Section 5
Revisions to Cumulative Impact Analyses

5.1 Summary and Purpose of Revisions

California Environmental Quality Act (CEQA) Guidelines Section 15130 requires the consideration of cumulative impacts within an EIR when a proposed project's incremental contribution to a larger universe of significant cumulative effects from multiple projects is itself "cumulatively considerable". "Cumulatively considerable" means that "the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." (CEQA Guidelines, § 15065[a][3]). A similar requirement to examine cumulative impacts exists for NEPA documents, and is required by Council on Environmental Quality (CEQ) regulations (Council on Environmental Quality 1997). This section updates and revises the cumulative impacts analysis presented in the Draft EIR/EIS; it also adds a discussion of the cumulative impacts associated with Alternatives 4A, 2D, and 5A.

5.1.1 Methodology and Format

As described in Chapter 4 of the Draft EIR/EIS, each resource chapter contains an analysis of the cumulative effects specific to that resource that could potentially result from implementation of any of the proposed alternatives and other cumulative projects. To ensure that the cumulative analysis accurately captures whether a proposed project's incremental effects are *cumulatively considerable*, the revised analysis of cumulative impacts adopts a clear two-step process, as endorsed by CEQA case law[1]. (1) The cumulative analysis first determines if the effects of the proposed project, in combination with those of other past, present, and probable future projects, would be *cumulatively significant*—that is, if a significant cumulative impact exists. (2) If the answer is yes, the analysis then determines whether the proposed project's incremental effect is *cumulatively considerable* and thus significant in and of itself.

This section breaks this analysis into two separate pieces which build upon each other. First, Section 5.2.1 examines concurrent project effects, considering potential additive effects of project components that are constructed during the same time period. Then, Section 5.2.2 describes the revisions to the cumulative analysis under each resource topic and the effects of these revisions on the cumulative impact analysis when considered in concert with the effects of the project effects described in Section 5.2.1. References have been made to specific sections of the chapter that have been revised. Analyses of the cumulative impacts for Alternatives 4A, 2D, and 5A are included in their entirety under each resource section below.

[1] Communities for a Better Environment v. California Resources Agency (2002) 103 Cal App 4th 98, 120.

5.1.2 Updated Analysis

5.1.2.1 Updated Projects

In response to comments raised by key stakeholders during the public comment period, and in light of changes that have occurred over time in project landscapes and the availability of new information since the 2009 release of the Notice of Preparation and the 2011 commencement of the extensive amounts of modeling undertaken for the Draft EIR/EIS, the cumulative analysis presented in the Draft EIR/EIS has been revised. Proposed future projects, that have since become more defined or developed since 2011, have been added into the cumulative impact analysis as appropriate in either a qualitative or quantitative fashion. In general, projects identified by commenters as being "in environmental review" and that would have a cumulative impact when considered in conjunction with action alternatives have been treated as reasonably foreseeable or probable for purposes of this additional analysis. However, where the details of these actions do not lend themselves to quantitative analysis, discussion is done at a qualitative level.

5.1.2.2 California Water Action Plan

In addition to updated details in the analysis and the addition of other new probable or reasonably foreseeable future projects, individual projects carried out under the California Water Action Plan that have become relatively well developed have also been considered in the cumulative impacts analyses.

Released by Governor Jerry Brown in January 2014, the California Water Action Plan, spells out a suite of actions in California to improve the reliability and resiliency of water resources and to restore habitat and species—all amid the uncertainty of drought and climate change. The California Water Action Plan was developed to meet three broad objectives: more reliable water supplies; the restoration of important species and habitat; and a more resilient, sustainably managed water resources system (water supply, water quality, flood protection, and environment) that can better withstand inevitable and unforeseen pressures in the coming decades. The California Water Action Plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes.

- Make conservation a California way of life.
- Increase regional self-reliance and integrated water management across all levels of government.
- Achieve the co-equal goals for the Delta.
- Protect and restore important ecosystems.
- Manage and prepare for dry periods.
- Expand water storage capacity and improve groundwater management.
- Provide safe water for all communities.
- Increase flood protection.
- Increase operational and regulatory efficiency.
- Identify sustainable and integrated financing opportunities.

In some instances, the California Water Action Plan describes actions and projects that generally could be pursued in furtherance of the Plan's goals, but specific projects are also either mentioned or alluded to in the California Water Action Plan. Among them are the BDCP, the San Joaquin River Restoration Program, the State Water Quality Control Board's (State Water Board's) Water Quality Control Plan for the Delta and its upstream watersheds, the Salton Sea Species Conservation Habitat Project, the Klamath Basin Restoration, Sites Reservoir and other north of Delta offstream storage projects, and the Delta Science Plan. These specific projects are currently at various stages of development. A number of these projects may have a cumulative impact in combination with the action alternatives because of their physical proximity or location of their impacts and have been included as part of the cumulative impact analysis in this recirculated document in Section 5.2, *Revisions to Cumulative Analyses*.

The Plan's first year of implementation was marked by significant achievements. A review of state agency actions throughout 2014 shows that more than 100 efforts furthering the Action Plan were either continued or initiated. Various state agencies undertook numerous actions in 2014 to step up conservation programs encouraging Californians to reduce their water use by at least 20% and enacting measures to protect water supply and water quality. Also in furtherance of the goals of the California Water Action Plan, Governor Brown signed the Sustainable Groundwater Management Act (SGMA) (see below) and work on the Carlsbad desalination plant continued with proposals for additional desalination plants being pursued all along the coast.

California EcoRestore

California EcoRestore will be led by the Delta Conservancy as the lead state agency, and will accelerate and implement a suite of Delta restoration actions prescribed in the 2014 California Water Action Plan by 2020. Under EcoRestore, the state will pursue restoration of more than 30,000 acres of fish and wildlife habitat. This habitat restoration will include creating 3,500 acres of managed wetlands; restoring 9,000 acres of tidal and sub-tidal habitat; restoring more than 17,500 acres of floodplain; and restoring more than 1,000 acres of aquatic, riparian and upland habitat projects, as well as flood management projects. EcoRestore will implement multiple fish passage improvement projects in the Yolo Bypass and other key locations, and will provide coordination with existing local Habitat Conservation Plans and Natural Community Conservation Plans.

Among the projects already identified for implementation as part of EcoRestore are:

2015

- Dutch Slough Tidal Marsh Restoration Project
- Knights Landing Outfall Gates Fish Barrier Project

2016

- Southport Early Implementation Project
- McCormack-Williamson Tract Flood Control and Ecosystem Restoration Project
- Hill Slough Restoration Project
- Goat Island at Rush Ranch Tidal Marsh Restoration
- Tule Red Restoration Project

2017

- Lower Yolo Ranch Tidal Restoration Project
- Prospect Island Tidal Habitat Restoration Project
- Wallace Weir Improvements and Tule Canal Agricultural Crossings
- Lower Putah Creek Realignment

2018

- Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed
- Sherman Island Setback Levee Habitat Enhancement Project
- Twitchell Island Levee Habitat Restoration Project
- Staten Island Sandhill crane habitat enhancement

Enhanced Instream Flows

One of the actions mentioned in the California Water Action Plan under the goal to protect and restore important ecosystems is to enhance water flows in stream systems statewide. The California Water Action Plan charges the State Water Board and the California Department of Fish and Wildlife (CDFW) with implementing a suite of individual and coordinated administrative efforts to enhance flows statewide in at least five stream systems that support critical habitat for anadromous fish. One of the ways in which the State Water Board plans to achieve the charge in the California Water Action Plan is by establishing flow objectives as part of Phase 4 of the Board's Bay-Delta effort (Bay-Delta Plan). The Bay-Delta Plan focuses on evaluating the impact of insufficient freshwater flows as one of the stressors that may be contributing to declining fish populations in the estuary. As part of this process, the State Water Board may adopt flow objectives identifying increased freshwater flow needs through the Delta. Phase 4 will develop separate water quality control policies for individual tributaries to the Sacramento River.

Although proportional outflow needs of the Delta ecosystem is an integral part of the operating criteria for the operation of the SWP dual conveyance facilities (coordinated with CVP operations), the contribution of flows above and beyond those ultimately provided by the SWP and CVP could be achieved through long-term water transfers that would likely require their own environmental review, State Water Board review, and possibly compliance with the state and federal endangered species acts.

The updated cumulative analysis in this document accounts for the potential effects of implementing a public flows program under the California Water Action Plan. The analysis includes a general discussion of the potential types of impacts that could result from long-term acquisition and transfer of water that may be implemented during the adaptive management process in future years.

Sustainable Groundwater Management Act

In September 2014, Governor Brown signed the historic Sustainable Groundwater Management Act (SGMA). The SGMA builds upon the existing groundwater management provisions established by Assembly Bill (AB) 3030 (1992), Senate Bill (SB) 1938 (2002), and AB 359 (2011), as well as SBX7 6 (2009). The SGMA establishes a new structure for managing California's groundwater. Central to the

SGMA is the recognition that groundwater management in California is best accomplished locally. The SGMA requires the formation of locally controlled Groundwater Sustainability Agencies (GSAs), which must develop Groundwater Sustainability Plans (GSPs) in groundwater basins or subbasins that DWR designates as medium or high priority.

The SGMA defines sustainable groundwater management as "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results." Undesirable results are defined as any of the following effects.

- Chronic lowering of groundwater levels (not including overdraft during a drought if a basin is otherwise managed).
- Significant and unreasonable reduction of groundwater storage.
- Significant and unreasonable seawater intrusion.
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
- Significant and unreasonable land subsidence that substantially interferes with surface land uses.
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

The cumulative impact analysis has been reviewed for any potential required revisions in light of the reasonable and foreseeable actions by various Groundwater Sustainability Agencies managing groundwater basins and subbasins, especially those that are currently overdrafted, in response to this legislation.

5.2 Revisions to Cumulative Impacts Analyses

5.2.1 Concurrent Project Effects

The analyses for action alternatives (Alternatives 1A–2C, 3, 4, 5, and 6–9) presented in the Draft EIR/EIS were described separately for conveyance facilities and other conservation measures (CMs) for habitat restoration and protection actions (CMs 2–11) and CMs for reducing other stressors (CM12–21) to distinguish when action alternative impacts are described at a project level of detail for water conveyance facilities or at a program level for CMs2–21. This Draft EIR/EIS analysis structure is needed to clearly describe the project level effects of water conveyance facilities and to distinguish them from effects described at a program level for other CMs. However, in some cases, when conservation measure construction could occur concurrently with conveyance facility construction and in the same general location, the combined CM's could result in additive impacts that are greater than the individual conservation measure components when they are evaluated separately. CM2–CM11, except for CM5, include interim restoration implementation actions that are expected to occur during the conveyance facility construction period. Table 5.2.1-1, provides a summary of the potential interim implementation actions that could be implemented concurrently during the conveyance facility construction period as early implementation actions under CM2–CM11.

Alternatives 4A, 2D, and 5A do not have the same kind of concurrent project effects as described for the other alternatives because the interim restoration implementation actions are not part of these new alternatives but instead would be implemented separately under the California Water Action Plan/California EcoRestore program. Concurrent project effects under Alternatives 4A, 2D, and 5A would be only those effects from construction of the water conveyance facilities combined with environmental commitments proposed to reduce impacts of constructing the conveyance facility.

Table 5.2.1-1. Interim Implementation Actions: Restoration Projects with Potential to Contribute to Meeting Habitat Conservation Measures or Environmental Commitments

Project	Property Owner/ Operator	Location	Size (acres)	Covered Species Benefitted	Status	Potential Overlap with BDCP (Associated Conservation Measure)
Calhoun Cut/ Lindsey Slough Tidal Habitat Restoration	CDFW	Cache Slough Complex	927	Delta smelt, longfin smelt, juvenile Chinook salmon, juvenile Central Valley steelhead, Sacramento splittail, juvenile green sturgeon, juvenile white sturgeon	In process	≤165 acres of tidal marsh restored (CM4, CM7)
Lower Yolo Restoration Project*	Westlands Water District	Cache Slough Complex	3,408	Delta smelt, longfin smelt, juvenile Chinook salmon, juvenile Central Valley steelhead, Sacramento splittail, juvenile green sturgeon, juvenile white sturgeon	In process	1,305 acres of wetland creation, 700 acres of wetland enhancement, 50 acres of riparian enhancement (CM4, CM7)
Dutch Slough Tidal Marsh Restoration*	DWR	West Delta	1,166	Sacramento splittail, juvenile salmon, steelhead, Delta smelt, longfin smelt, sturgeon, black rail	Planned	200–800 acres of restored tidal marsh, 20 acres of enhanced channel margin, 20 acres of restored riparian, total estimated area affected: 240–840 acres. Potential loss of 1,000 grazing acres (CM4, CM7, CM10)
McCormack-Williamson Tract*	The Nature Conservancy	Cosumnes/ Mokelumne East Delta	1,660	Chinook salmon, steelhead, delta smelt, Valley elderberry longhorn beetle	Planned	1,200–1,300 acres of restored tidal marsh, 100–200 acres of restored riparian (CM4, CM7)
Grizzly Slough*	DWR	Cosumnes/ Mokelumne East Delta	489	Chinook salmon, steelhead, delta smelt	Planned	470 acres of floodplain and riparian habitat (CM5, CM7)
Experimental Fremont Weir Fish Passage Improvements	Sacramento San Joaquin Drainage District (Central Valley Flood Protection Board). DWR maintains Weir. CDFW operates existing fish ladder and leases Fremont Weir Wildlife Area.	Yolo Bypass	N/A	Chinook salmon, Central Valley steelhead, Sacramento splittail, green and white sturgeon	Planned	Fremont Weir improvements (CM2)

Project	Property Owner/ Operator	Location	Size (acres)	Covered Species Benefitted	Status	Potential Overlap with BDCP (Associated Conservation Measure)
Fremont Weir Modifications/ Floodplain Enhancement	Owner: Sacramento San Joaquin Drainage District (Central Valley Flood Protection Board). DWR maintains Weir. CDFW operates existing fish ladder and leases Fremont Weir Wildlife Area.	Yolo Bypass	TBD	Chinook salmon, Central Valley steelhead, delta smelt, Sacramento splittail, lamprey	Planned	5,000–20,000 acres of inundated floodplain in the Yolo Bypass (CM2)
Lisbon Weir Fish Passage Enhancement	CDFW and private obligations	Yolo Bypass	N/A	Chinook salmon, Central Valley steelhead, Sacramento splittail	Planned	Yolo Bypass enhancements (CM2)
Putah Creek Fish Passage Enhancement	CDFW	Yolo Bypass	N/A	Chinook salmon, Sacramento splittail	Planned	3–10 acres of restored tidal marsh, 50–500 acres of inundated tidal plain, 1–5 acres of restored channel margin, 1–5 acres of restored riparian
Sacramento Weir Improvements	Sacramento San Joaquin Drainage District (Central Valley Flood Protection Board). DWR maintains Weir. CDFW operates existing fish ladder and leases Sacramento Bypass Wildlife Area.	Yolo Bypass (the Sacramento Bypass is a tributary of the Yolo Bypass).	N/A	Chinook salmon, Central Valley steelhead, delta smelt, Sacramento splittail, lamprey	Planned	Yolo Bypass enhancements (CM2)
Southport Project*	City of West Sacramento, DWR	Sacramento River between RM 52.8 and 56.0	280		Planned	280 acres of floodplain restoration (CM5)
Agricultural Crossings	Private ownership	Yolo Bypass	N/A	Chinook salmon, Central Valley steelhead, Sacramento splittail	Planned	N/A
Meins Landing Tidal Habitat Restoration (Identified for Delta Ecosystem Enhancement Program)	DWR	Suisun Marsh	666	Chinook salmon, delta smelt, Sacramento splittail, salt marsh harvest mouse, Suisun shrew, California clapper rail, California black rail	Planned	633 acres of restored tidal marsh, 33 acres of restored riparian. total estimated affected: 666 acres (CM4)
Hill Slough Tidal Habitat Restoration*	CDFW and Private obligations	Suisun Marsh	1,750	Chinook salmon, delta smelt, California clapper rail, California black rail, salt marsh harvest mouse, Suisun shrew, Suisun Marsh covered plant species	In process	846 acres of restored tidal marsh, 94 acres restored riparian. total estimated affected: 940 acres (CM4)
Tule Red Restoration*	Westervelt Ecological Services, Inc.	Suisun Marsh	Est. 300	Chinook salmon, Delta smelt, California clapper rail, California black rail, salt marsh harvest mouse, Suisun shrew, Suisun Marsh covered plant species	Planned	300 acres tidal marsh creation and 1,300 acres of possible tidal marsh enhancement (CM4)

Project	Property Owner/ Operator	Location	Size (acres)	Covered Species Benefitted	Status	Potential Overlap with BDCP (Associated Conservation Measure)
Rush Ranch Tidal Habitat Restoration*	Solano Land Trust	Suisun Marsh	2,070	Delta smelt, longfin smelt, splittail, Chinook salmon, California black rail, California clapper rail, Suisun song sparrow, salt marsh common yellowthroat, burrowing owl, salt marsh harvest mouse, Suisun ornate shrew, Suisun thistle, soft bird's beak, Delta tule pea, Suisun Marsh aster	Planned	70 acres of restored tidal marsh, 3 acres of enhanced channel margin (CM4)
Prospect Island Tidal Habitat Restoration*	DWR	Cache Slough Complex	1,316	Delta smelt, longfin smelt, juvenile Chinook salmon, juvenile steelhead, green sturgeon, white sturgeon	Planned	450–1,300 acres of restored tidal marsh and riparian habitat (CM4, CM7)
Chipps Island	Chipps Island	Suisun Marsh	750	Delta smelt, longfin smelt, juvenile Chinook salmon, juvenile steelhead, green sturgeon, white sturgeon	Planned	100–250 acres restored tidal marsh (CM4)
Decker Island		Eastern Decker Island	110	Salmon and steelhead	Planned	110 acres of tidal natural communities

Note: This table includes possible restoration actions that would meet the requirements of habitat conservation measures or Environmental Commitments that could be implemented concurrently with construction of water conveyance facilities under the range of alternatives examined in the Draft EIR/EIS and this RDEIR/SDEIS.

