternative 2A because the operations of the facilities would
29 be identical.

30 **CEQA Conclusion:** Alternative 2C would provide positive changes related to reducing reverse flows
31 in Old and Middle Rivers in May-June through March and negative changes in the form of less
32 positive flows in wetter years and increased reverse flow conditions in drier years during April and
33 May as compared to Existing Conditions. These impacts are considered significant because the
34 increase (more negative) in reverse flow conditions is greater than 1%. The significance of the
35 impact to beneficial use of the surface water for water supplies and aquatic resources, and
36 appropriate Mitigation Measures for those impacts on beneficial uses, Determination of the
37 significance of this effect is related to effects on water quality and aquatic resources. Therefore, the
38 significance of these effects is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*
39 *and Aquatic Resources*.

1 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**
 2 **Involving Flooding Due to the Construction of New Conveyance Facilities**

3 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 2C
 4 would be identical to those described under Alternative 1C because the facilities would be identical.
 5 Alternative 2C would not result in increased exposure of people or structures to flooding due to
 6 construction of the conveyance facilities because the BDCP proponents would be required to comply
 7 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due
 8 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR
 9 would consult with local reclamation districts to ensure that construction activities would not
 10 conflict with reclamation district flood protection measures. Determination of design flood
 11 elevations would need to consider sea level rise to reduce impacts.

12 *CEQA Conclusion:* Alternative 2C would not result in an increase to exposure of people or structures
 13 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 14 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 15 potential and levee failure due to construction and operation of the facilities as described in Section
 16 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
 17 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
 18 significant level.

19 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

20 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

21 **6.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and**
 22 **Intakes 1 and 2 (6,000 cfs; Operational Scenario A)**

23 **Reverse Flows in Old and Middle River**

24 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

25 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 3 on a
 26 long-term average basis except in April and May; and October, compared to reverse flows under
 27 both Existing Conditions and the No Action Alternative, as shown in Figure 6-23. Compared to flows
 28 under the No Action Alternative, Old and Middle River flows would be less positive in April and May
 29 under Alternative 3 because Alternative 3 does not include inflow/export ratio criteria for the San
 30 Joaquin River in those months; and it would be less positive in October because Alternative 3 does
 31 not include Fall X2. Therefore, Alternative 3 would result in reduced reverse flow conditions in Old
 32 and Middle Rivers in November through March and June through September and increased reverse
 33 flow conditions in April, May, and October.

34 *NEPA Effects:* A comparison with reverse flow conditions under the No Action Alternative provides
 35 an indication of the potential change due to Alternative 3 without the effects of sea level rise and
 36 climate change and the results show that reverse flow conditions under Alternative 3 would be
 37 reduced on a long-term average basis except in October, April, and May as compared to No Action
 38 Alternative.

39 *CEQA Conclusion:* Alternative 3 would provide positive changes related to reducing reverse flows in
 40 Old and Middle Rivers in June through March and negative changes in the form of increased reverse

1 flow conditions in April and May, compared to Existing Conditions. These impacts are considered
 2 significant because the increase (more negative) in reverse flow conditions is greater than 1%. The
 3 significance of the impact to beneficial use of the surface water for water supplies and aquatic
 4 resources, and appropriate Mitigation Measures for those impacts on beneficial uses. ~~Determination~~
 5 ~~of the significance of this impact is related to impacts on water quality and aquatic resources. The~~
 6 significance of these impacts is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*
 7 *and Aquatic Resources*.

8 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 9 **Involving Flooding Due to the Construction of New Conveyance Facilities**

10 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 3
 11 would be similar to those described under Alternative 1A because the facilities would be similar
 12 with the exception of three fewer intakes, pumping plants, and associated conveyance facilities.
 13 Therefore, potential for effects would be less than described under Alternative 1A. However, the
 14 measures included in Alternative 1A to avoid adverse effects would be included in Alternative 3.
 15 Therefore, Alternative 3 would not result in an increase to exposure of people or structures to
 16 flooding due to construction of the conveyance facilities because the BDCP proponents would be
 17 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential
 18 and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4.
 19 Additionally, DWR would consult with local reclamation districts to ensure that construction
 20 activities would not conflict with reclamation district flood protection measures. Determination of
 21 design flood elevations would need to consider sea level rise to reduce impacts.

22 **CEQA Conclusion:** Alternative 3 would not result in an increase to exposure of people or structures
 23 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 24 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 25 potential and levee failure due to construction and operation of the facilities as described in Section
 26 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
 27 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
 28 significant level.

29 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

30 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

31 **6.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel** 32 **and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)**

33 Facilities construction under Alternative 4 would ~~include construction of three intakes. be similar to~~
 34 those described under Alternative 2A with only three intakes. The facilities at the intake locations
 35 would not include pump; however, the facilities would include fish screens and sediment removal as
 36 included in Alternative 2A. The intermediate forebay also would be smaller than under Alternative
 37 2A.

38 Alternative 4 water conveyance operations would be based on Alternative 2A, with the exception
 39 that a range of possible operations for ~~the additional~~ spring and fall Delta outflow requirements that
 40 are considered to be equally likely would be evaluated. This range of operations comprises four
 41 separate scenarios as described in detail in Section 3.6.4.2 in Chapter 3, *Description of Alternatives*,

1 and in Appendix 5A, BDCP EIR/EIS Modeling Technical Appendix. These four scenarios vary
 2 depending on assumptions for Delta outflow requirements in spring and fall.

- 3 • Alternative 4 Operational Scenario H1 (Alternative 4 H1) does not include enhanced spring
 4 outflow requirements or Fall X2,
- 5 • Alternative 4 Operational Scenario H2 (Alternative 4 H2) includes enhanced spring outflow
 6 requirements but not Fall X2,
- 7 • Alternative 4 Operational Scenario H3 (Alternative 4 H3) does not include enhanced spring
 8 outflow requirements but includes Fall X2 (similar to Alternative 2A), and
- 9 • Alternative 4 Operational Scenario H4 (Alternative 4 H4) includes both enhanced spring outflow
 10 requirements and Fall X2.

