Chapter 6
Surface Water

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.

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

Design Criteria Assumptions for Facilities along Levees and in Yolo Bypass

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

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

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

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

6.3.2 Determination of Effects

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

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

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

~~(described below for Surface Water Impacts 1–3). Section 6.3.2 describes t~~The potential for changes in flood management operations described in this chapter ~~as~~ are determined through a qualitative evaluation of CALSIM II model results (described below as Surface Water Impacts ~~4–7~~1 and 2).

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

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

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

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

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

6.3.3 Effects and Mitigation Approaches

6.3.3.1 No Action Alternative

Reverse Flows in Old and Middle River

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

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

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

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

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

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

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

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

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

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

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

NEPA Effects: Alternative 1A 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 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. Determination of design flood elevations would need to consider sea level rise to reduce impacts.

***CEQA Conclusion*:** Alternative 1A would not result in an increase to 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~~These~~ impacts are considered ~~less than~~ significant. Mitigation Measure SW-~~5~~7 would reduce this impact to a less-than-significant level.

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

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

6.3.3.3 Alternative 1B—Dual Conveyance with East Alignment 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

NEPA Effects: Effects on Old and Middle River flows under Alternative 1B 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 1B 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 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, ~~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-~~5~~7 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*.

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 1C 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 1C would not result in an increase to 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-~~5~~7 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.

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

Reverse Flows in Old and Middle River

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

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

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

***CEQA Conclusion*:** Alternative 2A would provide positive changes related to reducing reverse flows in Old and Middle Rivers in ~~May~~ June through March and negative changes in the form of less positive flows in wetter years and increased reverse flow conditions in drier years during 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 impact is related to impacts on water quality and aquatic resources. The significance of these impacts~~ are~~is~~ 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: Effects associated with construction of conveyance facilities under Alternative 2A would be identical to those described under Alternative 1A because the facilities would be identical. Alternative 2A would not result in an increase to 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 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 2A would not result in an increase to 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-~~5~~7 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.

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

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 2B would be identical to those described for Impact SW-3 under Alternative 2A because the operations of the facilities would be identical.

***CEQA Conclusion*:** Alternative 2B would provide positive changes related to reducing reverse flows in Old and Middle Rivers in ~~May~~ June through March and negative changes in the form of less positive flows in wetter years and increased reverse flow conditions in drier years during April and May as 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*.

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: Effects associated with construction of conveyance facilities under Alternative 2B would be identical to those described under Alternative 1B because the facilities would be identical. Alternative 2B would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because 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. However, increased wind fetch near open water areas of habitat restoration could cause potential damage to adjacent levees.

***CEQA Conclusion*:** Alternative 2B 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-~~5~~7 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.

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

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 2C would be identical to those described for Impact SW-3 under Alternative 2A because the operations of the facilities would be identical.

***CEQA Conclusion*:** Alternative 2C would provide positive changes related to reducing reverse flows in Old and Middle Rivers in ~~May~~ June through March and negative changes in the form of less positive flows in wetter years and increased reverse flow conditions in drier years during April and May as 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*.

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: Effects associated with construction of conveyance facilities under Alternative 2C would be identical to those described under Alternative 1C because the facilities would be identical. Alternative 2C 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 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 2C would not result in an increase to 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-~~5~~7 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.

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

Reverse Flows in Old and Middle River

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

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

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

***CEQA Conclusion*:** Alternative 3 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 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 impact is related to impacts on water quality and aquatic resources. The significance of these impacts 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: Effects associated with construction of conveyance facilities under Alternative 3 would be similar to those described under Alternative 1A because the facilities would be similar with the exception of three fewer intakes, pumping plants, and associated conveyance facilities. Therefore, potential for effects would be less than described under Alternative 1A. However, the measures included in Alternative 1A to avoid adverse effects would be included in Alternative 3. Therefore, Alternative 3 would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because 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 3 would not result in an increase to 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-~~5~~7 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.