This section provides a qualitative overview of the potential concurrent effects that could occur if separate conservation measures for an alternative were implemented at the same time or in approximately the same location. This analysis relies on the available description and detail provided for conservation actions in the BDCP and other information that has been developed for early implementation actions described in draft BDCP Chapter 6, *Plan Implementation*.

5.2.1.1 Water Supply

The Alternatives 1A–9 assessment in Chapter 5, *Water Supply*, of the Draft EIR/EIS evaluated the effects of the water conveyance facilities, plus the hydrodynamic and operation effects of CM2 and CM4, separately from the other effects of CM2–CM21. This section discusses the potential for the concurrent implementation of the water conveyance facilities and restoration activities under Alternatives 1A–9 to result in more substantial effects to water supply than identified in the separate impact assessments.

As described in Chapter 5, *Water Supply* of the Draft EIR/EIS, construction of water conveyance facilities associated with Alternatives 1A–9 would not affect the timing or amount of water exported from the Delta through existing SWP and CVP facilities. Even though there is potential for CM2–CM11, interim restoration implementation actions to occur during the conveyance facility construction period, the construction activities of these conservation measures would not affect the timing or amount of water exported from the Delta through existing SWP and CVP facilities.

Implementation of Alternatives 1A through 9 would change Delta exports and SWP and CVP water deliveries south of the Delta as compared to Existing Conditions and No Action Alternative. Delta exports and SWP and CVP deliveries south of the Delta would increase under BDCP Alternatives 1A,

1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1-H4), 4A, 5, 5A, and 9 as compared to Existing Conditions and No Action Alternative. Implementation of Alternatives 6A, 6B, 6C, 7, and 8 would result in reductions in Delta exports and SWP and CVP deliveries south of the Delta as compared to Existing Conditions and No Action Alternative.

None of the alternatives would modify water deliveries to non-SWP and non-CVP water rights holders, including in-Delta water rights holders. Therefore, the water supply analysis addresses impacts to DWR, Reclamation, and SWP water users and CVP water service contractors, as opposed to other water rights holders, as the BDCP does not include any actions that would affect water availability to any such water rights holders. However, water quality of the available water, particularly for in-Delta water rights holders, could vary with different alternatives; and therefore, affect beneficial use of the water rights, as described in Chapter 8, *Water Quality*.

Even with the water conveyance facilities associated with Alternatives 1A–9 operational, implementation of CM2–CM21 are not expected to affect the timing or amount of water exported from the Delta through existing SWP and CVP facilities, beyond the changes in Delta exports and water deliveries under Alternatives 1A–9 described above. For Alternatives 4A, 2D, and 5A, implementation of habitat Environmental Commitments would similarly not affect timing or amount of water exported from the Delta beyond changes to exports described in the analysis of these alternatives.

It should be noted that SWP/CVP water supply operations are affected both by specific operations criteria identified for each alternative, which are addressed on a project level basis in this EIR/EIS, and by assumptions regarding the location and extent of tidal marsh restoration for each alternative, which are identified only at a programmatic level. Therefore, long-term results of SWP/CVP operations may be different than described due to changes in location and extent of tidal marsh restoration. The Draft EIR/EIS analysis assumed that evaporation at the tidal marsh restoration sites would be similar to the water demands of the existing irrigated and non-irrigated vegetation, freshwater marsh and wetlands, or other land uses currently located at the future tidal marsh restoration areas.

Changes in SWP/CVP exports or deliveries are not specifically included in the physical conditions evaluated under CEQA or NEPA; but could be considered as part of economic or social changes. The economic or social change, or in this case the change in SWP/CVP exports or deliveries, that an alternative may cause are not, in and of themselves, significant environmental effects that would require analysis under CEQA, as described in Section 5.3.2, *Determination of Effects*, in the Draft EIR/EIS. However, the effects of changes to SWP/CVP export or deliveries could be relevant in determining the significance of physical environmental changes, such as changes in decisions by SWP/CVP agricultural water users to convert agricultural land to other uses; or indirect physical changes in the environment, such as the need to develop future water supplies. These types of environmental effects are addressed throughout this RDEIR/SDEIS and in the Draft EIR/EIS.

5.2.1.2 Surface Water

The Alternatives 1A–9 assessment in Chapter 6, *Surface Water*, of the Draft EIR/EIS evaluated the effects of the water conveyance facilities, plus the hydrodynamic and operation effects of CM2 and CM4, separately from the other effects of CM2–CM21. This section discusses the potential for the concurrent implementation of the water conveyance facilities and restoration activities under

Alternatives 1A–9 to result in more substantial effects to surface water than identified in the separate impact assessments.

Implementation of Alternatives 1A through 9 would not change flood storage capacity in upstream reservoirs or flood flows in the Sacramento and San Joaquin rivers as compared to the Existing Conditions and No Action Alternative, even with the concurrent implementation of conservation measures CM1–CM21 or environmental commitments for Alternatives 4A, 2D, and 5A

Implementation of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1, H3), 4A, 5, 5A, and 9 would result in more negative flows in Old and Middle Rivers in April and/or May as compared to Existing Conditions and the No Action Alternative. Under Alternative 3, reverse flow conditions also would become more negative in October as compared to the No Action Alternative. Under Alternative 9, reverse flow conditions also become more negative in December as compared to Existing Conditions; and more negative in all months except June as compared to No Action Alternative. The reverse flows under Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4 (H1, H3), 4A, 5, 5A, and 9 become more positive in the other months as compared to Existing Conditions and No Action Alternative. Under Alternative 4 (H2, H4), reverse flows would become more negative in April as compared to Existing Conditions; however, reverse flows would become more positive in April as compared to the No Action Alternative. Under Alternatives 6A, 6B, 6C, 7, and 8, the reverse flow conditions would become more positive in all months as compared to the Existing Conditions and No Action Alternative. Concurrent implementation of conservation measures CM1–CM21, does not result in any additional effect on reverse Old and Middle River flow under Alternatives 1A–9. 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 to beneficial uses are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries and Aquatic Resources*, of the Draft EIR/EIS.

Implementation of Alternatives 1A through 9 could result in alterations to drainage patterns; substantially increase the rate or amount of surface runoff in a manner that would result in flooding; contribute runoff which would exceed capacity of existing or future stormwater drainage systems; provide additional sources of polluted runoff; increase exposure to significant risk of loss, injury, or death involving flooding; and/or place facilities within a 100-year Flood Hazard Area depending upon the final construction plans of the conveyance and habitat restoration facilities. Therefore, implementation of Alternatives 1A through 9 would result in significant adverse impacts for these factors as compared to the Existing Conditions and No Action Alternative. Concurrent implementation of the CM1–CM21 would potentially result in additional adverse effects. Mitigation Measures SW-4, SW-7, and SW-8 are available to reduce these impacts.

Consequently, the concurrent implementation of the water conveyance facilities and restoration activities under Alternatives 1A–9 would not result in new, more adverse effects/significant impacts to surface water beyond those described in the separate impact assessments.

5.2.1.3 Groundwater

The Alternatives 1A–9 assessment in Chapter 7, *Groundwater*, of the Draft EIR/EIS evaluated the effects of the water conveyance facilities, plus the operational effects of CM2 and CM4, separately from the other effects of CM2–CM21. This section discusses the potential for the concurrent implementation of the water conveyance facilities and restoration activities under Alternatives 1A–9 to result in more substantial effects to groundwater resources than identified in the separate impact assessments.

CM4 and CM5 are the only conservation measures identified with potential impacts on groundwater resources due to the locations and types of implementation measures described in the Project Descriptions. Additional impacts from the construction and operation of CM4 and CM5 are considered in the cumulative analysis effects below.

No conservation measures beyond the water conveyance facilities would be implemented for the SWP/CVP Export Service Areas, so the discussion of concurrent groundwater effects of the water conveyance facilities in addition to restoration activities in this region are not applicable to groundwater resources in the SWP/CVP Export Service Areas.

Delta Region

Summary of Effects and Impacts due to CM1

Construction of the water conveyance facilities under Alternatives 1A through 9 would result in temporary localized groundwater level declines of up to 20 feet in some areas due to construction dewatering activities in the vicinity of the facilities to be built. Groundwater level reductions are forecasted to last up to 2 months after dewatering activities are completed. Nearby domestic and municipal wells could experience significant reductions in well yield, if they are shallow wells, and may not be able to support existing land uses. Mitigation Measure GW-1 would be available to lessen the severity of the temporary groundwater level declines in the vicinity of construction dewatering sites. Construction activities are not anticipated to cause adverse effects on agricultural drainage in the Delta.

Operation of the new water conveyance facilities under Alternatives 1A, 2A, 2D, 3, 4, 4A, 5, 5A,6A, 7, and 8 would result in potential groundwater level rises near the Clifton Court and Bryon Tract Forebays, which would not adversely affect groundwater levels and nearby existing well yields. However, if agricultural drainage systems adjacent to these forebays are not adequate to accommodate the additional drainage requirements, operation of the forebays could interfere with agricultural drainage in some areas of the Delta. Mitigation Measure GW-5 would be available to lessen the severity of the impact on existing agricultural drainage systems. However, in some cases, the impact might not be mitigatable due to factors such as cost, and would be significant and unavoidable in those specific instances.

The Intermediate and Byron Tract Forebays, as well as the expanded Clifton Court Forebay under Alternatives 4, 4A, 2D, and 5A would be constructed to comply with the requirements of the Division of Safety of Dams (DSD) which includes design provisions to minimize seepage. These design provisions would minimize seepage under the embankments and onto adjacent properties. Once constructed and placed in operation, the operation of the forebays would be monitored to ensure seepage does not exceed performance requirements. In the event seepage were to exceed these performance requirements, the BDCP proponents would modify the embankments or construct seepage collection systems that would ensure any seepage from the forebays would be collected and conveyed back to the forebay or other suitable disposal site. Constructing the forebays to DSD standards, monitoring for seepage, and making modifications to the forebays or constructing measures to attenuate seepage if it were to occur will ensure that existing agricultural drainage systems would not be adversely affected.

Operation of the new water conveyance facilities under Alternatives 1B, 2B, and 6B would result in effects similar to the ones described for Alternatives 1A, 2A, 2D, 3, 4, 4A, 5, 5A, 6A, 7, and 8 above, with additional effects due to the operation of the east canal alignment. For the unlined canal option,

some groundwater recharge could occur episodically beneath the northern portion of the canal between the intakes and the Mokelumne River, resulting in a groundwater level rise of less than 5 feet, which would not adversely affect the yield of nearby supply wells. However, this groundwater level rise from the unlined canal leakage could affect local agricultural drainage. Operation of the unlined canal would cause an adverse effect on agricultural drainage that would be addressed by Mitigation Measure GW-5.

Groundwater discharge into the canal would occur along the middle portion of the canal between the Mokelumne River and the San Joaquin River, resulting in groundwater level declines of approximately 10 feet, which could result in reduced yields of shallow supply wells located within 2 miles of the canal. Groundwater level declines of up to 10 feet are unlikely to affect the yields of deeper wells that may exist nearby. For the lined canal option, minimal changes of less than 1 foot would occur to groundwater levels in most areas in the vicinity of the canal due to the limited exchange of groundwater and surface water between the lined canal and the underlying groundwater aquifer. Groundwater discharge to the canal would occur along the middle portion of the canal between the Mokelumne River and the San Joaquin River, resulting in groundwater level declines of less than 5 feet. Potential reduction of shallow well yields within approximately 2 miles of the canal would be possible. For both unlined and lined canal options, model simulations indicate up to 5 foot episodic lowering of groundwater levels beneath the Sacramento River within an approximately 4-mile wide corridor (about 2 miles on either side of the river) due to lower flows in the river as a result of diversions at the north Delta intakes that result in a reduction in river flows and elevations, as described in Chapter 6, *Surface Water*. For both the unlined and the lined canal option, the groundwater level changes would cause an adverse effect on nearby shallow domestic well yields. In some cases, the sustainable yield of some wells might be affected by the lower water levels such that they are not able to support the existing or planned land uses for which permits have been granted. Implementation of Mitigation Measure GW-2 would help address these effects; however, the impact may continue to be significant because replacement water supplies may not meet the preexisting demands or planned land use demands of the affected party.

Operation of the new water conveyance facilities under Alternatives 1C, 2C, and 6C would result in effects similar to the ones described for Alternatives 1A, 2A, 2D, 3, 4, 4A, 5, 5A, 6A, 7, and 8 above, with additional effects due to the operation of the west canal alignment. For the unlined canal option, most canal leakage would occur in the northern portion of the canal, between the intakes and the inflow to the tunnel. Thus, rises in groundwater levels are forecasted to occur in these areas of the north Delta (up to 10 feet), which would not reduce the yields of nearby wells. This water level rise is not anticipated to adversely affect groundwater recharge. However, these local changes in groundwater flow patterns adjacent to the unlined canal, where groundwater recharge from surface water occurs, would affect agricultural drainage in the area, due to groundwater level rises from canal leakage. Operations of the unlined canal would cause an adverse effect on agricultural drainage. Mitigation Measure GW-5 is available to address this effect. No substantial effect on groundwater levels would be anticipated in the vicinity of the tunnel. In the canal segment south of the tunnel, an area of groundwater recharge from the unlined canal would occur in an area that transitions to a zone of groundwater discharge to the canal in the vicinity of Byron Tract. For the lined canal option, minimal changes to groundwater levels would occur due to the limited quantity of groundwater recharge from the lined canal reaches or discharge from groundwater to the lined canal. For both canal options, the groundwater level changes could cause an adverse effect on nearby shallow domestic well yields. The sustainable yield of some wells might be affected by the lower water levels such that they are not able to support the existing or planned land uses for which

permits have been granted. Implementation of Mitigation Measure GW-2 would help address these effects; however, the impact may continue to be significant because replacement water supplies may not meet the preexisting demands or planned land use demands of the affected party. For the lined canal option, minimal changes to groundwater levels would occur due to the limited quantity of groundwater recharge from the lined canal or discharge from groundwater to the lined canal.

Under Alternative 9, construction activities related to temporary dewatering and associated reduced groundwater levels have the potential to temporarily affect the productivity of existing nearby water supply wells. This impact is considered significant. Implementation of Mitigation Measure GW-1 would reduce this impact to a less-than-significant level. Operation of the additional infrastructure, such as small canal sections and operable barriers in streams, is not anticipated to deplete groundwater supplies or interfere with groundwater recharge, alter local groundwater levels, or reduce the production capacity of preexisting nearby wells. In addition, Alternative 9 is not anticipated to cause significant impacts on groundwater flow and agricultural drainage in the Delta Region. The new, small canal sections and channel connections could result in very localized impacts to groundwater flow and agricultural drainage. However, no regional impacts are anticipated to occur.

Construction and operation of the new water conveyance facilities under any of the alternatives are not anticipated to result in significant groundwater quality impacts in the Delta.

Combination of Effects and Impacts with CM4 and CM5

Implementation of CM4 and CM5 under any of the alternatives could result in additional increased frequency of inundation of areas associated with the proposed tidal habitat, channel margin habitat, and seasonally inundated floodplain restoration actions, which would result in increased groundwater recharge. Such increased recharge could result in groundwater level rises in some areas. More frequent inundation would also increase seepage, which is already difficult and expensive to control in most agricultural lands in the Delta (see Chapter 14, *Agricultural Resources*). Impacts associated with the implementation of CM4 and CM5 would result in significant impacts and would have adverse effects on agricultural drainage due to additional seepage issues when considered concurrent to the effects from implementing conveyance facilities under Alternatives 1A through 9. This impact would be reduced to a less-than-significant level in most instances, with the implementation of Mitigation Measure GW-5 by identifying areas where seepage conditions have worsened and installing additional subsurface drainage measures, as needed.

The increased inundation frequency in restoration areas would also increase the localized areas exposed to saline and brackish surface water, which could result in increased groundwater salinity beneath such areas. The flooding of large areas with saline or brackish water would result in an adverse effect and would result in significant impacts on groundwater quality beneath or adjacent to flooded areas. Since adverse/significant groundwater quality impacts were not identified with the operation of the conveyance facilities, the implementation of CM4 and CM5 would result in new significant impacts/adverse effects on groundwater quality in some areas of the Delta. It would not be possible to completely avoid this effect. However, if water supply wells in the vicinity of these areas are not useable because of water quality issues, Mitigation Measure GW-7 is available to address this effect. This discussion would not apply to Alternatives 4A, 2D, and 5A because those alternatives do not include an equivalent of Conservation Measure 5.

None of the BDCP alternatives are anticipated to result in groundwater level-induced land subsidence.

5.2.1.4 Water Quality

The Alternatives 1A–9 assessment in Chapter 8, *Water Quality*, of the Draft EIR/EIS evaluated the effects of the water conveyance facilities, plus the hydrodynamic effects of CM2 and CM4, separately from the other effects of CM2–CM21. This section discusses the potential for the concurrent implementation of the water conveyance facilities and restoration activities under Alternatives 1A–9 to result in more substantial effects to water quality than identified in the separate impact assessments. This discussion is organized according to the geographic regions of the affected environment, because implementation of the conservation measures differs in these areas. No conservation measures beyond the water conveyance facilities would be implemented for the SWP/CVP Export Service Areas, so the discussion of concurrent water quality effects of the water conveyance facilities in addition to restoration activities in this region is based on water quality changes in the Delta at the export pumping plants.