11 Model results discussed for this Alternative are summarized in Tables 6-2 through 6-7.

12 **SWP/CVP Reservoir Storage and Related Changes to Flood Potential**

13 **Impact SW-1: Changes in SWP or CVP Reservoir Flood Storage Capacity**

14 Reservoir storage in Shasta Lake, Folsom Lake, and Lake Oroville during the October through June
 15 period is compared to the flood storage capacity of each reservoir to identify the number of months
 16 where the reservoir storage is close to the flood storage capacity.

17 **NEPA Effects:** Under Alternative 4 scenarios, the number of months where the reservoir storage is
 18 close to the flood storage capacity in Shasta Lake, Folsom Lake, and Lake Oroville would be similar
 19 (or show no more than 10% increase) under the No Action Alternative, as shown in Tables 6-2
 20 through 6-7.

21 A comparison with storage conditions under the No Action Alternative provides an indication of the
 22 potential change due to Alternative 4 without the effects of sea level rise and climate change and the
 23 results show that reservoir storages would not be consistently high during October through June
 24 under Alternative 4 as compared to the conditions under the No Action Alternative. Therefore,
 25 Alternative 4 would not result in adverse effects on reservoir flood storage capacity as compared to
 26 the conditions without the project.

27 **CEQA Conclusion:** Under Alternative 4 scenarios, the number of months where the reservoir storage
 28 is close to the flood storage capacity in Shasta Lake, Folsom Lake, and Lake Oroville would be less
 29 than under Existing Conditions, as shown in Tables 6-2 through 6-7. These differences represent
 30 changes under Alternative 4, increased demands from Existing Conditions to No Action Alternative,
 31 and changes due to sea level rise and climate change. Alternative 4 would not cause consistently
 32 higher storages in the upper Sacramento River watershed during the October through June period.
 33 Accordingly, Alternative 4 would result in a less-than-significant impact on flood management. No
 34 mitigation is required.

~~Peak Monthly Flows~~ **Highest Monthly Flows** in Sacramento and San Joaquin Rivers and Related Changes to Flood Potential

Impact SW-2: Changes in Sacramento and San Joaquin River Flood Flows

Sacramento River at Bend Bridge

~~Peak monthly flows~~ **Highest monthly flows** that occur in Sacramento River at Bend Bridge are shown in Figures 6-8 and 6-9 during wet years and over the long-term average.

Average of highest flows simulated (flows with probability of exceedance of 10% or less) under Alternative 4 would remain similar (in scenarios H3 and H4) or increase by no more than 1% (in scenarios H1 and H2) of the channel capacity (100,000 cfs) as compared to the flows under the No Action Alternative, as shown in Tables 6-2 through 6-4.

Average of highest flows simulated (flows with probability of exceedance of 10% or less) under Alternative 4 would increase by 2% (in scenarios H3 and H4) to 3% (in scenarios H1 and H2) of the channel capacity (100,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. The increase primarily would occur due to sea level rise, climate change, and increased north of Delta demands.

A comparison with flow conditions under the No Action Alternative provides an indication of the potential change due to Alternative 4 without the effects of sea level rise and climate change and the results show that there would not be a consistent increase in high flow conditions under Alternative 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse impacts on flow conditions in the Sacramento River at Bend Bridge as compared to the conditions without the project.

Sacramento River at Freeport

~~Peak monthly flows~~ **Highest monthly flows** that occur in Sacramento River at Freeport are shown in Figures 6-10 and 6-11 during wet years and over the long-term average.

Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all Alternative 4 scenarios would decrease by 1% of the channel capacity (110,000 cfs) as compared to the flows under the No Action Alternative, as shown in Tables 6-2 through 6-4.

Average of highest flows simulated (flows with probability of exceedance of 10% or less) under Alternative 4 would remain similar (in scenarios H3 and H4) or increase by no more than 1% (in scenarios H1 and H2) of the channel capacity (110,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. The increase primarily would occur due to sea level rise, climate change, and increased north of Delta demands.

A comparison with flow conditions under the No Action Alternative provides an indication of the potential change due to Alternative 4 without the effects of sea level rise and climate change and the results show that there would not be a consistent increase in high flow conditions under Alternative 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse impacts on flow conditions in the Sacramento River at Freeport as compared to the conditions without the project.

1 **San Joaquin River at Vernalis**

2 ~~Peak monthly flows~~Highest monthly flows that occur in San Joaquin River at Vernalis are shown in
3 Figures 6-12 and 6-13 during wet years and over the long-term average.

4 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all
5 Alternative 4 scenarios would remain similar to (or show less than 1% change with respect to the
6 channel capacity: 52,000 cfs) as compared to the flows under the No Action Alternative, as shown in
7 Tables 6-2 through 6-4.

8 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all
9 Alternative 4 scenarios would remain similar (or show less than 1% change with respect to the
10 channel capacity: 110,000 cfs) as compared to the flows under Existing Conditions, as shown in
11 Tables 6-2 through 6-4.

12 A comparison with flow conditions under the No Action Alternative provides an indication of the
13 potential change due to Alternative 4 without the effects of sea level rise and climate change and the
14 results show that there would not be a consistent increase in high flow conditions under Alternative
15 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse
16 impacts on flow conditions in the San Joaquin River at Vernalis as compared to the conditions
17 without the project.

18 **Sacramento River at Locations Upstream of Walnut Grove (downstream of north Delta intakes)**

19 ~~Peak monthly flows~~Highest monthly flows that occur in the n the Sacramento River upstream of
20 Walnut Grove are shown in Figures 6-14 and 6-15 during wet years and over the long-term average.