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

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

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

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

- Alternative 4 Operational Scenario H1 (Alternative 4 H1) does not include enhanced spring outflow requirements or Fall X2,
- Alternative 4 Operational Scenario H2 (Alternative 4 H2) includes enhanced spring outflow requirements but not Fall X2,
- Alternative 4 Operational Scenario H3 (Alternative 4 H3) does not include enhanced spring outflow requirements but includes Fall X2 (similar to Alternative 2A), and
- Alternative 4 Operational Scenario H4 (Alternative 4 H4) includes both enhanced spring outflow requirements and Fall X2.

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

SWP/CVP Reservoir Storage and Related Changes to Flood Potential

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

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

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

A comparison with storage 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 reservoir storages would not be consistently high during October through June under Alternative 4 as compared to the conditions under the No Action Alternative. Therefore, Alternative 4 would not result in adverse effects on reservoir flood storage capacity as compared to the conditions without the project.

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

San Joaquin River at Vernalis

~~Peak monthly flows~~Highest monthly flows that occur in San Joaquin River at Vernalis are shown in Figures 6-12 and 6-13 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 remain similar to (or show less than 1% change with respect to the channel capacity: 52,000 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 all Alternative 4 scenarios would remain similar (or show less than 1% change with respect to the channel capacity: 110,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4.

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 San Joaquin River at Vernalis as compared to the conditions without the project.

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

~~Peak monthly flows~~Highest monthly flows that occur in the n the Sacramento River upstream of Walnut Grove are shown in Figures 6-14 and 6-15 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 decrease by 8% (in scenarios H1 and H2) to 9% (in scenarios H3 and H4)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 decrease by 7% (in scenarios H1 and H2) to 8% (in scenarios H3 and H4) of the channel capacity (110,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. This decrease 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 upstream of Walnut Grove as compared to the conditions without the project.

Trinity River Downstream of Lewiston Dam

~~Peak monthly flows~~Highest monthly flows that occur in the Trinity River downstream of Lewiston Lake are shown in Figures 6-16 and 6-17 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 (6,000 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 4% (in scenarios H3 and H4) to 5% (in scenarios H1 and H2) of the channel capacity (6,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. This 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 Trinity River downstream of Lewiston Lake as compared to the conditions without the project.

American River Downstream of Nimbus Dam

~~Peak monthly flows~~Highest monthly flows that occur in the American River at Nimbus Dam are shown in Figures 6-18 and 6-19 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 remain similar to (or show less than 1% change with respect to the channel capacity: 115,000 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 all Alternative 4 scenarios would increase by no more than 1% of the channel capacity (115,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. This 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 American River at Nimbus Dam as compared to the conditions without the project.

Feather River Downstream of Thermalito Dam

~~Peak monthly flows~~Highest monthly flows that occur in the Feather River downstream of Thermalito Dam are shown in Figures 6-20 and 6-21 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 H1 and H3) or increase by no more than 1% (in scenarios H2 and H4) of the channel capacity (210,000 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 scenario H3) or increase by no more than 1% (in scenarios H1, H2, and H4) of the channel capacity (210,000 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 Feather River at Thermalito Dam as compared to the conditions without the project.

Yolo Bypass at Fremont Weir

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

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

Average of highest spills simulated (flows with probability of exceedance of 10% or less) under Alternative 4 would increase by no more than 1% (in scenario H3) to 2% (in scenarios H1, H2, and H4) of the channel capacity (343,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. This 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 Yolo Bypass at Fremont Weir as compared to the conditions without the project.

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

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

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

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

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

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

Reverse Flows in Old and Middle River

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

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

NEPA Effects: A comparison with reverse 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 reverse flow conditions under Alternative 4 would be reduced on a long-term average basis except in April and May as compared to No Action Alternative.

CEQA Conclusion: Alternative 4 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 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 impact is related to impacts on water quality and aquatic resources. 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

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

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

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

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

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

Impact SW-5: 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 Habitat Restoration Area Facilities

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

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

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

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

Impact SW-6: 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

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

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

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

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

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

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

Alternative 4 would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because 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 4 would not result in an increase to 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-~~5~~7 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.