Upstream of the Delta

In areas upstream of the Delta, the conservation measures or components of these measures that would be implemented in addition to the water conveyance facilities would be: 1) the Yolo Bypass Fishery Enhancement (CM2), 2) Conservation Hatcheries (CM18), and 3) Urban Stormwater Treatment (CM19). CM2 is a fish enhancement measure and, thus, is not expected to alter water quality upstream of the Delta. CM18 involves the operation of a new fish hatchery, discharges from which would be required to meet NPDES permit requirements to protect water quality and beneficial uses. CM19 may involve actions to improve stormwater quality coming from urban areas outside the Delta, but that drain to Delta waters, and would result in either no effect or beneficial effects on water quality upstream of the Delta. All other conservation measures would be implemented in the Delta region. Maintenance activities associated with the physical structures would not result in substantial, adverse effects on water quality. Consequently, the concurrent implementation of the water conveyance facilities and restoration activities under Alternatives 1A–9 would not result in new, more adverse effects/significant impacts to water quality beyond those described in the separate impact assessments in Chapter 8, *Water Quality o*f the Draft EIR/EIS.

Delta and SWP/CVP Export Service Areas

The water quality assessment for the Delta region concluded that the separate impacts of the water conveyance facilities and CM2–CM21 under Alternatives 1A–9 would not be adverse/would be less than significant for ammonia, boron, dissolved oxygen, nitrate+nitrite, pathogens, phosphorus, trace metals, and turbidity/TSS. For water quality conditions of these constituents to be adverse/ significant under the concurrent implementation of the water conveyance facilities and CM2–CM21 would require that CM2–C21 implementation contribute additional loading of these constituents or otherwise alter conditions beyond the hydrodynamic effects of the water conveyance facilities to result in adverse conditions. However, when considered concurrently, CM1–CM21 are not expected to result in new, previously unidentified adverse/significant impacts, relative to the individual impact determinations, for the reasons provided below.

- Ammonia: Ammonia concentrations under the water conveyance facilities will be lower in the Delta due to lower Sacramento River concentrations resulting from a separate project being implemented by the Sacramento Regional County Sanitation District, which will result substantially reduced ammonia discharges from the Sacramento Regional Wastewater Treatment Plant. CM2–CM21 are not expected to substantially alter ammonia concentrations in

the affected environment. Thus, concurrent implementation of CM1–CM21 would not result in adverse ammonia conditions.

- Boron and Trace Metals: CM2–CM21 would not present new or substantially changed sources of boron or trace metals in the Delta. Thus, their concurrent implementation with CM1 would not result in adverse boron and trace metals conditions.
- Dissolved Oxygen (DO): DO conditions under the water conveyance facilities are expected to be similar to Existing Conditions, and CM2–CM21 are not expected to contribute oxygen-demanding substances at levels that would adversely affect DO levels. Further, CM14 would contribute to improving DO conditions in the Stockton Deep Water Channel. Thus, concurrent implementation of CM1–CM21 would not result in adverse DO conditions.
- Nitrate+nitrite: Long-term average nitrate+nitrite concentrations are anticipated to remain low with implementation of the water conveyance facilities. CM2–CM21 would not present new or substantially changed sources of nitrate+nitrite in the Delta. Conversely, it is expected there may be a decrease in nitrate+nitrite concentrations as lands used for agriculture are converted for restoration, thus reducing fertilizer application on these lands. Thus, their concurrent implementation with the water conveyance facilities would not result in adverse nitrate+nitrite conditions.
- Pathogens: Pathogens conditions under the water conveyance facilities are expected to be similar to Existing Conditions. Thus, its concurrent implementation with the restoration activities would not make pathogens conditions adverse.
- Phosphorus: The water conveyance facilities are not expected to substantially change phosphorus concentrations, because concentrations in Delta source water are similar throughout the year. The restoration activities are not anticipated to contribute additional phosphorus load. Thus, concurrent implementation of the water conveyance facilities with the restoration activities would not result in adverse phosphorus conditions.
- Turbidity/TSS: Turbidity/TSS conditions under the water conveyance facilities are expected to be similar to Existing Conditions. Thus, its concurrent implementation with the restoration activities would not make turbidity/TSS conditions adverse.

The assessment of bromide, chloride, and EC conditions in the Delta concluded that CM1 plus the hydrodynamic effects associated with CM2 and CM4 under Alternatives 1A–9 would result in an adverse effect/significant and unavoidable impact, to varying degrees. Implementation of CM2–CM21 would not present new or substantially changed sources of these constituents in the Delta beyond the effects on hydrodynamics. Thus, their concurrent implementation with CM1 would not result in more adverse/significant bromide, chloride, and EC conditions than has been described for the separate conservation measures.

The assessment of dissolved organic carbon (DOC) conditions in the Delta concluded that CM1 of Alternatives 1A–5 would not result in an adverse effect/significant impact, whereas, implementation of CM2–CM21 under these alternatives would result in an adverse/significant and unavoidable impact associated with the creation of the restoration areas. Concurrent implementation of CM1 with CM2–CM21 under Alternatives 1A–5 is not expected to result in more adverse/significant impacts than described for the separate conservation measures, because the long-term average DOC increases resulting from CM1 would be comparatively small and within the uncertainty in the contributions that would result from the restorations areas. Conversely, the assessment of CM1 under Alternatives 6A–9 concluded significant and unavoidable impacts for DOC. The

adverse/significant conditions under CM1 concurrent with the conditions anticipated for CM2–CM21 may be more adverse/significant than when considered separately, particularly because the projected long-term average DOC increases under CM1 would be a measurable, additive contribution.

The assessment of pesticide conditions in the Delta concluded that CM1 of Alternatives 1A–5 would not result in an adverse effect/significant impact, whereas Alternatives 6A–9 would result in significant and unavoidable impacts for pesticides, because of potential adverse increases at Franks Tract, Rock Slough, and Contra Costa Pumping Plant No. 1. The assessment of CM2–CM21, for all alternatives, identified an adverse/significant and unavoidable impact associated with CM13 (Invasive Aquatic Vegetation Control). However, concurrent implementation of CM1 with CM2–CM21, under all alternatives, is not expected to result in more adverse/significant impacts than described for the separate conservation measures, because the effects of CM13 would primarily occur in the vicinity of pesticide application, and mitigation is proposed to apply pesticides in a manner that minimizes the risk to human health, non-target organisms, and the aquatic ecosystem.

The assessment of mercury conditions in the Delta concluded that CM1 of Alternatives 1A–5 would not result in an adverse effect/significant impact, whereas, implementation of CM2–CM21 under these alternatives would result in an adverse/significant and unavoidable impact associated with the creation of the restoration areas. Concurrent implementation of CM1 with CM2–CM21 under Alternatives 1A–5 is not expected to result in more adverse/significant impacts than described for the separate conservation measures, because the mercury conditions in water and fish resulting from CM1 would be similar to Existing Conditions. Conversely, the assessment of CM1 under Alternatives 6A–9 concluded significant and unavoidable impacts for mercury. The adverse/significant conditions under CM1 concurrent with the conditions anticipated for CM2–CM21 may be more adverse/significant than when considered separately, particularly because of the bioaccumulative properties of mercury and because the Delta is already impaired due to elevated mercury.

The assessment of selenium conditions in the Delta concluded that CM1 under Alternatives 1A–5 would not result in an adverse effect/significant impact, whereas conditions under Alternatives 6A–9 would be adverse/significant and unavoidable. Selenium conditions resulting from implementation of CM2–CM21 under all alternatives were determined to not be adverse/less than significant. Of concern for selenium is increased exposure of aquatic organisms through increased water residence time and selenium concentrations. However, the impact assessment concluded that CM2–CM21 would not contribute substantially to these conditions, because factors would also be in place to minimize selenium exposure, including TMDLs to reduce loading to the system, wetland design to prevent buildup of selenium in restoration areas, and implementation of Avoidance and Minimization Measures (AMM)27–Selenium Management (Appendix 3.C of BDCP). Thus, concurrent implementation of CM1 and CM2–CM21 is not anticipated to result in more adverse/significant impacts than has been described for the separate conservation measures.

The assessment of *Microcystis* conditions in the Delta concluded that CM1 plus the hydrodynamic effects associated with CM2 and CM4 under Alternatives 1A–9 would result in an adverse effect/significant impact. Effects of CM2–CM21, beyond the increase in residence time and localized water temperature described in the separate impacts assessments, would not present new, previously unidentified impacts. Thus, concurrent implementation of CM1–CM21 would not result in more adverse/significant *Microcystis* conditions than has been described for the separate conservation measures.

5.2.1.5 Geology and Seismicity

Construction of the water conveyance facilities under all action alternatives has the potential to result in the loss of property, personal injury, or death due to structural failure from strong seismic shaking; settlement or collapse caused by dewatering; ground settlement; slope failure; and structural failure due to ground motions. In addition, operation of the water conveyance facilities under all action alternatives could potentially result in the loss of property, personal injury, or death from structural failure resulting from strong seismic shaking or seismic-related ground failure (including liquefaction); landslides and other slope instability; seiche or tsunami; and groundwater surface elevations from unlined canal seepage. These potential effects would be limited to the locations of the construction and the operations activities of the action alternatives. Implementation of the conservation measures in the restoration opportunity areas under Alternatives 1A–2C, 3, 4, 5, and 6–9, could result in similar geologic- and seismic-related risks.

The Delta and vicinity is within a highly active seismic area, with a generally high potential for major future earthquake events along nearby and/or regional faults, and with the probability for such events increasing over time. Construction activities for water conveyance facilities and CM2–7 and CM16 under Alternatives 1A–2C, 3, 4, 5, and 6–9, could overlap in time, with CM1 construction concluding after approximately 10 years. Similarly, in the long-term, operation of the water conveyance facilities and the habitat areas would occur concurrently. However, there would be little, if any, overlap in location. Therefore, it is unlikely that the potential geologic and seismic hazards resulting from these activities under Alternatives 1A–2C, 3, 4, 5, and 6–9 would combine to increase the overall risks of loss, injury or death at any one locality in the Plan Area. Environmental commitments to design and manage all active construction sites to meet safety and collapse prevention requirements of the relevant state codes and standards (described in Appendix 3B, *Environmental Commitments*) and conformance with Cal-OSHA and other state code requirements such as shoring, bracing, lighting, excavation depth restrictions, required slope angles, and other measures, to protect worker safety would act to reduce the severity of the geologic- and seismic-related hazards. Concurrent geologic and seismicity effects under Alternatives 4A, 2D, and 5A would be similar to, but less than, those described under other alternatives.

5.2.1.6 Soils

Vegetation removal and other soil disturbances associated with construction of water conveyance facilities and habitat restoration activities could cause accelerated water and wind erosion of soil. CM2–CM4 and CM6–CM21 have been identified as actions that will involve some element of implementation and construction within the first five years. However, DWR would seek coverage under the state General Permit for Construction and Land Disturbance Activities (as discussed in Appendix 3B, *Environmental Commitments*) necessitating the preparation of a SWPPP and an erosion control plan. Permit conditions would include erosion and sediment control BMPs (such as revegetation, runoff control, and sediment barriers) and compliance with water quality standards. Because implementation of the SWPPP and compliance with the General Permit would control accelerated soil erosion, there would not be substantial soil erosion resulting in daily site runoff turbidity in excess of 250 NTUs from combined conveyance facility and conservation measure construction during the same time period. Therefore, there would be no increase in concurrent effects on soil resources during construction.

Construction of the water conveyance facilities for all the action alternatives as well as proposed habitat restoration activities would involve irreversible removal, overcovering, and inundation of

topsoil over extensive areas, thereby resulting in a substantial loss of topsoil. The concurrent effects of conveyance facility and restoration conservation measure construction on loss of topsoil could be greater than the effect of conveyance facility construction alone. As indicated in the Draft EIR/EIS this impact would be significant. Mitigation Measures SOILS-2a and SOILS-2b would partially mitigate for these impacts, but not to a less-than-significant level because topsoil would be permanently lost over extensive areas. Therefore, this combined impact is considered significant and unavoidable.

Impacts related to constructing on corrosive soils, compressable solid and water and wind erosion of soils assuming concurrent effects of constructing conveyance facilities and other conservations measures would not be greater than described in the Draft EIR/EIS because these conditions are site specific and would be addressed by adhering to the California Building Code (CBC) requirements and environmental commitments to reduce effects on soil resources. Concurrent soils effects under Alternatives 4A, 2D, and 5A would be similar to, but less than, those described under other alternatives.

5.2.1.7 Fish and Aquatic Resources

When considering all of the various BDCP alternative construction activities together, there is potential for CM1, 2, 3, 4, 5, 6, 7, and 16 construction to occur somewhat simultaneously, with CM1 construction concluding after approximately 10 years. Construction-related effects of these activities would be similar in nature (i.e., increased turbidity, potential for accidental spills, etc.) however, only CM1 construction is expected to generate underwater noise. Much of the restoration-related construction activity can occur on the landside of levees prior to breaching and would therefore not affect fish. Additionally, the restoration actions (CMs 2–7) would occur throughout the Plan Area, focused in the first several years in the Suisun Marsh, West Delta, and North Delta regions, somewhat removed from the effects of CM1 construction. However, fish are mobile and may experience a broad range of effects to the extent that they are exposed to multiple construction activities. However, all of the BDCP construction activities, as well as other projects considered in this analysis, would be subject to avoidance and minimization measures that are standard for permitting in-water work, including conducting in-water work when the majority of fish are not present (primarily summer months, depending on the location). Additionally, of all of the BDCP construction activities, only CM1 construction activities are expected to generate underwater noise of a magnitude that can affect fish because of pile-driving. As such, when considered as an entire project, the BDCP alternatives would not generate effects of greater magnitude than those described above or in Chapter 11.

Similarly, the BDCP alternatives operational modeling incorporated most of the known operational criteria that would be applied in the future, including all of the components proposed for BDCP. Additional aspects of the NMFS BiOp, FWS BiOp, Oroville FERC Reliscensing BiOp, climate change adaptation, SWRCB regulatory process, and CWAP are designed to protect and/or enhance fish habitat upstream of and/or in the Plan Area. Some operational aspects of Alternatives 1A–1C, 2A–2C, 3, 5, 6A–6C, 7, 8, and 9, have the potential to cause operations-related adverse effects on fish, that can overlap with construction-related effects occurring in the Plan Area. Overall, however, these effects are addressed through a comprehensive conservation strategy designed to provide a net benefit. Alternatives 4A, 2D, and 5A do not have a conservation strategy, but includes criteria that minimize effects and mitigate as necessary to reduce effects on fish to less-than-significant levels.

. Under Alternatives 6 through 9, the operations-related effects of changes in mercury and selenium exposure for some fish (especially those that spend a substantial amount of time in the Delta) combined with the effects of restoration of tidal and floodplain habitats, may cause adverse effects. The operational effects of these alternatives on mercury and selenium were identified as adverse/significant and the restoration effects of these alternatives was determined to be not adverse/less than significant, primarily due to the measures that can be implemented (*CM12 Methylmercury Management/Environmental Commitment 12*) to minimize effects of restoration-related increases in contaminants. Together, they could be adverse, but these results are highly uncertain and will ultimately vary by the specific operations and restored sites, as well as activities associated with the ongoing loading and management of these contaminants, not included as part of the alternatives. Additionally, CM12 and AMM27 would provide mechanisms for better understanding, monitoring, and avoiding effects of contaminants, but there is a still a potential that under Alternatives 6 through 9, contaminant-related effects could be adverse. Conversely, Alternatives 1 through 5 are not expected to result in any adverse operational effects associated with contaminants. Alternatives 1 through 5 would also include CM12 and AMM27 to minimize effects, and therefore would not cause an overall contaminants effect related to fish. Similarly, Alternatives 4A, 2D, and 5A do not result in either adverse operational or restoration-related effects, and would therefore not have an overall effect related to contaminants.

Sediment loading to downstream bays was also evaluated separately for restoration and operations, and neither effect was found to be adverse either alone or in combination. When considering the RTM and sediment entrained at the NDD that could be reused in the Delta to fully offset any potential effects, it is not likely that there would be any effect. As such, no overall effect of sediment changes downstream of the Delta is expected under any alternatives.

When considering all of the various BDCP alternative construction activities together, there is potential for CM1, 2, 3, 4, 5, 6, 7, and 16 construction to occur somewhat simultaneously, with CM1 construction concluding after approximately 10 years. Construction-related effects of these activities would be similar in nature (i.e., increased turbidity, potential for accidental spills, etc.) however, only CM1 construction is expected to generate underwater noise. Much of the restoration-related construction activity can occur on the landside of levees prior to breaching and would therefore not affect fish. Additionally, the restoration actions (CMs 2–7) would occur throughout the Plan Area, focused in the first several years in the Suisun Marsh, West Delta, and North Delta regions, somewhat removed from the effects of CM1 construction. However, fish are mobile and may experience a broad range of effects to the extent that they are exposed to multiple construction activities. However, all of the BDCP construction activities, as well as other projects considered in this analysis, would be subject to avoidance and minimization measures that are standard for permitting in-water work, including conducting in-water work when the majority of fish are not present (primarily summer months, depending on the location). Additionally, of all of the BDCP construction activities, only CM1 construction activities are expected to generate underwater noise of a magnitude that can affect fish because of pile-driving. As such, when considered as an entire project, the BDCP alternatives would not generate effects of greater magnitude than those described above or in Chapter 11.