21 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under
22 Alternative 4 would decrease by 8% (in scenarios H1 and H2) to 9% (in scenarios H3 and H4) of the
23 channel capacity (110,000 cfs) as compared to the flows under the No Action Alternative, as shown
24 in Tables 6-2 through 6-4.

25 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under
26 Alternative 4 would decrease by 7% (in scenarios H1 and H2) to 8% (in scenarios H3 and H4) of the
27 channel capacity (110,000 cfs) as compared to the flows under Existing Conditions, as shown in
28 Tables 6-2 through 6-4. This decrease primarily would occur due to sea level rise, climate change,
29 and increased north of Delta demands.

30 A comparison with flow conditions under the No Action Alternative provides an indication of the
31 potential change due to Alternative 4 without the effects of sea level rise and climate change and the
32 results show that there would not be a consistent increase in high flow conditions under Alternative
33 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse
34 impacts on flow conditions in the Sacramento River upstream of Walnut Grove as compared to the
35 conditions without the project.

36 **Trinity River Downstream of Lewiston Dam**

37 ~~Peak monthly flows~~Highest monthly flows that occur in the Trinity River downstream of Lewiston
38 Lake are shown in Figures 6-16 and 6-17 during wet years and over the long-term average.

39 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under
40 Alternative 4 would remain similar (in scenarios H3 and H4) or increase by no more than 1% (in

1 scenarios H1 and H2) of the channel capacity (6,000 cfs) as compared to the flows under the No
2 Action Alternative, as shown in Tables 6-2 through 6-4.

3 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under
4 Alternative 4 would increase by 4% (in scenarios H3 and H4) to 5% (in scenarios H1 and H2) of the
5 channel capacity (6,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables
6 6-2 through 6-4. This increase primarily would occur due to sea level rise, climate change, and
7 increased north of Delta demands.

8 A comparison with flow conditions under the No Action Alternative provides an indication of the
9 potential change due to Alternative 4 without the effects of sea level rise and climate change and the
10 results show that there would not be a consistent increase in high flow conditions under Alternative
11 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse
12 impacts on flow conditions in the Trinity River downstream of Lewiston Lake as compared to the
13 conditions without the project.

14 **American River Downstream of Nimbus Dam**

15 ~~Peak monthly flows~~Highest monthly flows that occur in the American River at Nimbus Dam are
16 shown in Figures 6-18 and 6-19 during wet years and over the long-term average.

17 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all
18 Alternative 4 scenarios would remain similar to (or show less than 1% change with respect to the
19 channel capacity: 115,000 cfs) as compared to the flows under the No Action Alternative, as shown
20 in Tables 6-2 through 6-4.

21 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all
22 Alternative 4 scenarios would increase by no more than 1% of the channel capacity (115,000 cfs) as
23 compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. This increase
24 primarily would occur due to sea level rise, climate change, and increased north of Delta demands.

25 A comparison with flow conditions under the No Action Alternative provides an indication of the
26 potential change due to Alternative 4 without the effects of sea level rise and climate change and the
27 results show that there would not be a consistent increase in high flow conditions under Alternative
28 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse
29 impacts on flow conditions in the American River at Nimbus Dam as compared to the conditions
30 without the project.

31 **Feather River Downstream of Thermalito Dam**

32 ~~Peak monthly flows~~Highest monthly flows that occur in the Feather River downstream of
33 Thermalito Dam are shown in Figures 6-20 and 6-21 during wet years and over the long-term
34 average.

35 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under
36 Alternative 4 would remain similar (in scenarios H1 and H3) or increase by no more than 1% (in
37 scenarios H2 and H4) of the channel capacity (210,000 cfs) as compared to the flows under the No
38 Action Alternative, as shown in Tables 6-2 through 6-4.

39 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under
40 Alternative 4 would remain similar (in scenario H3) or increase by no more than 1% (in scenarios
41 H1, H2, and H4) of the channel capacity (210,000 cfs) as compared to the flows under Existing

1 Conditions, as shown in Tables 6-2 through 6-4. The increase primarily would occur due to sea level
2 rise, climate change, and increased north of Delta demands.

3 A comparison with flow conditions under the No Action Alternative provides an indication of the
4 potential change due to Alternative 4 without the effects of sea level rise and climate change and the
5 results show that there would not be a consistent increase in high flow conditions under Alternative
6 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse
7 impacts on flow conditions in the Feather River at Thermalito Dam as compared to the conditions
8 without the project.

9 **Yolo Bypass at Fremont Weir**

10 ~~Peak monthly spills~~Highest monthly spills into the Yolo Bypass at Fremont Weir occur in February
11 during wet years, as shown in Figure 6-22.

12 Average of highest spills simulated (flows with probability of exceedance of 10% or less) under
13 Alternative 4 (in all four Alternative 4 scenarios) would increase no more than 1% of the channel
14 capacity as compared to the flows under the No Action Alternative, as shown in Tables 6-2 through
15 6-4.

16 Average of highest spills simulated (flows with probability of exceedance of 10% or less) under
17 Alternative 4 would increase by no more than 1% (in scenario H3) to 2% (in scenarios H1, H2, and
18 H4) of the channel capacity (343,000 cfs) as compared to the flows under Existing Conditions, as
19 shown in Tables 6-2 through 6-4. This increase primarily would occur due to sea level rise, climate
20 change, and increased north of Delta demands.

21 A comparison with flow conditions under the No Action Alternative provides an indication of the
22 potential change due to Alternative 4 without the effects of sea level rise and climate change and the
23 results show that there would not be a consistent increase in high flow conditions under Alternative
24 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse
25 impacts on flow conditions in the Yolo Bypass at Fremont Weir as compared to the conditions
26 without the project.