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

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

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

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

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

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

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

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

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

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

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

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

Reverse Flows in Old and Middle River

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

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

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

***CEQA Conclusion*:** Alternative 5 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 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 impact is related to impacts on water quality and aquatic resources. The significance of these impacts 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: Effects associated with construction of conveyance facilities under Alternative 5 would be similar those described under Alternative 1A because the facilities would be similar with the exception of four fewer intakes, pumping plants, associated conveyance facilities. Therefore, potential for effects would be less than described under Alternative 1A. However, the measures included in Alternative 1A to avoid adverse effects would be included in Alternative 5. Therefore, Alternative 5 would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because 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 5 would not result in an increase to 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-~~5~~7 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.

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

Reverse Flows in Old and Middle River

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: Effects associated with construction of conveyance facilities under Alternative 6A would be identical to those described under Alternative 1A because the facilities would be identical.

Alternative 6A would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because the BDCP proponents would be required to comply with 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. 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 6A would not result in an increase to 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-~~5~~7 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.

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

Reverse Flows in Old and Middle River

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: Effects associated with construction of conveyance facilities under Alternative 6B would be identical to those described under Alternative 1B because the facilities would be identical. Alternative 6B would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because 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 6B would not result in an increase to 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-~~5~~7 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.

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

Reverse Flows in Old and Middle River

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

construction of the conveyance facilities because 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 6C would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because the BDCP proponents would be required to comply with requirements of the 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-~~5~~7 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.

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

Reverse Flows in Old and Middle River

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: Effects associated with construction of conveyance facilities under Alternative 7 would be similar to those described under Alternative 1A because the facilities would be similar with the exception of two fewer intakes, pumping plants, and associated conveyance facilities. Therefore, potential for effects would be less than described under Alternative 1A. However, the measures included in Alternative 1A to avoid adverse effects would be included in Alternative 7. Therefore, Alternative 3 would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because 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 7 would not result in an increase to 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-~~5~~7 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.

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

Reverse Flows in Old and Middle River

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: Effects associated with construction of conveyance facilities under Alternative 8 would be similar to those described under Alternative 1A because the facilities would be similar with the exception of two fewer intakes, pumping plants, and associated conveyance facilities. Therefore, potential for effects would be less than described under Alternative 1A. However, the measures included in Alternative 1A to avoid adverse effects would be included in Alternative 8. Therefore, Alternative 8 would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because the facilities 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 8 would not result in an increase to exposure of people or structures to flooding due to construction of the conveyance facilities because the facilities would be required to comply with USACE, CVFPB, and DWR requirement 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-~~5~~7 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.

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

Reverse Flows in Old and Middle River

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

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

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

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

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

***CEQA Conclusion*:** Alternative 9 would provide negative changes in the form of increased reverse flow conditions in all months except June, 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 impact is related to impacts on water quality and aquatic resources. The significance of these impacts 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

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

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

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

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

NEPA Effects: Alternative 9 would not result in an 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 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 9 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-~~5~~7 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.

6.3.4 Cumulative Analysis

Action Alternatives

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

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

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

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

***CEQA Conclusion*:** Because the cumulative projects would be required to convey water across the Delta in accordance with the BDCP alternative assumptions, implementation of the cumulative projects in combination with any of BDCP Alternatives 1A through 9 would not result in cumulative adverse effects in addition to the impacts described above for implementation of each alternative. ~~Implementing these projects in combination with any of BDCP Alternatives 1A through 9 would not result in a significant cumulative impact.~~ These impacts are considered significant for cumulative projects that would include Alternatives 1A through 5 or Alternative 9 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 ~~is~~are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries and Aquatic Resources*. Implementation of cumulative projects with Alternatives 6 through 8 would result in less than significant impacts.

6.4 References

6.4.1 Printed References

California Department of Water Resources. 2013. Urban Level of Flood Protection Criteria, FloodSAFE California. November.

California Department of Water Resources. 2014. Rural Levee Repair Guidelines, FloodSAFE California. March.