Similarly, the BDCP alternatives operational modeling incorporated most of the known operational criteria that would be applied in the future, including all of the components proposed for BDCP. Additional aspects of the NMFS BiOp, FWS BiOp, Oroville FERC Reliscensing BiOp, climate change adaptation, SWRCB regulatory process, and CWAP are designed to protect and/or enhance fish habitat upstream of and/or in the Plan Area. Some operational aspects of Alternatives 1A–1C, 2A–

2C, 3, 5, 6A–6C, 7, 8, and 9, have the potential to cause operations-related adverse effects on fish, that can overlap with construction-related effects occurring in the Plan Area. Overall, however, these effects are addressed through a comprehensive conservation strategy designed to provide a net benefit. Alternatives 4A, 2D, and 5A do not have a conservation strategy, but includes criteria that minimize effects and mitigate as necessary to reduce effects on fish to less-than-significant levels.

In the case of contaminants and sediment loading in downstream areas, some alternatives have the potential to cause combined effects when the effects of restoration and operations are considered together. Under Alternatives 6 through 9, the operations-related effects of changes in mercury and selenium exposure for some fish (especially those that spend a substantial amount of time in the Delta) combined with the effects of restoration of tidal and floodplain habitats, may cause adverse effects. The operational effects of these alternatives on mercury and selenium were identified as adverse/significant and the restoration effects of these alternatives was determined to be not adverse/less than significant, primarily due to the measures that can be implemented (*CM12 Methylmercury Management/Environmental Commitment 12*) to minimize effects of restoration-related increases in contaminants. Together, they could be adverse, but these results are highly uncertain and will ultimately vary by the specific operations and restored sites, as well as activities associated with the ongoing loading and management of these contaminants, not included as part of the alternatives. Additionally, CM12 and AMM27 would provide mechanisms for better understanding, monitoring, and avoiding effects of contaminants, but there is a still a potential that under Alternatives 6 through 9, contaminant-related effects could be adverse. Combined with other past and future projects, these Alternatives (6 through 9) could have a considerable contribution to a cumulative effect related to selenium effects on fish, especially green and white sturgeon. Conversely, Alternatives 1 through 5 are not expected to result in any adverse operational effects associated with contaminants Alternatives 1 through 5 also include CM12 and AMM27 to minimize effects, and therefore would not cause a combined contaminants effect related to fish. Similarly, Alternatives 4A, 2D, and 5A do not result in either adverse operational or restoration-related effects, and would therefore not have a considerable contribution to an effect related to contaminants.

Sediment loading to downstream bays was also evaluated separately for restoration and operations, and neither effect was found to be adverse either alone or in combination. When considering the RTM and sediment entrained at the NDD that could be reused in the Delta to fully offset any potential effects, it is not likely that there would be any effect. As such, no combined effect of sediment changes downstream of the Delta is expected under any alternatives.

5.2.1.8 Terrestrial Biological Resources

The terrestrial biological resources impact analyses contained in the BDCP Draft EIR/EIS included separate sections for Plan effects on 12 different natural communities, on cultivated land, and on 149 special-status wildlife and plant species. For each of these resources, the first impact discussion presented (e.g., *Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-Legged Frog*) is structured to provide a concurrent analysis of the effects of CM1 and CM2-CM11, and CM18 during the near-term time frame (the period in which CM1 would be constructed) and provides NEPA and CEQA conclusions for the near-term as well as the late long-term time periods of the Plan. The near-term analysis includes individual discussions of each Conservation Measure's contribution to the effect. For many of the natural communities and associated habitats for the special-status species, the near-term construction of CM1 and the conversion of lands for restoration would jointly reduce the acreages of essential habitat at locations scattered throughout the BDCP Plan Area. To avoid a substantial short-term loss of essential habitat during the near-term

period, many of the habitat protection and restoration actions (CM3, CM4, CM6, CM7, CM8, CM9, CM10, and CM11) would include early implementation schedules to allow habitat protection and habitat creation to keep pace with the gradual losses that would occur. The goal would be to avoid and minimize temporal losses in habitat acreage and value that could limit the range or reduce the long-term viability of the Plan Area's sensitive biological resources.

Each of the BDCP alternatives (1A–9) would provide sufficient habitat protection and restoration acreage in the near-term to keep pace with habitat losses by including CMs and AMMs to avoid significant impacts, with small exceptions. The impacts on vernal pool habitat and its associated special-status vernal pool crustaceans generated by construction of CM1 for Alternatives 1C, 2C, and 6C (the western canal alignment) would require mitigation in the form of increasing the amount of vernal pool complex habitat to avoid significant impacts. Also, the construction of the extensive, linear CM1 canals for Alternatives 1B, 1C, 2B, 2C, 6B, and 6C would contribute to a significant and unavoidable cumulative effect on wildlife movement corridors across the Sacramento-San Joaquin Delta. CM1 construction for Alternatives 1B, 2B, and 6B would also create a significant and unavoidable cumulative impact by creating barriers to the movement and population connectivity of giant garter snakes in the western portion of the Plan Area.

The analyses for Alternatives 4A, 2D, and 5A address both the effects of constructing the water conveyance facilities and implementing the Environmental Commitments concurrently (restoration, enhancement, and protection) and the NEPA and CEQA conclusions are based on the overall effects of both. The Environmental Commitments, resource guidelines, Avoidance and Minimization Measures, and mitigation measures presented are sufficient to avoid significant cumulative effects from the combined losses due to water conveyance construction and restoration except for upstream effects on bank swallows (see Impact BIO-189: *Cumulative Upstream Effects of Reservoir and Water Conveyance Facilities Operations on Bank Swallow* in Section 5.2.4.7 below).

5.2.1.9 Land Use

Construction, operation and maintenance of the water conveyance facilities and conservation measures under all action alternatives except Alternatives 4A, 2D, and 5A would result in effects on land use within the Plan Area. Conflicts with existing land uses as a result of constructing the proposed water conveyance facilities would result in adverse effects because permanent structures would be removed or relocated within the water conveyance facility footprint. Creating physical structures adjacent to and through an existing community would result in adverse and significant and unavoidable effects. Impacts related to dividing an existing community could be reduced, but not to a less-than-significant level, by introducing Mitigation Measures TRANS-1a and TRANS-1B that would implement traffic management plans and limit hours and amount of construction activity on congested roadway segments. Other impacts on land use were determined not to be significant.

Adverse impacts from conflicts with existing land uses as a result of implementing the proposed Conservation Measures 2–21 would occur for Alternatives 1A–2C, 3, 4, 5, and 6–9, particularly within CZ 1, 3, and 5–10. Existing land uses in the CZs are predominantly agricultural, open space, or rural residential with some small inclusions of commercial and industrial areas. Land uses within the boundaries of incorporated cities vary considerably in the study area but predominantly include areas dedicated to residential, commercial, and industrial areas. While the location of each restoration and/or enhancement action is not known at this time, it is possible that implementing these conservation measures and associated restoration and enhancement actions may result in temporary (e.g., construction activities that may conflict with land designated as open space) or

permanent (e.g., displacement of existing residents and removal of existing structures) physical conflicts with existing land uses in or immediately adjacent to the study area. Without more site-specific information about the locations and types of restoration to be implemented, no definitive conclusion can be made about the potential for restoration actions to result in the permanent conversion of land uses (including displacement of existing structures and residences) due to the construction of permanent features of the facility, nor can a conclusion be made with regard to the degree of indirect impacts, which could occur primarily as a result of incompatibility with adjacent land uses or the loss or increased difficultly of access to parcels. When required, the BDCP proponents would provide compensation to property owners for losses due to implementation of the alternative, which would reduce the severity of effects related to this physical impact, but would not reduce the severity of the physical impact itself. Although definitive conclusions cannot be made for CM2–CM21, conflicts with existing land uses as a result of constructing the proposed water conveyance facilities would result in adverse effects for Alternatives 1A through 9 because permanent structures would be removed or relocated within the water conveyance facility footprint. The combined impacts of CM1 (Alternatives 1A–2C, 3, 4, 5, and 6–9) with CM2–CM21 therefore, would also result in adverse effects. Concurrent land use effects under Alternatives 4A, 2D, and 5A would be similar to, but less than, those under other alternatives.

5.2.1.10 Agricultural Resources

Construction, operation, and maintenance of the water conveyance facilities and implementation of CM2–CM11, CM13, CM15, CM16, CM20, and CM21 under all action alternatives except Alternatives 4A, 2D, and 5A would have the potential to create concurrent direct and indirect impacts on Important Farmland and land subject to Williamson Act contracts. Such conditions may arise as a result of the conversion of agricultural land to other uses as a result of construction of conveyance facility features such as north Delta intakes, pumping plants, forebays, conveyance pipelines, canals, and tunnels, along with ground disturbing activities associated with habitat restoration and enhancement, which would also convert agricultural land to other uses, create disruptions in agricultural infrastructure such as irrigation or drainage ditches, or change local groundwater levels. Other concurrent effects could result from operations of water conveyance facilities in concert with effects from tidal habitat restoration, particularly to the extent that both project elements could contribute to increases in salinity in water used for irrigation in the Plan Area.

Under Alternatives 4A, 2D, and 5A, relative to the other action alternatives, the magnitude of these effects would likely be smaller because agricultural conversion associated with habitat restoration and enhancement activities would be limited relative to the other action alternatives. Construction activities for the water conveyance facilities and the Environmental Commitments (and restoration/enhancement activities under Alternatives 4A, 2D, and 5A) could overlap in time, with water conveyance facility construction concluding after approximately 10 years. In addition, the long-term effects associated with water conveyance facility operations and tidal habitat would occur simultaneously and, in some cases, could occur in close proximity, which could magnify agricultural effects, particularly in areas where such activities would be concentrated. Accordingly, the combined impact of constructing the water conveyance facilities with implementing restoration and enhancement activities would result in a significant impact on Important Farmland and land subject to Williamson Act contracts. Implementing Mitigation Measures AG-1, GW-1, GW-5, and WQ-11 would reduce the severity of these impacts, but they would remain significant and unavoidable, as discussed for Alternative 4A (Section 4.3.10), Alternative 2D (Section 4.410), and Alternative 5 (Section 4.5.10).

5.2.1.11 Recreation

Construction of the water conveyance facilities under all action alternatives except Alternatives 4A, 2D, and 5A would have a wide range of significant adverse impacts on recreation occurring within the Plan Area. These include disruption of recreation activities occurring at formal public and private recreation sites, restricting boat access from some Delta channels, and reducing sport-fishing opportunities occurring within the Delta. These impacts were considered significant because of the importance of the recreation facility being affected or the long duration of construction. These impacts could be reduced, but not to a less-than-significant level by introducing a broad range of mitigation measures which address both the direct loss of access (REC-2) or indirect changes in environmental conditions including changes in visual character of the Delta (AES-1a through AES-1g and AES-4b and AES-4c), noise generated during construction (NOI-1a and NOI-1b), and conflicts with construction traffic (TRANS-1a through TRANS 1c). Other impacts on recreation were determined to not be significant.

Operation of the of the Alternatives would also adversely impact recreation, including water-dependent activities occurring at major CVP and SWP water storage reservoirs and potential disruption of recreation within the Delta as a result of maintaining the water conveyance facilities. With the exception of San Luis Reservoir, operation of the Alternatives would not substantially reduce recreation opportunities occurring at the major water storage reservoirs. The impact on boating at San Luis Reservoir would be considered significant because the reservoir surface elevation would fall below levels required to launch boats. This impact would be reduced to a less-than-significant level by implementing Mitigation Measure REC-6.

Conservation Measures 2–4 and CM6–CM11 would also adversely impact recreation occurring within the Delta. These measures would result in a significant impact on fishing opportunities and boating occurring within the Delta but would be reduced to a less-than-significant level by implementing the mitigation measures described above. The conservation measures are not expected to contribute to other impacts on recreation that would occur as a result of construction of the water conveyance facilities. These conservation measures would also not affect the operation of the Alternatives and as such would not affect recreation opportunities at major CVP and SWP water storage reservoirs.

The combined impact of constructing the water conveyance facility with implementing CM2–CM4 and CM6–CM11 would increase the impacts on recreation resources and result in a significant impact on recreation occurring within the Plan Area. These impacts include loss of boating and fishing opportunities. Implementing Mitigation Measures AES-1a through AES-1g, AES-4b, AES-4c, TRANS 1a through TRANS-1c, NOI-1a, and NOI-1b) would reduce these combined impacts but not to a less-than-significant level.

Concurrent recreation effects of conveyance facilities and Environmental Commitments under Alternatives 4A, 2D, and 5A would likely be much less than under other alternatives because restoration actions under these alternatives would be reduced compared to other action alternatives.

5.2.1.12 Socioeconomics

Construction of the water conveyance facilities under all action alternatives has the potential to result in socioeconomic effects including temporary effects, regional economics and employment in the Delta; effects on population and housing in the Delta; changes in community character; changes

in local government fiscal conditions; and effects on recreational and agricultural economics. Operation and maintenance of the water conveyance facilities under all action alternatives could potentially result in permanent regional effects including economic and employment effects; effects on population and housing; changes in community character; changes in local government fiscal conditions; and effects on recreational and agricultural economics. Of these potential effects, implementation of CM2–CM21 for all action alternatives except Alternatives 4A, 2D, and 5A, could potentially contribute to effects on population and housing in the Delta; changes in community character; changes in local government fiscal conditions; and changes in recreational and agricultural economics in the Delta. CM2–CM21 would not be implemented under Alternatives 4A, 2D, and 5A. However, habitat restoration and enhancement would be implemented under this alternative, albeit to a smaller geographic scale and magnitude relative to the other action alternatives; therefore, the types of socioeconomic effects associated with habitat restoration/enhancement that could occur under the other action alternatives could occur under Alternatives 4A, 2D, and 5A.

Beneficial effects on the Delta region's economy and employment would be expected under all action alternatives as a result of implementing CM1 and CM2–CM21, or CM1 and the habitat restoration and enhancement under Alternatives 4A, 2D, and 5A, due to expenditures on construction and increased operations-related employment and labor income. Therefore, to the extent that construction and/or operation of the water conveyance facilities and the conservation measures (or habitat restoration and enhancement under Alternative 4A) overlap in time and geographic area, it is expected that the beneficial economic effect in the Delta region may be additive. Although the combined beneficial effects with Alternative 4A would likely be considerably less substantial given that the magnitude of restoration/enhancement under that alternative would be lower relative to the other action alternatives. There would also be an anticipated decrease in agricultural- and natural gas production-related employment and labor income in the region due to these activities as well, and the combined effects of implementing CM1 with implementing either the other conservation measures under Alternatives 1A–2C, 3, 4, 5, and 6–9 or the restoration/ enhancement activities under Alternatives 4A, 2D, and 5A, could increase the severity of this adverse economic effect.

To the extent that construction and/or operation of the water conveyance facilities and the conservation measures (or habitat restoration and enhancement under Alternatives 4A, 2D, and 5A) overlap in time and geographic area, there could be additive increases in population and housing in the Delta region as a result. However, the magnitude of this increase would likely be less under Alternative 4A given that there would be less habitat restoration and enhancement under this action alternative relative to the others. Although the combined effects with Alternatives 4A, 2D, and 5A would likely be considerably less substantial given that the magnitude of restoration/enhancement under that alternative would be lower relative to the other action alternatives. Because these activities would not result in concentrated, substantial increases in population or new housing, they would not be considered to have an adverse effect.

Implementation of CM1 and CM2–CM21 under Alternatives 1A–2C, 3, 4, 5, and 6–9 and CM1 and habitat restoration and enhancement under Alternatives 4A, 2D, and 5A could alter the community character in the Delta through noise, visual effects, air pollution and traffic associated with earthwork and site preparation for CM1 and any restoration, enhancement, protection, and management of various natural community types could alter the rural characteristics of Delta communities. While water conveyance construction could result in beneficial effects relating to the economic welfare of a community, adverse social effects could also arise as a result of declining

economic stability in communities closest to construction effects and in those most heavily influenced by agricultural and recreational activities. To the extent that construction and/or operation of the water conveyance facilities and the conservation measures (or habitat restoration and enhancement under Alternatives 4A, 2D, and 5A) overlap in time and geographic area, there could be additive adverse effects.

Construction of water conveyance facilities would result in the removal of a portion of the property tax base for various local government entities in the Delta region, as would implementation of CM2–21 (Alternatives 1A–2C, 3, 4, 5, and 6–9) or of habitat restoration and enhancement (Alternative 4A). Therefore, to the extent that construction of CM1 and the other conservation measures (or habitat restoration and enhancement under Alternatives 4A, 2D, and 5A) overlap in time and geographic area, there could be additive adverse effects on local government fiscal conditions. Combined adverse effects would likely be less severe under Alternative 4A given the smaller geographic scale and magnitude of habitat restoration and enhancement relative to the other action alternatives.

With implementation of CM1, as well as with implementation of the other conservation measures (Alternatives 1A–2C, 3, 4, 5, and 6–9) or habitat restoration and enhancement under Alternatives 4A, 2D, and 5A, adverse effects on recreational and agriculture economics are anticipated. Construction activities (including site preparation and earthwork) would limit opportunities for recreational activities where they occur in or near existing recreational areas, and noise, odors, and visual effects of construction activities would also temporarily compromise the quality of recreation. Implementation of the action alternatives would lead to reductions in crop acreage and in the value of agricultural production in the Delta region. Effects on agricultural economics would include effects on crop production and agricultural investments resulting from restoration actions on agricultural lands. Accordingly, to the extent that construction/operation of CM1 and the other conservation measures (or habitat restoration and enhancement under Alternatives 4A, 2D, and 5A) overlap in time and geographic area, there could be additive adverse effects on recreational and agricultural economics, but the magnitude of the effects would likely be lower for Alternatives 4A, 2D, and 5A relative to the other action alternatives given that there would be considerably less habitat restoration and enhancement under this alternative.