27 **NEPA Effects:** Overall, Alternative 4 would not result in an increase in potential risk for flood
28 management compared to the No Action Alternative. ~~Peak monthly flows~~Highest monthly flows
29 under Alternative 4 in the locations considered in this analysis either were similar to or less than
30 ~~peak monthly flows~~highest monthly flows that would occur under the No Action Alternative; or the
31 increase in ~~peak monthly flows~~highest monthly flows would be less than the flood capacity for the
32 channels at these locations.

33 Average of highest flows simulated (flows with probability of exceedance of 10% or less) would
34 increase no more than 1% of the channel capacity as compared to the flows under the No Action
35 Alternative.

36 Increased frequency of spills due to the proposed notch under Alternative 4 would not cause any
37 significant adverse effect in conveying flood flows, because the maximum capacity of the notch is
38 6,000 cfs (less than 2% of the channel capacity); and the notch is closed (no additional flow) when
39 the River stage reaches the weir crest elevation. Therefore, even if the notch enables spills before
40 the River stage reaches the crest elevation, these spills would be minor relative to the capacity of the
41 Bypass. Velocity in the Bypass would increase as the spills occur over the crest; therefore the inertia

1 due to earlier spills through the notch would decrease and would not be significant by the time the
2 Bypass reaches full capacity.

3 Therefore, Alternative 4 would not result in adverse effects on flood management.

4 **CEQA Conclusion:** Alternative 4 would not result in an increase in potential risk for flood
5 management compared to Existing Conditions when the changes due to sea level rise and climate
6 change are eliminated from the analysis. ~~Peak monthly flows~~Highest monthly flows under
7 Alternative 4 in the locations considered in this analysis either were similar to or less than those
8 that would occur under Existing Conditions without the changes in sea level rise and climate change;
9 or the increased ~~peak monthly flows~~highest monthly flows would not exceed the flood capacity of
10 the channels at these locations. Accordingly, Alternative 4 would result in a less-than-significant
11 impact on flood management. No mitigation is required.

12 **Reverse Flows in Old and Middle River**

13 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

14 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 4 on a
15 long-term average basis except in May in scenarios H2 and H4 and in April and May in scenarios H1
16 and H3, compared to reverse flows under both Existing Conditions and the No Action Alternative, as
17 shown in Figure 6-23. Compared to flows under the No Action Alternative, Old and Middle River
18 flows would be less positive in April and May under scenarios H1 and H3 because these scenarios do
19 not include inflow/export ratio criteria for the San Joaquin River in those months, although there
20 are other criteria for Old and Middle River flows assumed in these scenarios. This effect is only seen
21 in May in scenarios H2 and H4 because these two scenarios include enhanced spring outflow
22 requirements. Therefore, Alternative 4 would result in reduced reverse flow conditions in Old and
23 Middle Rivers in June through March and increased reverse flow conditions in April (in scenarios H1
24 and H3) and May (in all four Alternative 4 scenarios).

25 **NEPA Effects:** A comparison with reverse flow conditions under the No Action Alternative provides
26 an indication of the potential change due to Alternative 4 without the effects of sea level rise and
27 climate change and the results show that reverse flow conditions under Alternative 4 would be
28 reduced on a long-term average basis except in April and May as compared to No Action Alternative.

29 **CEQA Conclusion:** Alternative 4 would provide positive changes related to reducing reverse flows in
30 Old and Middle Rivers in June through March and negative changes in the form of increased reverse
31 flow conditions in April and May, compared to Existing Conditions. These impacts are considered
32 significant because the increase (more negative) in reverse flow conditions is greater than 1%. The
33 significance of the impact to beneficial use of the surface water for water supplies and aquatic
34 resources, and appropriate Mitigation Measures for those impacts on beneficial uses. Determination
35 of the significance of this impact is related to impacts on water quality and aquatic resources. The
36 significance of these impacts is are described in Chapter 8, Water Quality, and Chapter 11, Fisheries
37 and Aquatic Resources.

1 **Impact SW-4: Substantially Alter the Existing Drainage Pattern or Substantially Increase the**
 2 **Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding during**
 3 **Construction of Conveyance Facilities**

4 **NEPA Effects:** Effects associated with construction and operations of facilities under Alternative 4
 5 would be similar to those described under Alternative 1A with the exception of three two fewer
 6 intakes, elimination of the pumps at the intake locations, and reduction of the intermediate forebay
 7 acreage. Additional pumps would be constructed near Clifton Court Forebay under Alternative 4 as
 8 compared to Alternative 1A. ~~b~~ Because similar construction methods and similar features would be
 9 used as under Alternative 1A, the types of effects would be similar. However, the. ~~Accordingly,~~
 10 potential for effects would be less than described under Alternative 1A. However, the measures
 11 included in Alternative 1A to avoid adverse effects would be included in Alternative 4.

12 Alternative 4 would involve excavation, grading, stockpiling, soil compaction, and dewatering that
 13 would result in temporary and long-term changes to drainage patterns, drainage paths, and facilities
 14 that would in turn, cause changes in drainage flow rates, directions, and velocities. Construction of
 15 cofferdams ~~would~~ could impede river flows, cause hydraulic effects, and increase water surface
 16 elevations upstream. Potential adverse effects could occur due to increased stormwater runoff from
 17 paved areas that could increase flows in local drainages; and changes in sediment accumulation near
 18 the intakes. Mitigation Measure SW-4 is available to address effects of runoff and sedimentation.

19 **CEQA Conclusion:** Alternative 4 ~~would~~ could result in alterations to drainage patterns, stream
 20 courses, and runoff; and potential for increased surface water elevations in the rivers and streams
 21 during construction and operations of facilities located within the waterway. Potential impacts could
 22 occur due to increased stormwater runoff from paved areas that could increase flows in local
 23 drainages, and from changes in sediment accumulation near the intakes. These impacts are
 24 considered significant. Mitigation Measure SW-4 would reduce this impact to a less-than-significant
 25 level

26 **Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation**

27 Please see Mitigation Measure SW-4 under Impact SW-4 in the discussion of Alternative 1A.

28 **Impact SW-5: Substantially Alter the Existing Drainage Pattern or Substantially Increase the**
 29 **Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding during**
 30 **Construction of Habitat Restoration Area Facilities**

31 **NEPA Effects:** Effects of alternating existing drainage patterns under Alternative 4 would be the
 32 same as those described for Impact SW-5 under Alternative 1A because the habitat restoration areas
 33 would be identical and provisions to avoid adverse effects on drainage patterns would be the same.

34 **CEQA Conclusion:** Please see Impact SW-5 conclusion in Alternative 1A.

35 **Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation**

36 Please see Mitigation Measure SW-4 under Impact SW-4 in the discussion of Alternative 1A.

1 **Impact SW-6: Create or Contribute Runoff Water Which Would Exceed the Capacity of**
 2 **Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources**
 3 **of Polluted Runoff**

4 Effects associated with construction and operations of facilities under Alternative 4 would be similar
 5 to those described under Alternative 1A with the exception of three fewer intakes, elimination of
 6 the pumps at the intake locations, and reduction of the intermediate forebay acreage. Additional
 7 pumps would be constructed near Clifton Court Forebay under Alternative 4 as compared to
 8 Alternative 1A. ~~Because similar construction methods and similar features would be used as under~~
 9 ~~Alternative 1A, the types of effects would be similar. However, the~~ ~~Accordingly,~~ potential for effects
 10 would be less than described under Alternative 1A.

11 **NEPA Effects:** Paving, soil compaction, and other activities would increase runoff during facilities
 12 construction and operations. Construction and operation of dewatering facilities and associated
 13 discharge of water would result in localized increases in flows and water surface elevations in
 14 receiving channels. These activities could result in adverse effects if the runoff volume exceeds the
 15 capacities of local drainages. Compliance with permit design requirements would avoid adverse
 16 effects on surface water quality and flows from dewatering activities. The use of dispersion facilities
 17 would reduce the potential for channel erosion. Mitigation Measure SW-4 is available to address
 18 adverse effects.

19 **CEQA Conclusion:** Alternative 4 actions would include installation of dewatering facilities in
 20 accordance with permits issued by the Regional Water Quality Control Board, USACE, and CVFPB
 21 (See Section 6.2.2.4). Alternative 4 would include provisions to design the dewatering system in
 22 accordance with these permits to avoid significant impacts on surface water quality and flows. As an
 23 example, the project would be designed to meet USACE requirements for hydraulic neutrality and
 24 CVFPB requirements for access for maintenance and flood-fighting purposes. However, increased
 25 runoff could occur from facilities sites during construction or operations and could result in
 26 significant impacts if the runoff volume exceeds the capacities of local drainages. These impacts are
 27 considered significant. Mitigation Measure SW-4 would reduce this potential impact to a less-than-
 28 significant level.

29 **Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation**

30 Please see Mitigation Measure SW-4 under Impact SW-4 in the discussion of Alternative 1A.

31 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**
 32 **Involving Flooding Due to the Construction of New Conveyance Facilities**

33 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 4
 34 would be identical those described under Alternative 1A with the exception of three fewer
 35 intakes, elimination of the pumps at the intake locations, and reduction of the intermediate forebay
 36 acreage. Additional pumps would be constructed near Clifton Court Forebay under Alternative 4 as
 37 compared to Alternative 1A. ~~Because similar construction methods and similar features would be~~
 38 ~~used as under Alternative 1A, the types of effects would be similar. However, the~~ ~~Therefore,~~
 39 potential for effects would be less than described under Alternative 1A. However, the measures
 40 included in Alternative 1A to avoid adverse effects would be included in Alternative 4.

41 Alternative 4 would not result in an increase to exposure of people or structures to flooding due to
 42 construction of the conveyance facilities because the BDCP proponents would be required to comply

1 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due
 2 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR
 3 would consult with local reclamation districts to ensure that construction activities would not
 4 conflict with reclamation district flood protection measures. Determination of design flood
 5 elevations would need to consider sea level rise to reduce impacts.

6 **CEQA Conclusion:** Alternative 4 would not result in an increase to exposure of people or structures
 7 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 8 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 9 potential and levee failure due to construction and operation of the facilities as described in Section
 10 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
 11 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
 12 significant level.

13 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

14 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

15 **Impact SW-8: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 16 **Involving Flooding Due to Habitat Restoration**

17 **NEPA Effects:** Effects of operation of habitat restoration areas on levees under Alternative 4 would
 18 be the same as those described for Impact SW-8 under Alternative 1A because the habitat
 19 restoration areas would be identical and provisions to avoid adverse effects on drainage patterns
 20 would be the same.

21 **CEQA Conclusion:** Please see Impact SW-8 conclusion in Alternative 1A.