Measures to reduce these combined socioeconomic effects in the Delta region would include implementation of Mitigation Measure AG-1, Mitigation Measure MIN-13 and Mitigation Measure REC-2, as well as implementation of other mitigation measures and environmental commitments related to noise, visual effects, transportation, agriculture, and recreation. These mitigation measure and environmental commitments would help preserve agricultural productivity, provide offsite mitigation for Important Farmland and land subject to the Williamson Act, minimize the need for well abandonment or relocation, and would enhance recreational access and conditions (e.g., noise abatement, mosquito control, erosion control).

5.2.1.13 Aesthetics and Visual Resources

Construction, operation and maintenance of the water conveyance facilities and conservation measures under Alternatives 1A–2C, 3, 4, 5, and 6–9 would result in effects on visual quality and character, scenic vistas, views from scenic highways and light and glare conditions in the study area. Visual resources changes would result from the introduction of new facility, restoration or other structures into the landscape that could change the quality of views from public areas, roads or sensitive visual receptors (e.g., residences). With the exception of CM5, CM2–CM11 have been identified as actions that will involve some element of construction within the first five years of

implementation. Visual resource effects created by concurrent construction of the water conveyance facilities and implementation of CM2–CM11 could create compounding visual changes that could increase the visual resource effects in the vicinity of conveyance facility construction if additional construction were to occur in the same viewshed during the same time period. For example, restoration actions proposed on McCormack-Williamson Tract could potentially combine with and increase construction related impacts on aesthetic visual resources associated with construction of the intermediate forebay on Glanville Tract, location of reusable tunnel material (RTM) storage sites, or tunnel-related construction on Staten Island under Alternative 4. Similarly, construction of restoration actions in the Cache Slough complex or on Prospect Island could result in concurrent visual resource effects with conveyance facility construction under Alternatives 1C, 2C, and 6C (western alignment). Although these interim implementation actions could result in beneficial long term effects on visual resources from restored habitat areas, concurrent visual resources effects could, nevertheless occur during their construction. These combined effects for be significant.

Mitigation Measures AES 1a through 1g, AES 6a and 6b and AES 4a through 4c would partially reduce these potentially concurrent aesthetic and visual resource effects in a similar manner as described for the action alternatives. Proposed mitigation measures would reduce effects by avoiding trees and other visual features near construction areas, providing barriers for between construction sites and sensitive receptors, restoring construction sites or locating visually disruptive construction features away from public views or sensitive receptors, to the extent feasible.

Concurrent visual resource effects of Alternatives 4A, 2D, and 5A would likely be much less than under other alternatives because restoration actions under these alternatives would be reduced compared to other action alternatives.

5.2.1.14 Cultural Resources

Construction of the water conveyance facility under Alternatives 1A through 9 would have adverse impacts on cultural resources including archaeological sites, buried human remains, traditional cultural properties and historic architecture/built environment resources. These impacts would be largely attributable to the large amount of construction activity and land disturbance that would be required to implement each alternative. Mitigation Measures CUL-1 through CUL-7 would reduce the impact occurring under Alternatives 1A–2C, 3, 4, 5, and 6–9 but not to a less-than-significant level because disturbance cannot be avoided to complete construction of the water conveyance facilities and monitoring all construction activities is infeasible. Operation and maintenance of the water conveyance facilities would not adversely impact cultural resources because extensive ground disturbing activities would not be required.

Implementing CM2–CM4 and CM6–CM11 would adversely impact cultural resources as a result of construction activities required to implement the restoration actions. Implementing Mitigation Measures CUL-1 through CUL-7 would reduce these impacts, but not to a less-than-significant level because construction of restoration features would include disturbance to the land surface and damage or destroy unknown archaeological sites or buried human remains.

The combined impact of constructing the water conveyance facility with implementing CM2–CM4 and CM6–CM11 would result in a significant impact on cultural resources because ground disturbing activities could occur simultaneously. Implementing Mitigation Measures CUL-1 through CUL-7 would reduce these combined impacts, but not to a less-than-significant level.

Concurrent effects of Alternatives 4A, 2D, and 5A on cultural resources would likely be much less than under other alternatives because restoration actions under these alternatives would be reduced compared to other action alternatives.

5.2.1.15 Transportation

Constructing the water conveyance facilities under Alternatives 1A–2C, 3, 4, 5, and 6–9 result in adverse impacts on a wide range of transportation features within the Plan Area. The greatest impact on transportation would occur during construction as a result of the substantial number of vehicle trips required to convey materials and workers to and from construction sites. Many of these impacts are expected to last the entire time needed to construct the water conveyance facilities. These significant impacts include reducing the level-of-service on some roadway segments to unacceptable levels, deteriorating the condition of roadway pavement, and increasing safety hazards. Mitigation Measures TRANS-1a through TRANS-1c, and TRANS-2a through TRANS-2c would be available to reduce these impacts, but not to a less-than-significant level. Impacts on level-of-service, pavement conditions, safety would remain significant and unavoidable during construction.

Construction would also result in significant impacts on rail and transit services provided in the study area. The impact on rail services could be reduced to a less-than-significant level by implementing Mitigation Measures TRANS-1. However, the impact on transit services would not be reduced to a less-than-significant level even when implementing Mitigation Measures TRANS 1a through TRANS 1c because of the level-of-service would still fall below thresholds of significance.

Implementing CM2–CM4 and CM6–CM11 (Environmental Commitments 3, 4, 6–11 under Alternatives 2D, 4A, and 5A) would also result in an adverse impact on transportation during each measures construction phase. Similar to constructing the water conveyance facilities, transporting materials and workers to and from restoration sites would result in significant impacts on level-of-service, the condition of roadway pavement, and roadway safety. These impacts could also be reduced, but not to a less-than-significant level, by implementing Mitigation Measures TRANS 1a through TRANS 1c.

The combined impact of constructing the water conveyance facility and simultaneously implementing of some of the conservation actions would result in significant impacts on the level – of-service of some roadway segments, the condition of roadway pavement, and roadway safety. Implementing the mitigation described above would reduce these combined impacts but not to a less-than-significant level. Simultaneously operating and maintaining the water conveyance facilities and the restoration sites is not expected to result in a significant impact on the availability or safety of roadway transportation, marine, rail, or transit within the study area. Operating and maintaining the water conveyance facilities and restoration sites would require substantially fewer workers than during the construction thereby minimizing demand on transportation infrastructure workers.

Concurrent effects of Alternatives 4A, 2D, and 5A on the transportation system would likely be much less than under other alternatives because conflicts with restoration actions under these alternatives would be reduced compared to other action alternatives.

5.2.1.16 Public Services and Utilities

Public Services

Construction of the water conveyance facilities and conservation measures under Alternatives 1A–2C, 3, 4, 5, and 6–9 would have the potential effect of increasing demand for services related to construction site security and construction-related accidents because of the scale and duration of construction associated with the water conveyance facility as well as the conservation measures. Alternatives 4A, 2D, and 5A would have a lesser impact due to the smaller footprint of the project. With the exception of CM5, CM2–CM21 have been identified as actions that will involve some element of implementation and construction within the first five years. The majority of construction jobs for the water conveyance facility as well as for these conservation measures are expected to be filled by the existing five-county labor force, and the minor increase in population associated with specialized construction jobs (e.g., tunnel construction) during the construction period would be spread across a large multi-county area. Increases in demand for law enforcement, fire protection, and medical services related to this small change in population in any one county are expected to be negligible.

Alternatives 1A, 1B, 2A, 2B, 6A, 6B, 7, and 8, depending on the final design of the water conveyance alignment, could require relocation of the Hood Fire Station. But in general, implementing CM1 in addition to the proposed conservation measures would not result in effects associated with the need to construct new government facilities as a result of increased need for public services (i.e., law enforcement, fire protection, emergency responders, hospitals, public schools, libraries).

Utilities

Water and Wastewater

Construction of Alternatives 1A through 9 would require water supply and wastewater treatment services. However, it is not expected that Alternatives 1A through 9 would impact municipal water systems. Water for construction will be provided by available sources to the extent possible; if needed, water may be brought to the construction sites in water trucks.

Field offices for the construction of CM1, the establishment of a new fish hatchery (CM18), expansion of facilities to support dissolved oxygen levels in the Stockton Deep Water Ship Channel (CM14), and activities to reduce the risk of invasive species introduction on recreational vessels (CM20), would require potable water. Demand related to the field offices would be temporary and limited to the construction period. If there are no existing water lines in the vicinity, then field offices will require construction of a water tank.

Tunnel boring for CM1 would create a substantial amount of wastewater but due to treatment through environmental commitments, would not require treatment at wastewater treatment facilities. Concrete batch plants would also create wastewater, which would be treated onsite at designated concrete batch plant sites. Wastewater generated during construction at field offices and temporary construction facilities will be served by temporary portable facilities (e.g., portable toilets). Construction of conservation measures could also generate wastewater and could require expanded wastewater treatment.

Considered across the alternatives, potable water supply needs are substantial in volume; some anticipated to be met with non-municipal water sources without any need for new water supply

entitlements, but water needs for CM2–CM21 is uncertain at this time and could create an adverse effect. Wastewater treatment services required for CM1 would be provided by temporary facilities and treated onsite, but construction of CM2–CM21 could create wastewater that could require expanded treatment facilities.

Solid Waste

Construction of Alternatives 1A through 9 would generate construction debris, excavated material and green waste that would require disposal at a landfill. Although the amount of solid waste that will be generated by CM2–CM21 is unknown at this time, it will be a fraction of the amount generated by construction of CM1. Based on the available capacity of landfills in the study area and the waste diversion requirements set forth by the State of California, it is expected that Alternatives 1A through 9 would not cause any exceedance of landfill capacity, as there is a remaining landfill capacity of over 300 million tons in nearby landfills (Appendix 20A, Table 20A-6).

Electricity and Natural Gas

Construction of some elements of CM1 could disrupt utility services or require relocation of existing facilities. Conservation measures including habitat restoration and enhancement would, in some cases, involve substantial earthwork and ground disturbance. Construction activities could result in damage to or interference with existing water, sewer, storm drain, natural gas, oil, electric, and/or communication lines and, in some cases, could require that existing lines be permanently relocated, potentially causing interruptions in service. Mitigation Measures UT-6a, UT-6b, and UT-6c are available to reduce these impacts.

5.2.1.17 Energy

Construction and operation of the water conveyance facility would increase energy consumption, relative to the No Action Alternative. Construction activities would consume diesel and gasoline to power heavy-duty vehicles, as well as electricity to power tunnel boring machines (TBM) and equipment. Gasoline and diesel fuel consumption would range between 81 and 154 million gallons, depending on the alternative, over the entire construction period. Operation of the north Delta intakes under Alternatives 1A through 8 would increase annual energy use for pumping and water conveyance through the Delta by between 18 gigawatt-hour (GWh) and 421 GWh, relative to the No Action Alternative. Alternative 9 would rely on the existing Delta channels and would not consume a substantial amount of new energy. Delta exports under Alternatives 1A through 5A would require less than the maximum monthly energy requirement planned and previously operated for CVP and SWP water supply deliveries, whereas exports under Alternatives 6A through 9 would reduce energy used to pump water from the Delta to CVP and SWP contractors (refer to Table 21-11).

With the exception of CM5, CM2–CM11 (Environmental Commitments 3, 4, 6–11 under Alternatives 2D, 4A, and 5A) have been identified as actions that will involve some element on construction within the first five years of implementation. Concurrent implementation of CM2–11/Environmental Commitments 3, 4, 6–11 and construction and operation of the water conveyance facility would increase cumulative demand for diesel, gasoline, and electricity. Although energy will be consumed during construction of the water conveyance facility, best management practices (BMPs) will ensure that only high-efficiency equipment is used during construction. Similarly, Mitigation Measure AQ-24 requires equipment utilized during implementation of CM2–CM11/Environmental Commitments 3, 4, 6–11 be properly maintained according to manufactures specifications. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. With

respect to electricity consumption, the increased demand attributable to any alternative compared to statewide use (300,000 GWh) would not be significant. Moreover, all alternatives would be managed to maximize efficient energy use, including off-peak pumping and use of gravity, as applicable. Accordingly, there would be no adverse effect.

Concurrent energy effects of Alternatives 4A, 2D, and 5A would likely be much less than under other alternatives because restoration actions under these alternatives would be reduced compared to other action alternatives.

5.2.1.18 Air Quality and Greenhouse Gases

Air Quality

Construction of the water conveyance facilities and conservation measures would generate emissions of criteria pollutants (ROG, NO_X, CO, PM10, PM2.5, and SO_X) that would result in short-term effects on ambient air quality. Emissions would primarily originate from heavy-duty off-road equipment, on-road haul trucks, and grading and land clearing. Construction of the water conveyance facilities would occur between 2018 and 2029, with peak activities and emissions occurring between 2023 and 2026 for the majority of alternatives (utility construction would begin in 2017). With the exception of CM5, CM2–CM11 have been identified as actions that will involve some element of construction within the first five years of implementation (Environmental Commitments 3, 4, 6–11 under Alternatives 2D, 4A, and 5A). Criteria pollutants generated by concurrent construction of the water conveyance facilities and implementation of CM2–CM11/ Environmental Commitments 3, 4, 6–11 could exceed local air district thresholds and contribute to or worsen an existing air quality conditions.

Environmental commitments to minimize fugitive dust and utilize best available engine control technologies would reduce criteria pollutants generated by construction of the water conveyance facilities. Emissions of ROG, NO_X, and PM in excess of local or federal thresholds would be offset to below air district thresholds through implementation of Mitigation Measures 1a, 1b, 3a, 3b, 4a, and 4b, thereby avoiding adverse effects to regional air quality during construction of the water conveyance facilities for all Alternatives except Alternatives 1C, 2C, and 6C.[2] Although Mitigation Measures AQ-3a and AQ-3b would be available to reduce ROG and NO_X in the BAAQMD, given the magnitude of estimated emissions, neither measure would reduce emissions below district thresholds.[3] Accordingly, construction of Alternatives 1C, 2C, and 6C in the BAAQMD would result in an adverse and cumulative air quality effect.

With regard to CMs 2–11/Environmental Commitments 3, 4, 6–11, Mitigation Measure AQ-24 requires development of an Air Quality Mitigation Plan (AQMP) prior to the commencement of any construction. The AQMP will be incorporated into the site-specific environmental review and must include all feasible recommended and required air district best management practices. Combined

[2] Analysis is independent of the General Confomritiy assessment (Impact AQ-20), which considers secondary particulate matter precursor thresholds with respect to mitigation feasibility.

[3] The amount of moneys required to achieve sufficient contracts to reduce project emissions below air district thresholds would require immediate and substantial outreach, staffing, and other resources. There are also a number of hurdles related to accelerating equipment turnover and identifying available projects. While the mitigation measure will reduce project emissions, it is unlikely sufficient resources can be identified to reduce emissions by the amount required to achieve a less-than-significant finding.

implementation of Mitigation Measures 1a, 1b, 3a, 3b, 4a, 4b, and 24 would minimize concurrent emissions from construction of the water conveyance facilities and implementation of CM2–CM11/ Environmental Commitments 3, 4, 6–11, but may not be sufficient to reduce emissions below applicable air quality management district thresholds. Accordingly, this effect would be adverse.

Geographically proximate construction activities associated with the water conveyance facilities and CM2–CM11/Environmental Commitments 3, 4, 6–11 may expose adjacent receptors to increased health threats from localized PM, CO, and DPM. Effects would vary according to the equipment used, locations of emission sources and receptors, and underlying meteorology. Environment commitments and Mitigation Measures AQ-9 and AQ-16 implemented during construction of the water conveyance facilities would reduce onsite fugitive dust and equipment exhaust. All restoration sites adjacent to sensitive receptors would be subject to Mitigation Measure AQ-25, which requires preparation of a site-specific HRA. The HRA would not only consider project-level emissions, but also cumulative contributions from other reasonably foreseeable projects, including the water conveyance facilities, as required by local air district CEQA guidelines. Accordingly, there would be no adverse effect.

Greenhouse Gases

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, GHG emissions are inherently cumulative due to their long atmospheric lifetimes (refer to Table 22-1). Accordingly, emissions generated through implementation of CM2–CM11/Environmental Commitments 3, 4, 6–11, as well as during long term operation of the water conveyance facilities, may contribute to a cumulative climate change impact, even if activities do not occur concurrently.

Construction of the water conveyance facilities would generate between 1.4 and 3.1 million metric tons of CO_2e, depending on the alternative. However, Mitigation Measure AQ-21 would offset construction-related emissions to net zero through implementation of a GHG Mitigation Program. Accordingly, construction of the water conveyance facilities would not contribute to cumulative GHG concentrations or global climate change impacts since emissions would be offset to net zero. Similarly, GHG emissions associated with operations, maintenance, and increased SWP pumping would be reduced through modifications to DWR's Renewable Energy Procurement Plan (REPP).