22 **Mitigation Measure SW-8: Implement Measures to Address Potential Wind Fetch Issues**

23 Please see Mitigation Measure SW-8 under Impact SW-8 in the discussion of Alternative 1A.

24 **Impact SW-9: Place within a 100-Year Flood Hazard Area Structures Which Would Impede or** 25 **Redirect Flood Flows, or Be Subject to Inundation by Mudflow**

26 Effects associated with construction and operations of facilities under Alternative 4 would be
 27 identical those described under Alternative 1A with the exception of three fewer intakes,
 28 elimination of the pumps at the intake locations, and reduction of the intermediate forebay acreage.
 29 Additional pumps would be constructed near Clifton Court Forebay under Alternative 4 as
 30 compared to Alternative 1A. ~~B~~Because similar construction methods and similar features would be
 31 used as under Alternative 1A, the types of effects would be similar. ~~Therefore~~ However, the potential
 32 for effects would be less than described under Alternative 1A. However, ~~t~~The measures included in
 33 Alternative 1A to avoid adverse effects would be included in Alternative 4. As described under
 34 Impact SW-1, Alternative 4 would not increase flood potential on the Sacramento River, San Joaquin
 35 River, Trinity River, American River, or Feather River, or Yolo Bypass, as described under Impact
 36 SW-2. Alternative 4 would include measures to address issues associated with alterations to
 37 drainage patterns, stream courses, and runoff and potential for increased surface water elevations in
 38 the rivers and streams during construction and operations of facilities.

1 **NEPA Effects:** Potential adverse effects could occur due to increased stormwater runoff from paved
 2 areas that could increase flows in local drainages; and changes in sediment accumulation near the
 3 intakes. These effects are considered adverse. Mitigation Measure SW-4 is available to address these
 4 potential effects.

5 **CEQA Conclusion:** Alternative 4 would not result in an impedence or redirection of flood flows or
 6 conditions that would cause inundation by mudflow due to construction or operations of the
 7 conveyance facilities or construction of the habitat restoration facilities because the BDCP
 8 proponents would be required to comply with the requirements of USACE, CVFPB, and DWR to
 9 avoid increased flood potential as described in Section 6.2.2.4. Potential adverse impacts could occur
 10 due to increased stormwater runoff from paved areas that could increase flows in local drainages, as
 11 well as changes in sediment accumulation near the intakes. These impacts are considered
 12 significant. Mitigation Measure SW-4 would reduce this potential impact to a less-than-significant
 13 level.

14 **Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation**

15 Please see Mitigation Measure SW-4 under Impact SW-4 in the discussion of Alternative 1A.

16 **6.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and** 17 **Intake 1 (3,000 cfs; Operational Scenario C)**

18 **Reverse Flows in Old and Middle River**

19 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

20 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 5 on a
 21 long-term average basis except in April and May compared to reverse flows under both Existing
 22 Conditions and the No Action Alternative, as shown in Figure 6-23. Therefore, Alternative 5 would
 23 result in reduced reverse flow conditions in Old and Middle Rivers in June through March and
 24 increased reverse flow conditions in April and May.

25 **NEPA Effects:** A comparison with reverse flow conditions under the No Action Alternative provides
 26 an indication of the potential change due to Alternative 5 without the effects of sea level rise and
 27 climate change and the results show that reverse flow conditions under Alternative 5 would be
 28 reduced on a long-term average basis except in October, April, and May as compared to No Action
 29 Alternative.

30 **CEQA Conclusion:** Alternative 5 would provide positive changes related to reducing reverse flows in
 31 Old and Middle Rivers in June through March and negative changes in the form of increased reverse
 32 flow conditions in April and May, compared to Existing Conditions. These impacts are considered
 33 significant because the increase (more negative) in reverse flow conditions is greater than 1%. The
 34 significance of the impact to beneficial use of the surface water for water supplies and aquatic
 35 resources, and appropriate Mitigation Measures for those impacts on beneficial uses. Determination
 36 of the significance of this impact is related to impacts on water quality and aquatic resources. The
 37 significance of these impacts is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*
 38 *and Aquatic Resources*.

1 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**
 2 **Involving Flooding Due to the Construction of New Conveyance Facilities**

3 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 5
 4 would be similar those described under Alternative 1A because the facilities would be similar with
 5 the exception of four fewer intakes, pumping plants, associated conveyance facilities. Therefore,
 6 potential for effects would be less than described under Alternative 1A. However, the measures
 7 included in Alternative 1A to avoid adverse effects would be included in Alternative 5. Therefore,
 8 Alternative 5 would not result in an increase to exposure of people or structures to flooding due to
 9 construction of the conveyance facilities because the BDCP proponents would be required to comply
 10 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due
 11 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR
 12 would consult with local reclamation districts to ensure that construction activities would not
 13 conflict with reclamation district flood protection measures. Determination of design flood
 14 elevations would need to consider sea level rise to reduce impacts.

15 *CEQA Conclusion:* Alternative 5 would not result in an increase to exposure of people or structures
 16 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 17 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 18 potential and levee failure due to construction and operation of the facilities as described in Section
 19 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
 20 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
 21 significant level.

22 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

23 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

24 **6.3.3.11 Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and**
 25 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

26 **Reverse Flows in Old and Middle River**

27 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**
 28 **Involving Flooding Due to the Construction of New Conveyance Facilities**

29 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 6A
 30 would be identical to those described under Alternative 1A because the facilities would be identical.
 31 Alternative 6A would not result in an increase to exposure of people or structures to flooding due to
 32 construction of the conveyance facilities because the BDCP proponents would be required to comply
 33 with USACE, CVFPB, and DWR to avoid increased flood potential and levee failure due to
 34 construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR would
 35 consult with local reclamation districts to ensure that construction activities would not conflict with
 36 reclamation district flood protection measures. Determination of design flood elevations would need
 37 to consider sea level rise to reduce impacts.

38 *CEQA Conclusion:* Alternative 6A would not result in an increase to exposure of people or structures
 39 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 40 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood

1 potential [and levee failure due to construction and operation of the facilities](#) as described in Section
 2 6.2.2.4. [If the design flood elevations did not consider sea level rise to reduce impacts, these impacts](#)
 3 [are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-](#)
 4 [significant level.](#)

5 **[Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage](#)**

6 [Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.](#)

7 **6.3.3.12 Alternative 6B—Isolated Conveyance with East Alignment and**
 8 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

9 **Reverse Flows in Old and Middle River**

10 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**
 11 **Involving Flooding Due to the Construction of New Conveyance Facilities**

12 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 6B
 13 would be identical to those described under Alternative 1B because the facilities would be identical.
 14 Alternative 6B would not result in an increase to exposure of people or structures to flooding due to
 15 construction of the conveyance facilities because the BDCP proponents would be required to comply
 16 with USACE, CVFPB, and DWR requirements to avoid increased flood potential [and levee failure due](#)
 17 [to construction and operation of the facilities](#) as described in Section 6.2.2.4. Additionally, DWR
 18 would consult with local reclamation districts to ensure that construction activities would not
 19 conflict with reclamation district flood protection measures. [Determination of design flood](#)
 20 [elevations would need to consider sea level rise to reduce impacts.](#)

21 *CEQA Conclusion:* Alternative 6B would not result in an increase to exposure of people or structures
 22 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 23 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 24 potential [and levee failure due to construction and operation of the facilities](#) as described in Section
 25 6.2.2.4. [If the design flood elevations did not consider sea level rise to reduce impacts, these impacts](#)
 26 [are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-](#)
 27 [significant level.](#)

28 **[Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage](#)**

29 [Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.](#)

30 **6.3.3.13 Alternative 6C—Isolated Conveyance with West Alignment and**
 31 **Intakes W1–W5 (15,000 cfs; Operational Scenario D)**

32 **Reverse Flows in Old and Middle River**

33 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**
 34 **Involving Flooding Due to the Construction of New Conveyance Facilities**

35 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 6C
 36 would be identical to those described under Alternative 1C because the facilities would be identical.
 37 Alternative 6B would not result in an increase to exposure of people or structures to flooding due to

1 construction of the conveyance facilities because the BDCP proponents would be required to comply
 2 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due
 3 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR
 4 would consult with local reclamation districts to ensure that construction activities would not
 5 conflict with reclamation district flood protection measures. Determination of design flood
 6 elevations would need to consider sea level rise to reduce impacts.

7 **CEQA Conclusion:** Alternative 6C would not result in an increase to exposure of people or structures
 8 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 9 required to comply with requirements of the USACE, CVFPB, and DWR to avoid increased flood
 10 potential and levee failure due to construction and operation of the facilities as described in Section
 11 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
 12 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
 13 significant level.

14 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

15 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

16 **6.3.3.14 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 **Reverse Flows in Old and Middle River**

20 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 21 **Involving Flooding Due to the Construction of New Conveyance Facilities**

22 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 7
 23 would be similar to those described under Alternative 1A because the facilities would be similar
 24 with the exception of two fewer intakes, pumping plants, and associated conveyance facilities.
 25 Therefore, potential for effects would be less than described under Alternative 1A. However, the
 26 measures included in Alternative 1A to avoid adverse effects would be included in Alternative 7.
 27 Therefore, Alternative 3 would not result in an increase to exposure of people or structures to
 28 flooding due to construction of the conveyance facilities because the BDCP proponents would be
 29 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential
 30 and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4.
 31 Additionally, DWR would consult with local reclamation districts to ensure that construction
 32 activities would not conflict with reclamation district flood protection measures. Determination of
 33 design flood elevations would need to consider sea level rise to reduce impacts.

34 **CEQA Conclusion:** Alternative 7 would not result in an increase to exposure of people or structures
 35 to flooding due to construction of the conveyance facilities because the BDCP proponents would be
 36 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 37 potential and levee failure due to construction and operation of the facilities as described in Section
 38 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
 39 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
 40 significant level.

1 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

2 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

3 **6.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**
4 **3, and 5, and Increased Delta Outflow (9,000 cfs; Operational**
5 **Scenario F)**

6 **Reverse Flows in Old and Middle River**

7 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**
8 **Involving Flooding Due to the Construction of New Conveyance Facilities**

9 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 8
10 would be similar to those described under Alternative 1A because the facilities would be similar
11 with the exception of two fewer intakes, pumping plants, and associated conveyance facilities.
12 Therefore, potential for effects would be less than described under Alternative 1A. However, the
13 measures included in Alternative 1A to avoid adverse effects would be included in Alternative 8.
14 Therefore, Alternative 8 would not result in an increase to exposure of people or structures to
15 flooding due to construction of the conveyance facilities because the facilities would be required to
16 comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee
17 failure due to construction and operation of the facilities as described in Section 6.2.2.4.

18 Additionally, DWR would consult with local reclamation districts to ensure that construction
19 activities would not conflict with reclamation district flood protection measures. Determination of
20 design flood elevations would need to consider sea level rise to reduce impacts.

21 *CEQA Conclusion:* Alternative 8 would not result in an increase to exposure of people or structures
22 to flooding due to construction of the conveyance facilities because the facilities would be required
23 to comply with USACE, CVFPB, and DWR requirement to avoid increased flood potential and levee
24 failure due to construction and operation of the facilities as described in Section 6.2.2.4. If the design
25 flood elevations did not consider sea level rise to reduce impacts, these impacts are considered
26 significant. Mitigation Measure SW-57 would reduce this impact to a less-than-significant level.

27 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

28 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

29 **6.3.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs;**
30 **Operational Scenario G)**

31 **Reverse Flows in Old and Middle River**

32 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

33 Old and Middle River flow criteria in Alternative 9 is only applied to flows in the Middle River.

34 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 9 on a
35 long-term average basis only June compared to conditions under the No Action Alternative, as
36 shown in Figure 6-23. Therefore, Alternative 9 would result in adverse impacts in the form of
37 increased reverse flow conditions in almost all months.

1 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 9 on a
 2 long-term average basis in months June through November compared to reverse flows under
 3 Existing Conditions, as shown in Figure 6-23. However, these differences represent changes under
 4 Alternative 9, increased demands from Existing Conditions to No Action Alternative, and changes
 5 due to sea level rise and climate change.