Alternatives 1A through 5A would increase CVP pumping demand, relative to existing conditions, which would result in an equivalent reduction in electricity available for sale from the CVP to electricity users. This reduction in the supply of GHG emissions-free electricity to the California electricity users could result in a potential indirect emissions increase, as these electricity users would have to acquire substitute electricity supplies that may result in GHG emissions (although additional conservation is also a possible outcome as well). While it is unknown what type of power source (e.g., renewable, natural gas) would substitute the CVP electricity, based on the current statewide energy mix, Alternatives 1A through 5A could result in an indirect GHG emissions increase between 15,000 and 47,000 metric tons CO_2e per year (based on LLT energy demand). Alternatives 6A through 9 would reduce CVP electricity demand, resulting in a potential indirect GHG emissions reduction, relative to existing conditions.

CM2–CM11/Environmental Commitments 3, 4, 6–11 would result in GHG emissions from construction equipment and vehicle exhaust. Restoration activities implemented under CM2–CM11/Environmental Commitments 3, 4, 6–11 could also alter GHG flux values from changes in land use cover. An initial analysis of land cover/use changes associated with tidal and riparian habitat restoration indicates that these program elements could have a beneficial impact on GHG emissions

in the California Delta. However, GHG flux from land use change is dynamic and extremely variable, with certain land use types (e.g., wetlands) resulting in net positive GHG emissions. Mitigation Measures AQ-24 and AQ-27 would reduce equipment emissions and the potential for restoration activities to result in a positive GHG flux, respectively. However, the measures may not be sufficient to avoid a net increase in GHG emissions from implementation of CM2–CM11/Environmental Commitments 3, 4, 6–11.

Based on the above analysis, construction of the water conveyance facilities would not increase GHG emissions with implementation of Mitigation Measure AQ-21. Modifications to DWR's REPP would also ensure GHG emissions from increased SWP pumping would not impede DWR's ability to achieve their GHG reduction goals outlined in their Climate Action Plan (CAP). Similarly, CVP operations under Alternatives 6A through 9 would contribute to indirect GHG reductions, relative to existing conditions. However, implementation of CM2–CM11/Environmental Commitments 3, 4, 6–11 under all alternatives, as well as increased CVP pumping under Alternatives 1A through 5, could result in a GHG emissions increase. While no single project is large enough to trigger global climate change on its own, DWR has adopted a net-zero GHG threshold for construction emissions. Since implementation of CM2–CM11/Environmental Commitments 3, 4, 6–11 (all alternatives) could increase GHG emissions above net-zero, this effect would be adverse.

5.2.1.19 Noise

Implementation of the BDCP action alternatives would involve construction and operation of new facilities related to water extraction and transport including intake facilities, pipelines, tunnels, and canals. The project also includes implementation of conservation measures. Some of these conservation measures include construction activities related to grading, levee modifications, modifications of existing infrastructure, and construction of new infrastructure. As stated in the impact discussion above, construction activities will generate noise and vibration. Operation of facilities related to the extraction and transport of water will also generate noise.

Construction of water conveyance facilities and restoration or enhancement activities under Alternatives 1A–9, while temporary, would expose noise-sensitive land uses during construction to noise levels above the daytime (50 dBA L_{eq}) or nighttime (45 dBA L_{eq}) noise thresholds for the duration of the construction period. While the locations for restoration activities have not been finalized at this time, it is possible that some would be contiguous with construction areas near the water conveyance facilities. It is possible that construction noise impacts would be magnified for some noise-sensitive receptors, while in other cases, more receptors would be impacted at a point in time, but by construction of one or the other. These impacts would remain significant and unavoidable despite available mitigation measures (Mitigation Measures NOI-1a, NOI-1b, NOI-2).

Operation of water conveyance facilities would also result in exposure of noise-sensitive land uses to noise levels above the daytime (50 dBA L_{eq}) or nighttime (45 dBA L_{eq}) noise thresholds. While this impact could be reduced to a less-than-significant level with the implementation of Mitigation Measure NOI-3, operations of the water conveyance facilities could overlap with continued construction on restoration activities, which would have a significant impact (as described above).

Concurrent noise effects of Alternatives 4A, 2D, and 5A would likely be much less than under other alternatives because restoration actions (Environmental Commitments 3, 4, 6–11) under these new alternatives would be reduced compared to other action alternatives.

5.2.1.20 Hazards and Hazardous Materials

Implementation of CM1 (construction, operation, and maintenance of the water conveyance facilities) and CM2–CM11, CM13, CM14, and CM18 under all action alternatives except Alternatives 4A, 2D, and 5A have the potential to result in direct impacts on construction personnel, the public, and/or the environment due to a variety of hazardous physical or chemical conditions. Such conditions may arise as a result of the intensity and duration of construction activities at the north Delta intakes, forebays, conveyance pipelines, and tunnels, and ground disturbing activities associated with habitat restoration and enhancement, and the hazardous materials (e.g., fuels, oils, solvents) that would be needed in these areas during construction. Potential hazards include the routine use of hazardous materials; the inadvertent release of existing contaminants in soil and groundwater, or hazardous materials in existing infrastructure to be removed; and disturbance of electrical transmission lines. Under Alternatives 4A, 2D, and 5A, relative to the other action alternatives, the magnitude of these effects would likely be smaller given that restoration and enhancement activities would be limited relative to the other action alternatives. Certain potential construction-related hazards would be related only to implementation of CM1 (e.g., introducing air safety hazards during construction). Construction activities for the water conveyance facilities (CM1) and these conservation measures (and restoration/enhancement activities under Alternatives 4A, 2D, 5A) could overlap in time, with CM1 construction concluding after approximately 10 years. In addition, in the long term, operation of these conservation measures (or operation of CM1 and the restoration/enhancement areas under Alternatives 4A, 2D, and 5A) would occur simultaneously and, in some cases, in close proximity. Accordingly, the combined effect/impact of constructing the water conveyance facilities with implementing restoration and enhancement conservation measures or activities could result in an increased impact on the public and environment related to hazards and hazardous materials similar to what has been identified for impacts from construction of the conveyance facilities, but new impacts would not be expected to occur. Implementing Mitigation Measures HAZ-1a, HAZ-1b, HAZ-6, HAZ-8, UT-6a, UT-6c, and TRANS-1a identified for conveyance facility impacts would reduce the severity of these impacts.

5.2.1.21 Public Health

Construction, operation, and maintenance of the water conveyance facilities and other conservation measures under Alternatives 1A–2C, 3, 4, 5, and 6–9 would result in effects on public health in the Plan Area. Effects could include increases in vector-borne diseases; exceedances of water quality criteria for constituents of concern (i.e., DBPs, trace metals, and pesticides); substantial mobilization of or increase in bioaccumulative constituents (i.e., pesticides and methylmercury); exposure of substantially more people to new sources of EMF; exposure of recreationists to pathogens; and increasing the potential for exposure of the public to *Microcystis* and microtoxin in drinking water and recreational waters.

Construction activities for the water conveyance facilities (CM1) and CM2–CM7 and CM16 could overlap in time, with CM1 construction concluding after approximately 10 years. Potential effects on public health resulting from concurrent construction, and potentially operation, of the water conveyance facilities and CM2–7 and CM16 could compound potential public health effects, particularly where these activities occur in close proximity and within the same time frame. For example, construction and operation of the water conveyance facilities and CM2–CM7, CM10 and CM11 could increase suitable mosquito habitat within the Plan Area. Where the implementation of CM1 and these other conservation measures occur in the same time frame, and particularly within the same general area, the potential for adverse public health effects would increase relative to what

may occur with implementation of CM1 alone. Similarly, where construction and operation of CM1 and CM2, CM4, CM5, and CM10 overlap in time and occur in close proximity, there would be a greater potential for substantial mobilization of or increase in bioaccumulative pesticides and fish tissue concentrations of mercury in that area. Implementation of environmental commitments related to mosquito management and erosion and sediment control, and CM12, *Methylmercury Management*, would reduce the severity of these potential effects on public health.

In the long term, operation of these conservation measures will occur simultaneously and, as a result, potential effects on public health could be additive. For example, projected increases in the frequency, magnitude and geographic extent of *Microcystis* blooms are the result of the additive influence on hydraulic residence time in the Delta of operation of CM1 as well as the hydrodynamic impacts of habitat restoration under CM2 and CM4. A projected increase in Delta hydraulic residence time relative to the No Action Alternative would occur for all action alternatives except Alternatives 4A, 2D, and 5A. In addition, the influence of habitat restoration on hydraulic residence time under Alternatives 4A, 2D, and 5A would not be as substantial given that the area of restoration under these alternatives would be so small as to have little to no effect on through-Delta residence time. Regardless, operation of these conservation measures, including CM1, under Alternatives, 4A, 2D, and 5A would increase hydraulic residence time in the Delta and thus would create conditions conducive to *Microcystis* bloom formation relative to Existing Conditions. Accordingly, beneficial uses including drinking water and recreational waters would potentially be impacted and therefore, so would public health. Mitigation Measures WQ-32a (*Design Restoration Sites to Reduce Potential for Increased Microcystis Blooms*) and Mitigation Measure WQ-32b (*Investigate and Implement Operational Measures to Manage Water Residence Time*) would help reduce the severity of these impacts.

5.2.1.22 Minerals

Construction and operation of the water conveyance facility under Alternatives 1A–2C, 3, 4, 5, and 6–9 would have an adverse impact on mineral resources by restricting or eliminating access to natural gas and aggregate deposits located in the Plan Area. Construction activities would consume aggregate resource but not to the level that would severely diminish local supplies Operation and maintenance of the water conveyance facilities would not adversely impact access to natural gas or aggregate resources.

Implementing CM2–CM4 and CM6–CM11 would restrict or eliminate access to natural gas fields and reduce the availability of locally important aggregate resource sites. These impacts would occur because of the large land area that would be restored within the Plan Area. Mitigation Measures MIN-6 and MIN-11 would reduce these impacts to less-than-significant levels by designing restoration projects ins such a fashion that would allow continued access to natural gas fields and to prioritize the use of the aggregate resources that would otherwise be lost as a result of implementing the restoration projects.

The combined impact of constructing and operating the water conveyance facility with implementing CM2–CM4 and CM6–CM11 would increase the magnitude of the significant impact on access to natural gas fields and aggregate resource sites. However, implementing Mitigation Measures MIN-6 and MIN-11 would reduce these impacts to a less-than-significant level.

Concurrent effects of Alternatives 4A, 2D, and 5A on mineral resources would likely be much less than under other alternatives because restoration actions under these new alternatives would be reduced compared to other action alternatives.

5.2.1.23 Paleontological Resources

Construction and operation of the water conveyance facility under Alternatives 1A–2C, 3, 4, 5, and 6–9 would have an adverse impact on paleontological resources by destroying unique or significant examples of these resources during earthmoving activities. Because of the large land area that would disturbed, the impact on paleontological resources was found to be significant under Alternatives 1A–9. Mitigation Measures PALEO-1a through 1d would reduce the impact occurring under Alternative 1A–9 but not to a less-than-significant level because disturbance cannot be avoided to complete construction of the water conveyance facilities. Operation and maintenance of the water conveyance facilities would not adversely impact paleontological resources because extensive ground disturbing activities would not be required.

Implementing CM2–CM4 and CM6–CM11 would adversely impact paleontological resource as a result construction activities required to implement the restoration actions. Implementing Mitigation Measures PALEO 1a through 1d would reduce these impacts to a less than significant because construction of restoration features would primarily occur on the land surface and the proposed measures would help avoid destruction of these resources.

Although there would not be any new impacts other than those previously disclosed, the combined impact of constructing the water conveyance facility with implementing CM2–CM4 and CM6–CM11 could increase the overall magnitude of the significant impact on paleontological resources because ground disturbing activities would occur simultaneously. Implementing Mitigation Measures MIN-6 and MIN-11 would reduce these combined impacts, but not to a less-than-significant level.

Concurrent effects of Alternatives 4A, 2D, and 5A on paleontological resources would likely be much less than under other alternatives because restoration actions under these new alternatives would be reduced compared to other action alternatives.

5.2.1.24 Environmental Justice

Disproportionate impacts on low income and minority populations within the Plan Area would occur during construction of the water conveyance water conveyance facilities under Alternatives 1A through 9 (including Alternatives 4A, 2D, and 5A). These impacts are attributable to changes in land uses and resulting impacts on farm-related employment, changes in the visual character of the plan area that would affect the character of minority communities, loss or damage to cultural resources that could have disproportionate impact on Native Americans, disruption to public services provided to minority communities, changes in air quality and noise that could have a disproportionate effect on low-income and minority populations within the study area, and potential public health implications resulting from changes in the quality of water delivered to minority populations.

Most of the disproportionate impacts on low-income and minority populations identified above would occur as a result of constructing and operating the water conveyance facilities. However, disproportionate impacts on low-income and minority populations would resulting from changes in socioeconomic conditions, changes in air quality, and loss of cultural resources would also occur as CM2–CM4 and CM6–CM11 are implemented. The CMs, when combined with constructing the water

conveyance facilities, would increase the likelihood that disproportionate impacts on low income and minority communities would occur. These combined impacts include changes in farm-related employment as agricultural lands are converted to fish and wildlife habitat, air quality is further degraded and additional noise is generated during construction, additional sensitive cultural resources are damaged or destroyed.

5.2.2 Cumulative Impacts

5.2.2.1 Water Supply

This cumulative effects analysis considers the potential combined effects on water supply as a result of the action alternatives and other past, present, and reasonably foreseeable future projects. For this analysis, the projects listed in Table 5-10 of the Draft EIR/EIS and in Table 5.2.2.2-1 have been considered. For a complete list of projects, consult Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, in Appendix A of this RDEIR/SDEIS. These projects would provide additional water supply reliability to both SWP and CVP water users as well as other water users or could otherwise have a direct or indirect effect on SWP/CVP water supply.

Table 5.2.2.1-1. Effects on Water Supplies from Additional Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Status	Description of Program/Project	Effects on Water Supply
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Program identifies water supply plans to maintain and possibly increase water supply reliability for surface water users.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for indirect effects on water supply at various Delta locations related to changes in hydrodynamics and water quality near restoration actions.
Department of Water Resources and State Water Resources Control Board and local Groundwater Sustainability Agencies	Sustainable Groundwater Management Act Implementation	Signed into law September 2014	Legislation defines rules and regulations that DWR needs to implement to help local agencies manage groundwater resources sustainably.	The SGMA requires the formation of locally controlled Groundwater Sustainability Agencies, which must develop Groundwater Sustainability Plans in groundwater basins or subbasins that DWR designates as medium or high priority. This could result in reductions in use of surface water supplies for communities and agricultural areas in some years, especially supplies that are acquired through transfers, because the water supplies would be used for groundwater recharge or conjunctive use. In the long-term this legislation will improve water supply reliability.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Water Supply
State Water Resources Control Board	Bay-Delta Water Quality Control Plan Update (initiated through the California Water Boards' Strategic Plan Update 2008–2012)	Ongoing development.	The State Water Board is updating the 2006 Bay-Delta Water Quality Control Plan (WQCP) in four phases: Phase I: Modifying water quality objectives (i.e., establishing minimum flows) on the Lower San Joaquin River and Stanislaus, Tuolumne, and Merced Rivers to protect the beneficial use of fish and wildlife and (2) modifying the water quality objectives in the southern Delta to protect the beneficial use of agriculture; Phase II: Evaluating and potentially amending existing water quality objectives that protect beneficial uses and the program of implementation to achieve those objectives. Water quality objectives that could be amended include Delta outflow criteria; Phase III: Requires changes to water rights and other measures to implement changes to the WQCP from Phases I and II; Phase IV: Evaluating and potentially establishing water quality criteria and flow objectives that protect beneficial uses on tributaries to the Sacramento River.	Water supplies of water rights users and SWP and CVP water users could be affected if increased instream flow and/or Delta outflow objectives are established in the regulatory process to protect beneficial uses.
Bay Area Water Quality and Supply Reliability Program	San Francisco Bay Area Integrated Regional Water Management Plan	Final Released September 2013	The Bay Area Integrated Regional Management Plan (IRWMP) is an evolving plan that will be used to prioritize projects and provide information for projects to be funded by state and federal agencies, such as the Proposition 50 projects.	Program identifies local water supply projects to increase water supply reliability in the Bay Area, including for SWP and CVP water users.
Department of Water Resources	North Bay Aqueduct Alternative Intake	Notice of Preparation issued on December 2, 2009. CEQA documentation under preparation.	Plan to construct and operate an alternative intake on the Sacramento River, generally upstream of the Sacramento Regional Wastewater Treatment Plant, and connect it to the existing North Bay Aqueduct system by a new pipeline. The proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct intake at Barker Slough.	Program identifies local water supply projects to increase water supply reliability in Solano and Napa counties for SWP water users Solano County Water Agency and the Napa County Flood Control and Water Conservation District.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Water Supply
East Bay Municipal Utility District	Camanche Permit Extension	Final Environmental Impact Report published in September 2014	Extension of the term of the existing Camanche water right Permit 10478 through the year 2040 to continue to maintain operational flexibility to meet future water demand and address system vulnerabilities, including during emergencies and with potential effects of climate change.	Program identifies water supply projects for EBMUD to maintain water supply reliability for this CVP water user.
East Bay Municipal Utility District	Water Supply Management Program 2040	Final plan published in April 2012	The plan serves as the basis for water conservation and recycling programs and for development of supplemental supply initiatives through 2040, especially dry-year water needs and future needs with climate change.	Program identifies water supply projects for EBMUD to maintain water supply reliability for this CVP water user.
El Dorado Water and Power Authority	Water rights petition for 40,000 acre-feet per year, consistent with diversion and storage provisions under the El Dorado-Sacramento Municipal Utility District Cooperation Agreement.	Supplemental Water Rights Petition submitted in 2009	The proposed project is to establish permitted water rights allowing diversion of water from the American River basin to meet planned future water demands in the El Dorado Irrigation District and Georgetown Divide Public Utility District service areas and other areas located within El Dorado County that are outside of these service areas.	Changes in water rights could change pattern and quantities of inflow into Folsom Lake which could reduce available water supplies for CVP water users in some months.
Placer County Water Agency	Sacramento River Water Reliability Study	Notice of Preparation in 2003. Project is on hold during recent recession. Reclamation was preparing a joint NEPA document; however, the NEPA process was halted in 2009.	PCWA, Sacramento Suburban Water District, and the cities of Roseville and Sacramento, are investigating the viability of a joint water supply diversion from the Sacramento River, consistent with the Water Forum Agreement to meet planned future growth within the Placer-Sacramento region, maintain reliable water supply while reducing diversions of surface water from the American River in future dry years to preserve the river ecosystem, and enhance ground water conjunctive management to help sustain the quality and availability of groundwater.	Could reduce flows in the Sacramento River upstream of American River confluence and increase flows on the American River. In drier years, flows in the Sacramento River downstream of the American River also could be reduced because additional water would be available to CVP water users in the American River watershed.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Water Supply
Semitropic Water Storage District	Delta Wetlands Projects	Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	Project is inconsistent with Contra Costa County General Plan Policy for Agricultural Lands and Delta Protection Commission's Land Use Plan Principles for Agriculture and Recreation. Project will also result in conversion of existing agricultural land.
Reclamation	Shasta Lake Water Resources Investigation	Draft Environmental Impact Statement published in June 2013	The project is a multiple purpose plan to modify Shasta Dam and Reservoir to increase survival of anadromous fish populations in the upper Sacramento River; increase water supplies and water supply reliability; and, to the extent possible through meeting these objectives, include features to benefit other identified ecosystem, flood damage reduction, and related water resources needs which could result in additional storage capacity of 256,000 to 634,000 acre-feet.	Program identifies water supply plans to maintain and possibly increase water supply reliability for CVP water users.
Department of Water Resources and Reclamation	North-of-the-Delta Offstream Storage Investigation	Preliminary Administrative Draft Environmental Impact Statement published in December 2013	The plan will provide offstream storage in the northern Sacramento Valley for improved water supply and water supply reliability, improved water quality, and enhanced survival of anadromous fish and other aquatic species. All alternatives include a new reservoir at the Sites location, with various facilities for water conveyance.	Program identifies water supply plans to maintain and possibly increase water supply reliability for CVP and non-CVP water users.
Reclamation	Upper San Joaquin River Basin Storage Investigation	Draft Environmental Impact Statement published in August 2014	The Upper San Joaquin Storage would contribute to restoration of the San Joaquin River, improve water quality of the San Joaquin River, and facilitate additional conjunctive management and water exchanges that improve the quality of water deliveries to urban communities. To the extent possible, the Upper San Joaquin River Basin Storage Investigation will explore opportunities to provide other benefits that could include hydropower, flood control, and recreation.	Program identifies water supply plans to maintain and possibly increase water supply reliability for CVP and non-CVP water users.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Water Supply
San Joaquin River Restoration Program	San Joaquin River Restoration Program	Final Environmental Impact Statement published in July 2012. Implementation ongoing.	A comprehensive long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply impacts from restoration flows. The project was authorized and funded with the passage of San Joaquin River Restoration Settlement Act, part of the Omnibus Public Land Management Act of 2009 (Public Law 111-11). Interim flows began in October, 2009. There will be many physical improvements within and near the San Joaquin River to fully achieve the river restoration goal. The improvements will occur in two separate phases that will focus on a combination of water releases from Friant Dam, as well as structural and channel improvements.	The program would affect available CVP water supplies in the Friant Kern Division. However, this portion of the CVP is not affected by the BDCP alternatives. Water released into the San Joaquin River for the restoration program could increase Delta inflows at Vernalis; however, at this time, the water can be diverted upstream of the Delta. Therefore, the program would not affect the water bodies affected by the BDCP alternatives.
Reclamation	San Luis Reservoir Expansion	Draft Appraisal Report published in December 2013	The plan is to increase the storage capacity of San Luis Reservoir (behind B.F. Sisk Dam) to improve the reliability of CVP and SWP water supplies dependent upon San Luis Reservoir. Seismic risks under the dam and in the Delta, regulatory constraints to operating Delta export facilities, algae blooms at low water levels, and future climate change have and will reduce the reliability of CVP/SWP deliveries dependent upon the San Luis Reservoir.	Program identifies water supply plans to maintain and possibly increase water supply reliability for CVP and SWP water users.
Department of Water Resources	South Delta Temporary Barriers Project	Ongoing Program	The program was initiated in 1991, and includes four rock barriers across South Delta channels. The objectives of the project are to increase water levels, improve water circulation patterns and water quality in the southern Delta for local agricultural diversions, and improve operational flexibility of the SWP to help reduce fishery impacts and improve fishery conditions. Future plans may include re-consideration of installing non-physical barriers or permanent barriers.	Program identifies water supply plans to maintain water supply reliability for CVP and SWP water users.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Water Supply
Department of Water Resources	Implementation of Senate Bill X7 7	Legislation was adopted in 2009	This legislation requires the state to achieve a 20% reduction in urban per capita water use by December 31, 2020; require each urban retail water supplier to develop urban water use targets; agricultural water suppliers to implement efficient water management practices; and DWR in consultation with other state agencies, to develop a single standardized water use reporting form.	The legislation would reduce water demands for existing water users; and reduce projected demands for future growth.
Metropolitan Water District of Orange County	Seawater Desalination Project at Huntington Beach	Final CEQA documents published in 2010. Awaiting permits	Water treatment plant would provide up to 50 mgd of desalinated water.	Program would maintain and possibly increase water supply reliability for SWP water users.
San Diego County Water Authority and other water suppliers	Carlsbad Seawater Desalination Plant	Under construction.	Water treatment plant would provide up to 50 mgd of desalinated water.	Program would maintain and possibly increase water supply reliability for SWP water users.
San Diego County Water Authority	Emergency Storage Project	Under construction	The project will increase the amount of water stored locally. New water storage and pipeline connections will distribute water throughout the region if imported water supplies are reduced. The Emergency Storage Project is expected to meet the county's emergency water needs through 2030.	Program would maintain and possibly increase water supply reliability for SWP water users.
Western Municipal Water District and Reclamation	Riverside-Corona Feeder Conjunctive Use Project	Final Supplemental Environmental Impact Statement and Environmental Impact Report published in 2011	The project would allow WMWD to purchase water from SWP and store up to 40,000 acre-feet of water in the San Bernardino Basin Area and Chino Basin and to extract the water from the basins. The facilities would convey local water supplies and deliver treated imported water.	Program would maintain and possibly increase water supply reliability for SWP water users, especially in drier years.

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Impact WS-4: Cumulative Change in Delta Exports

Delta exports would change under implementation of the action alternatives. Implementation of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4 (H1 operational scenario), 5, and 9 would not result in reductions in Delta exports as compared to Existing Conditions and No Action Alternative as described in Sections 5.3.3.2 through 5.3.3.10 and Section 5.3.3.16 of the Draft EIR/EIS. Implementation of Alternatives 4 (H4 operational scenario), 6A, 6B, 6C, 7, and 8 would result in reductions in Delta exports as compared to Existing Conditions and No Action Alternative as described in Sections 5.3.3.11 through 5.3.3.15 of the Draft EIR/EIS. Implementation of Alternative 4 (H2, H3, and H1 operational scenarios) would result in reductions in Delta exports as compared to Existing Conditions and an increase as compared to No Action Alternative. Indirect effects of changes in Delta exports are addressed in Chapter 30, *Growth Inducement and Other Indirect Effects*, of the Draft EIR/EIS and other chapters addressing specific resources.

Implementation of the cumulative projects and programs and the action alternatives (which includes non-SWP and CVP projects that are included in the No Action Alternative) could modify stream flows in the Sacramento and/or San Joaquin Rivers. However, the changes that would occur in stream flows would be within operational ranges projected to occur under any of the action alternatives. Overall, there could be changes in diversion patterns throughout the year for SWP and CVP water users in the Sacramento Valley, other water rights water users located in the Sacramento River and in the Delta, and Delta exports. The changes could differ by water year type. For example, storage or conjunctive use water supply projects located upstream of the Delta could result in changes in diversion patterns that could result in changes in Delta exports. However, future cumulative projects would require water rights permits from the SWRCB to protect senior water rights. For most of the cumulative projects considered in this EIR/EIS, the water rights modifications would involve less senior water rights than the SWP and CVP water rights. Cumulative projects related to American River and Mokelumne River would involve more senior water rights than the SWP and CVP water rights. Therefore, these types of projects, including the North Bay Aqueduct Alternate Intake Project combined with the action alternatives could result in some changes in Delta inflows which could affect the ability to operate the Delta export pumping plants to meet water quality and flow requirements for SWP and CVP operations. It is anticipated, based upon the available environmental documentation for the projects on the Sacramento, American and Mokelumne rivers that the effects in the Delta would not be substantial.

Other types of cumulative projects would involve development of local water supplies by SWP and CVP water users. Use of these projects, such as desalination projects, generally would be used to increase water supply reliability in years when SWP and/or CVP water supplies and other water supplies are restricted. If these projects are used to reduce the amount of SWP and/or CVP water use over a long-term basis, it is not anticipated that there would be any changes in Delta exports because other SWP and/or CVP water users would be allowed to use the water not used by local water users with future auxiliary water supplies. The CWAP is intended to improve water supply conditions in California and thus is expected to improve conditions for SWP/CVP and other water users. The EcoRestore program would not directly affect water supply availability, but could potentially alter localized Delta hydrodynamics and water quality in ways that could affect water user operations.

NEPA Effects: Implementation of the cumulative projects in combination with Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D 3, 4 (H1, H2, H3 operational scenarios), 4A, 5, 5A, and 9 (which would result in

either no change or an increase in Delta exports as compared to the No Action Alternative) would not result in cumulative reduction in Delta exports because the changes in Delta exports due to the cumulative projects would not be allowed under requirements to protect senior water rights. Minimal effects of future diversions on SWP/CVP water supply would occur related to potential future diversions by water users with water rights senior to the SWP and CVP, and no effects would occur to total water demand for SWP and CVP water supplies that are reliant on the Delta export facilities. Implementation of these projects in combination with Alternatives 4 and 4A (H4 operational scenario), 6A, 6B, 6C, 7, and 8 would result in cumulative water supply effects, primarily due to a reduction in Delta exports under these alternatives as compared to the No Action Alternative. Indirect physical effects of changes in Delta exports are addressed in Chapter 30, *Growth Inducement and Other Indirect Effects,* of the Draft EIR/EIS and other chapters addressing specific resources.

CEQA Conclusion: Implementation of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D 3, 4 (H1 operational scenario), 5, 5A, and 9 would not result in reductions in Delta exports as compared to the Existing Conditions. Implementation of the cumulative projects in combination with Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1 operational scenario), 5, 5A, and 9 would not result in cumulative Delta exports because the changes in Delta exports due to the cumulative projects would not be allowed under the protection of senior water rights, effects of future diversions by water rights holders of water rights senior to the SWP and CVP would be minimal, and/or no effects to total water demand for SWP and CVP water supplies would occur that are reliant on the Delta export facilities.

Implementation of Alternatives 4 (H2, H3, H4 operational scenarios), 4A, 6A, 6B, 6C, 7, and 8 would result in reductions in Delta exports. Implementation of the cumulative projects in combination with Alternatives 4 (H2, H3, H4 operational scenarios), 4A, 6A, 6B, 6C, 7, and 8 would result in cumulative effects on Delta exports, primarily due to a reduction in Delta exports under these alternatives as compared to the Existing Conditions. The indirect physical effects of these changes in Delta exports are addressed in Chapter 30, *Growth Inducement and Other Indirect Effects,* of the Draft EIR/EIS and other chapters addressing specific resources.

Impact WS-5: Cumulative Change in SWP and CVP Deliveries

SWP and CVP deliveries would change under implementation of the action alternatives, as previously described in this chapter. Implementation of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D. 3, 4 (H1 operational scenario), 5, 5A, and 9 would not result in reductions in SWP and CVP South of Delta deliveries as compared to Existing Conditions and No Action Alternative as described in Sections 5.3.3.2 through 5.3.3.10 and Section 5.3.3.16 of the Draft EIR/EIS. Implementation of Alternatives 4 (H4 operational scenario), 6A, 6B, 6C, 7, and 8 would result in reductions in SWP and CVP South of Delta deliveries as compared to Existing Conditions and No Action Alternative as described in Sections 5.3.3.11 through 5.3.3.15 of the Draft EIR/EIS. Implementation of Alternatives 4 (H2, H3 operational scenarios), and 4A would result in reductions in SWP and CVP South of Delta deliveries as compared to Existing Conditions and an increase as compared to No Action Alternative.

Implementation of the cumulative projects and programs could modify Delta exports, and therefore Delta deliveries, as described under Impact WS-4. As described above for Delta exports, the cumulative changes in SWP and CVP South of Delta deliveries would not be substantial.

NEPA Effects: Implementation of the cumulative projects in combination with Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1, H2, H3 operational scenario), 4A, 5, 5A, and 9 (which would result in either no change or an increase in SWP and CVP deliveries as compared to the No Action

Alternative) would not result in cumulative reduction in South of Delta deliveries because the changes in Delta exports due to the cumulative projects would not be allowed under the protection of senior water rights, minimal effects would occur associated with future diversions by water rights holders of water rights senior to the SWP and CVP, and/or no effects to total water demand would occur for SWP and CVP water supplies that are reliant on the Delta export facilities. Implementation of these projects in combination with Alternatives 4 (H4 operational scenario), 6A, 6B, 6C, 7, and 8 would result in cumulative effects, primarily due to a reduction in Delta exports under these alternatives as compared to the No Action Alternative. Indirect effects of changes in Delta exports are addressed in Chapter 30, *Growth Inducement and Other Indirect Effects,* and other chapters addressing specific resources.

***CEQA Conclusion*:** Implementation of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1 operational scenario), 5, 5A, and 9 would not result in reductions in SWP and CVP deliveries as compared to Existing Conditions. Implementation of the cumulative projects in combination with Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1 operational scenario), 5, 5A, and 9 would not result in cumulative SWP and CVP delivery effects because the changes in Delta exports due to the cumulative projects would not be allowed under the protection of senior water rights, minimal effects would occur associated with future diversions by water rights holders of water rights senior to the SWP and CVP, and/or no effects to total water demand would occur for SWP and CVP water supplies that are reliant on the Delta export facilities.

Implementation of Alternatives 4 (H2, H3, H4 operational scenarios), 4A, 6A, 6B, 6C, 7, and 8 would result in reductions in SWP and CVP deliveries. Implementation of the cumulative projects in combination with Alternatives 4 (H2, H3, H4 operational scenarios), 4A, 6A, 6B, 6C, 7, and 8 would result in cumulative water delivery effects, primarily due to a reduction in Delta exports under these alternatives as compared to the Existing Conditions. The indirect physical effects of these changes in Delta exports are addressed in Chapter 30, *Growth Inducement and Other Indirect Effects,* and other chapters addressing specific resources.

Impact WS-6: Cumulative Effects of Water Transfers on Water Supply

To the extent that implementation of the cumulative projects reduces SWP and CVP Delta exports, there would be a cumulative effect on cross-Delta water transfers evidenced as an increase in the frequency of water transfer demands and an increase in the average annual cross-Delta transfers.

NEPA Effects: Implementation of the cumulative projects in combination with Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1, H2, H3 operational scenarios), 4A, 5, 5A, and 9 would not result in cumulative effects related to transfers (because there would not be a reduction in Delta exports and a related ability to transfer water).

Implementation of the cumulative projects in combination with Alternatives 4 (H4 operational scenario), 6A, 6B, 6C, 7, and 8 would result in cumulative effects because a reduction in Delta exports could result in increased frequency of transfers and increased transfer volumes. Indirect effects of changes in Delta exports are addressed in Chapter 30, *Growth Inducement and Other Indirect Effects,* of the Draft EIR/EIS and other chapters addressing specific resources.

***CEQA Conclusion*:** Implementation of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1 operational scenario), 5, 5A, and 9 would not result in reductions in SWP and CVP exports. Implementation of the cumulative projects in combination with Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1

operational scenario), 5, 5A, and 9 would not result in cumulative effects related to water transfers because there would not be a reduction in Delta exports and a related ability to transfer water.

Implementation of Alternatives 4 (H2, H3, H4 operational scenarios), 4A, 6A, 6B, 6C, 7, and 8 in combination with the cumulative projects would result in cumulative effects because a reduction in Delta exports could result in increased frequency of transfers and increased transfer volumes. The indirect physical effects of these changes in Delta exports are addressed in Chapter 30, *Growth Inducement and Other Indirect Effects*, of the Draft EIR/EIS and other chapters addressing specific resources.

5.2.2.2 Surface Water

This cumulative effects analysis considers the potential effects on surface water as a result of the action alternatives combined with other past, present, and reasonably foreseeable future projects. For this analysis, the projects listed in Table 6-9 of the Draft EIR/EIS and in Table 5.2.2.2-1 were considered. For a complete list of such projects, consult Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, in Appendix A of this RDEIR/SDEIS. These projects would affect surface water flows and patterns in the study area.