6 **NEPA Effects:** A comparison with reverse flow conditions under the No Action Alternative provides
 7 an indication of the potential change due to Alternative 9 without the effects of sea level rise and
 8 climate change and the results show that reverse flow conditions under Alternative 9 would be
 9 more likely to occur on a long-term average basis except in June as compared to No Action
 10 Alternative.

11 **CEQA Conclusion:** Alternative 9 would provide negative changes in the form of increased reverse
 12 flow conditions in all months except June, compared to Existing Conditions. These impacts are
 13 considered significant because the increase (more negative) in reverse flow conditions is greater
 14 than 1%. The significance of the impact to beneficial use of the surface water for water supplies and
 15 aquatic resources, and appropriate Mitigation Measures for those impacts on beneficial uses,
 16 Determination of the significance of this impact is related to impacts on water quality and aquatic
 17 resources. The significance of these impacts is are described in Chapter 8, *Water Quality*, and
 18 Chapter 11, *Fisheries and Aquatic Resources*.

19 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 20 **Involving Flooding Due to the Construction of New Conveyance Facilities**

21 As described under Impact SW-4, facilities under Alternative 9 would be designed to avoid increased
 22 flood potential as compared to Existing Conditions or the No Action Alternative in accordance with
 23 the requirements of USACE, CVFPB, and DWR. As described under Impact SW-1, Alternative 9 would
 24 not increase flood potential on the Sacramento River, San Joaquin River, or Yolo Bypass.

25 USACE, CVFPB, and DWR would require facilities constructed under Alternative 9 that would disturb
 26 existing levees to be designed in a manner that would not adversely affect existing flood protection.
 27 Facilities construction would include temporary cofferdams, stability analyses, monitoring, and
 28 slope remediation, as described in Chapter 3, *Description of Alternatives*. For the excavation of
 29 existing levees for installation of fish screens and operable barriers, sheet pile wall installation
 30 would minimize effects on slope stability during construction. Dewatering inside the cofferdams or
 31 adjacent to the existing levees would remove waterside slope resistance and lead to slope instability.
 32 Slopes would be constructed in accordance with existing engineering standards, as described in
 33 Chapter 3, *Description of Alternatives*.

34 Some project facilities could require rerouting of access roads and waterways that could be used
 35 during times of evacuation or emergency response.

36 Alternative 9 would be designed to avoid increased flood potential compared to Existing Conditions
 37 or the No Action Alternative, in accordance with the requirements of USACE, CVFPB, and DWR.

38 **NEPA Effects:** Alternative 9 would not result in an increased exposure of people or structures to
 39 flooding due to construction of the conveyance facilities because the BDCP proponents would be
 40 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential
 41 and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4.
 42 Additionally, DWR would consult with local reclamation districts to ensure that construction

1 activities would not conflict with reclamation district flood protection measures. Determination of
 2 design flood elevations would need to consider sea level rise to reduce impacts.

3 **CEQA Conclusion:** Alternative 9 would not result in increased exposure of people or structures to
 4 flooding due to construction of the conveyance facilities because the BDCP proponents would be
 5 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood
 6 potential and levee failure due to construction and operation of the facilities as described in Section
 7 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts
 8 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-
 9 significant level.

10 Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage

11 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

12 **6.3.4 Cumulative Analysis**

13 *Action Alternatives*

14 **Impact SW-13: Cumulative Impact - Reverse Flow Conditions in Old and Middle Rivers**

15 **NEPA Effects:** Implementing the projects listed in Table 6-9 in combination with any of Alternatives
 16 1A through 9 would not result in cumulative adverse effects on Old and Middle River flows.

17 San Joaquin River Restoration Program would include recirculation of the water released from
 18 Friant Dam; however the increased south Delta exports would not cause increase in reverse OMR
 19 flows as they would be subject to the same OMR regulations. In addition, Alternatives 1A through 5
 20 and 9 would increase the occurrence of more negative OMR flows, especially in April and May;
 21 however, Alternatives 6 through 8 would include north Delta diversion facility that would help
 22 reduce south Delta pumping eliminate negative OMR flows in April and May.

23 Therefore, implementing these Because the cumulative projects would be required to convey water
 24 across the Delta in accordance with the BDCP alternative assumptions, implementation of the
 25 cumulative projects in combination with any of BDCP Alternatives 1A through 9 would not result in
 26 cumulative adverse effects in addition to the impacts described above for implementation of each
 27 alternative.

28 **CEQA Conclusion:** Because the cumulative projects would be required to convey water across the
 29 Delta in accordance with the BDCP alternative assumptions, implementation of the cumulative
 30 projects in combination with any of BDCP Alternatives 1A through 9 would not result in cumulative
 31 adverse effects in addition to the impacts described above for implementation of each alternative.
 32 Implementing these projects in combination with any of BDCP Alternatives 1A through 9 would not
 33 result in a significant cumulative impact. These impacts are considered significant for cumulative
 34 projects that would include Alternatives 1A through 5 or Alternative 9 because the increase (more
 35 negative) in reverse flow conditions is greater than 1%. The significance of the impact to beneficial
 36 use of the surface water for water supplies and aquatic resources, and appropriate Mitigation
 37 Measures for those impacts on beneficial uses are described in Chapter 8, *Water Quality*, and
 38 Chapter 11, *Fisheries and Aquatic Resources*. Implementation of cumulative projects with
 39 Alternatives 6 through 8 would result in less than significant impacts.

1 **6.4 References**

2 **6.4.1 Printed References**

3 [California Department of Water Resources. 2013. Urban Level of Flood Protection Criteria,](#)
4 [FloodSAFE California. November.](#)

5 [California Department of Water Resources. 2014. Rural Levee Repair Guidelines, FloodSAFE](#)
6 [California. March.](#)
7