Table 5.2.2.2-1. Effects on Surface Water from Additional Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Status	Description of Program/Project	Effects on Surface Water
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Program identifies water resources plans that could modify surface water flow patterns, expand water storage capacity, and increase flood protection.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for indirect effects on surface water at various Delta locations related to changes in localized hydrodynamics near restoration actions.
Department of Water Resources	Delta Risk Management Strategy	Phase 2 Report published in 2011.	Program examined the sustainability of the Delta, and assessed major risks to Delta resources for next 50 to 200 years. The first phase analyzed the risks and consequences of levee failure in the Delta region from earthquakes, high water conditions (storms and tides), climate change, subsidence, dry-weather events, and a combination of these factors. The analysis estimated the consequences of levee failures to the local and state economy, public health and safety and the environment. The results were reported in the DRMS Phase 1 report, Various scenarios to reduce the risks and consequences of levee failure were considered in the Phase 2 report.	Program identifies water resources plans that could modify surface water flow patterns and increase flood protection.
Department of Water Resources	FloodSAFE	Ongoing Program	The FloodSAFE vision is a sustainable integrated flood management and emergency response system throughout California that improves public safety, protects and enhances environmental and cultural resources, and supports economic growth by reducing the probability of destructive floods, promoting beneficial floodplain processes, and lowering the damages caused by flooding. The FloodSAFE Program is designed to help improve integrated flood management statewide with a significant emphasis on Central Valley and Delta communities with high risk of catastrophic damage.	Program identifies water resources plans that could modify surface water flow patterns and increase flood protection.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Surface Water
Department of Water Resources, Department of Fish and Wildlife, U.S. Army Corps of Engineers	CALFED Levee System Integrity Program	Ongoing Program	The CALFED Record of Decision required the Levee System Integrity Program to provide for long-term protection for Delta resources through maintenance and improvement of the Delta levee system. Goals are to protect life, infrastructure, and properties; and reduce the risk to land use and associated economic activities, water supply, infrastructure, and ecosystem from catastrophic breaching of Delta levees.	Program identifies water resources plans that could modify surface water flow patterns and increase flood protection.
U.S. Army Corps of Engineers	CALFED Levee Stability Program	Ongoing Program	The CALFED Record of Decision required the U.S. Army Corps of Engineers to analyze and prioritize potential near-term levee stability projects in the Delta.	Program identifies water resources plans that could modify surface water flow patterns and increase flood protection.
Reclamation, U.S. Army Corps of Engineers, Sacramento Area Flood Control Agency, and Central Valley Flood Protection Board	Folsom Dam Safety and Flood Damage Reduction Project	Under Construction	The project includes the Joint Federal Project Auxiliary Spillway, seismic improvements to the Main Concrete Dam and Mormon Island Auxiliary Dam, static improvements to earthen structures, security upgrades, replacement of the Main Concrete Dam spillway gates, and a 3.5-foot raise to all Folsom Facility structures. The modifications would create and conserve flood storage space.	Program will modify surface water flow patterns and increase flood protection along the Lower American River.
U.S. Army Corps of Engineers and Department of Water Resources	Delta Islands and Levees Feasibility Study	Draft Feasibility Study and Draft Environmental Impact Report published in April 2014	The program will address flood risk management, ecosystem restoration, water quality, water supply, and a variety of other issues identified in the Delta Risk Management Strategy studies.	Program identifies water resources plans that could modify surface water flow patterns and increase flood protection.
U.S. Army Corps of Engineers	Lower San Joaquin Feasibility Study	Ongoing Program	The program is to determine if there is a federal interest in providing flood risk management and ecosystem restoration improvements along the Lower (northern) San Joaquin River from the Mariposa Bypass through the city of Stockton, and channels of the San Joaquin River along Paradise Cut and Old River to Tracy Boulevard and Middle River to Victoria Canal.	Program identifies water resources plans that could modify surface water flow patterns and increase flood protection.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Surface Water
State Water Resources Control Board	Bay-Delta Water Quality Control Plan Update (initiated through the California Water Boards' Strategic Plan Update 2008–2012)	Ongoing development.	The State Water Board is updating the 2006 Bay-Delta Water Quality Control Plan (WQCP) in four phases: Phase I: Modifying water quality objectives (i.e., establishing minimum flows) on the Lower San Joaquin River and Stanislaus, Tuolumne, and Merced Rivers to protect the beneficial use of fish and wildlife and (2) modifying the water quality objectives in the southern Delta to protect the beneficial use of agriculture; Phase II: Evaluating and potentially amending existing water quality objectives that protect beneficial uses and the program of implementation to achieve those objectives. Water quality objectives that could be amended include Delta outflow criteria; Phase III: Requires changes to water rights and other measures to implement changes to the WQCP from Phases I and II; Phase IV: Evaluating and potentially establishing water quality criteria and flow objectives that protect beneficial uses on tributaries to the Sacramento River.	Program identifies water resources plans that could modify surface water flow patterns, increase minimum instream flows, and increase minimum Delta outflows.
Department of Water Resources	North Bay Aqueduct Alternative Intake	Notice of Preparation issued on December 2, 2009. CEQA documentation under preparation.	Plan to construct and operate an alternative intake on the Sacramento River, generally upstream of the Sacramento Regional Wastewater Treatment Plant, and connect it to the existing North Bay Aqueduct system by a new pipeline. The proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct intake at Barker Slough.	Program could modify surface water flow patterns.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Surface Water
El Dorado Water and Power Authority	Water rights petition for 40,000 acre-feet per year, consistent with diversion and storage provisions under the El Dorado-Sacramento Municipal Utility District Cooperation Agreement.	Supplemental Water Rights Petition submitted in 2009	The proposed project is to establish permitted water rights allowing diversion of water from the American River basin to meet planned future water demands in the El Dorado Irrigation District and Georgetown Divide Public Utility District service areas and other areas located within El Dorado County that are outside of these service areas.	Changes in water rights could change pattern and quantities of inflow into Folsom Lake which could change flows in the Lower American River.
Placer County Water Agency	Sacramento River Water Reliability Study	Notice of Preparation in 2003. Project is on hold during recent recession. Reclamation was preparing a joint NEPA document; however, the NEPA process was halted in 2009.	PCWA, Sacramento Suburban Water District, and the cities of Roseville and Sacramento, are investigating the viability of a joint water supply diversion from the Sacramento River, consistent with the Water Forum Agreement to meet planned future growth within the Placer-Sacramento region, maintain reliable water supply while reducing diversions of surface water from the American River in future dry years to preserve the river ecosystem, and enhance ground water conjunctive management to help sustain the quality and availability of groundwater.	Could reduce flows in the Sacramento River upstream of American River confluence and increase flows on the American River. In drier years, flows in the Sacramento River downstream of the American River also could be reduced because additional water would be available to CVP water users in the American River watershed.
East Bay Municipal Utility District	Camanche Permit Extension	Final Environmental Impact Report published in September 2014	Extension of the term of the existing Camanche water right Permit 10478 through the year 2040 to continue to maintain operational flexibility to meet future water demand and address system vulnerabilities, including during emergencies and with potential effects of climate change.	Project could result in changes in surface water flows in the Mokelumne River.
Semitropic Water Storage District	Delta Wetlands Projects	Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	Program could modify surface water flow patterns.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Surface Water
Reclamation	Shasta Lake Water Resources Investigation	Draft Environmental Impact Statement published in June 2013	The project is a multiple purpose plan to modify Shasta Dam and Reservoir to increase survival of anadromous fish populations in the upper Sacramento River; increase water supplies and water supply reliability; and, to the extent possible through meeting these objectives, include features to benefit other identified ecosystem, flood damage reduction, and related water resources needs which could result in additional storage capacity of 256,000 to 634,000 acre-feet.	Program would modify surface water flow patterns in the Sacramento River and improve flood management.
Department of Water Resources and Reclamation	North-of-the-Delta Offstream Storage Investigation	Preliminary Administrative Draft Environmental Impact Statement published in December 2013	The plan will provide offstream storage in the northern Sacramento Valley for improved water supply and water supply reliability, improved water quality, and enhanced survival of anadromous fish and other aquatic species. All alternatives include a new reservoir at the Sites location, with various facilities for water conveyance.	Program would modify surface water flow patterns in the Sacramento River and improve flood management.
Reclamation	Upper San Joaquin River Basin Storage Investigation	Draft Environmental Impact Statement published in August 2014	The Upper San Joaquin Storage would contribute to restoration of the San Joaquin River, improve water quality of the San Joaquin River, and facilitate additional conjunctive management and water exchanges that improve the quality of water deliveries to urban communities. To the extent possible, the Upper San Joaquin River Basin Storage Investigation will explore opportunities to provide other benefits that could include hydropower, flood control, and recreation.	Program would modify surface water flow patterns in the San Joaquin River and improve flood management.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Surface Water
San Joaquin River Restoration Program	San Joaquin River Restoration Program	Final Environmental Impact Statement published in July 2012. Implementation ongoing.	A comprehensive long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply impacts from restoration flows. The project was authorized and funded with the passage of San Joaquin River Restoration Settlement Act, part of the Omnibus Public Land Management Act of 2009 (Public Law 111-11). Interim flows began in October, 2009. There will be many physical improvements within and near the San Joaquin River to fully achieve the river restoration goal. The improvements will occur in two separate phases that will focus on a combination of water releases from Friant Dam, as well as structural and channel improvements.	Project would result in changes to San Joaquin River flows.
Department of Water Resources	South Delta Temporary Barriers Project	Ongoing Program	The program was initiated in 1991, and includes four rock barriers across South Delta channels. The objectives of the project are to increase water levels, improve water circulation patterns and water quality in the southern Delta for local agricultural diversions, and improve operational flexibility of the SWP to help reduce fishery impacts and improve fishery conditions. Future plans may include re-consideration of installing non-physical barriers or permanent barriers.	Program would change South Delta flow patterns.

Impact SW-11: Cumulative Impact—Changes in SWP or CVP Reservoir Flood Storage Capacity

Flood storage capacity would not change under the implementation of Alternatives 1A through 9 as compared to Existing Conditions or No Action Alternative, as described in Sections 6.3.3.1 through 6.3.3.16 of the Draft EIR/EIS. Implementation of the cumulative projects would either result in no change or an increase in flood management capabilities.

NEPA Effects: Implementing the cumulative projects in combination with any of Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A would not result in cumulative adverse effects on upstream storage conditions because they are either flood management improvement projects, or restoration projects and water supply projects that would not affect operations in upstream reservoirs. These projects would not have any measurable effect on upstream reservoir flood storage capacity.

Implementation of action alternatives would not result in a reduction in flood storage capacity of upstream reservoirs. Therefore, Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A when combined with the cumulative projects would not result in a cumulative adverse effect on flood storage.

***CEQA Conclusion*:** Implementing the cumulative projects in combination with any of the action alternatives would not result in a significant cumulative adverse effect because they are either flood management improvement projects, restoration projects or water supply projects that would not affect operations in upstream reservoirs.

Impact SW-12: Cumulative Impact—Changes in Sacramento and San Joaquin River Flood Flows

Implementation of Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A would not result in changes in Sacramento and San Joaquin rivers flood flows as compared to Existing Conditions or No Action Alternative, as described in Sections 6.3.3.1 through 6.3.3.16 of the Draft EIR/EIS. Implementation of the cumulative projects would either result in no change or an increase in flood management capabilities.

The cumulative projects considered for surface water resources would either specifically improve flood management conditions and reduce flood potential by increasing upstream storage capacity, levee improvements, expansion of the floodplain to reduce peak flood flows; diversion of additional water that could reduce peak flood flows (e.g., North Bay Aqueduct Alternatives Intake); or not substantially modify highest monthly flows in wet years, such as Dutch Slough Tidal Marsh Restoration Project, other California EcoRestore actions and the San Joaquin River Restoration Program.

NEPA Effects: Implementing the cumulative projects in combination with any of the BDCP Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A would not result in cumulative adverse effects on Sacramento and San Joaquin rivers flows in the winter and early spring months of wet years when flood potential is high. Some of the cumulative projects could result in beneficial effects.

***CEQA Conclusion*:** Implementing these projects in combination with any of BDCP Alternatives 1A through 9 would not result in a significant cumulative impact because none of the cumulative projects combined with the action alternatives would substantially affect Sacramento and San Joaquin River winter or spring flows.

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

Reverse flow conditions in Old and Middle Rivers under Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 (H1-H4, 4 A, 5, 5A, and 9 would become more negative in April and/or May as compared to Existing Conditions. Under Alternative 9, reverse flow conditions also would become more negative in December as compared to Existing Conditions. The reverse flows would become more positive in the other months. Under Alternatives 6A, 6B, 6C, 7, and 8, the reverse flow conditions become more positive in all months as compared to the Existing Conditions.

Reverse flow conditions in Old and Middle Rivers under Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4 H1and H3, 4 A, 5, 5A, and 9 would become more negative in April and/or May as compared to No Action Alternative. Under Alternative 3, reverse flow conditions also would become more negative in October as compared to No Action Alternative. Under Alternative 9, reverse flow conditions would become more negative in all months except June as compared to No Action Alternative. The reverse flows would become more positive in the other months. Under Alternatives 4 (H2 and H4), 6A, 6B, 6C, 7, and 8, the reverse flow conditions would become more positive in all months as compared to the No Action Alternative.

Some of the cumulative flood management and water supply reliability projects would cause changes in Delta inflow patterns in some months. However, reverse flow patterns with these cumulative projects and the BDCP alternatives would not change as compared to conditions without the cumulative projects because Delta exports would be subject to the same OMR regulations.

NEPA Effects: Implementing the cumulative projects in combination with any of Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A would not result in cumulative adverse effects on Old and Middle River flows. Some of the cumulative flood management and water supply reliability projects would cause changes in Delta inflow patterns in some months. However, reverse flow patterns with these cumulative projects and the action alternatives would not change as compared to conditions without the cumulative projects because Delta exports would be subject to the same OMR regulations.

Because the cumulative projects would be required to convey water across the Delta in accordance with the action alternatives' conveyance facility operational assumptions, implementation of the cumulative projects in combination with any of the action alternatives would not result in cumulative adverse effects in addition to the impacts described for implementation of each action alternative.

***CEQA Conclusion*:** Because the cumulative projects would be required to convey water across the Delta in accordance with the action alternatives' conveyance facility operational assumptions, implementation of the cumulative projects in combination with any of the action alternatives would not result in additional cumulative effects in addition to the impacts described above for implementation of each alternative. 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 to beneficial uses are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries and Aquatic Resources*, of the Draft EIR/EIS.

Impact SW-14: Cumulative Impact—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

Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A could result in alterations to drainage patterns or substantially increase the rate or amount of surface runoff in a manner that would result in flooding depending upon the final construction plans of the conveyance facilities. These impacts are considered significant.

None of the cumulative projects would result in construction activities near the facilities construction under the action alternatives that would change surface runoff in a manner that would result in flooding or otherwise contribute to this impact.

NEPA Effects: Implementing the cumulative projects in combination with any of the action alternatives would not result in additional cumulative adverse effects on existing drainage patterns because none of the cumulative projects would combine to alter drainage patterns in the vicinity of the action alternatives.

***CEQA Conclusion*:** Implementing the cumulative projects in combination with Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A would not result in a significant cumulative impact due to alterations of existing drainage patterns because none of the cumulative projects would combine to alter drainage patterns in the vicinity of the action alternatives. Mitigation Measure SW-4 will reduce the severity of impacts created by BDCP-related activities by implementing activities such as designing the facilities, including structures used in construction such as coffer dams, to be flood neutral, not increase the runoff volume and rate from the land, and not increase the sediment discharge from the construction sites. The mitigation measure also requires a hydraulic analysis of any existing channels prior to use of these channels for conveyance of dewatering flows.

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 in Appendix A of this RDEIR/SDEIS.

Impact SW-15: Cumulative Impact—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 Areas

Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A could result in alterations to drainage patterns or substantially increase the rate or amount of surface runoff in a manner that would result in flooding depending upon the final construction plans of the habitat restoration areas. These impacts are considered significant because substantial amount of habitat restoration would occur in the Delta under all of the action alternatives that could affect local drainage patterns and increase surface runoff during construction.

None of the cumulative projects would result in construction activities near the facilities construction under the actin alternatives that would change surface runoff in a manner that would result in flooding.

NEPA Effects: Implementing the cumulative projects in combination with any of the action alternatives would not result in cumulative adverse effects on existing drainage patterns near the restoration areas because none of the cumulative projects would occur in the near vicinity of the

action alternatives. ***CEQA Conclusion*:** Implementing these projects in combination with any of action alternatives would not result in a significant cumulative impact on existing drainage patterns near the restoration areas because none of the cumulative projects would combine to alter drainage patterns in the vicinity of the action alternatives. Mitigation Measure SW-4 will reduce the severity of impacts created by action alternatives by implementing activities such as designing the facilities, including structures used in construction such as coffer dams near future levee breaches, to be flood neutral, not increase the runoff volume and rate from the land, and not increase the sediment discharge from the construction sites. The mitigation measure also requires a hydraulic analysis of any existing channels prior to use of these channels for conveyance of dewatering flows.

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 in Appendix A of this RDEIR/SDEIS.

Impact SW-16: Cumulative Impact—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

Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A could contribute runoff water that would exceed capacity of existing and future drainage facilities or increase polluted runoff depending upon the final construction plans and/or locations of the conveyance facilities. These impacts are considered significant.

None of the cumulative projects would result in construction activities near the facilities construction under the action alternatives that would change surface runoff in a manner that would exceed capacity of existing or future drainage systems or provide substantial additional pollution runoff.

NEPA Effects: Implementing the cumulative projects in combination with any of the action alternatives would not result in cumulative adverse effects on contribution of runoff water that would exceed capacity of existing and future drainage facilities or increase polluted runoff because none of the cumulative projects would directly affect the same drainage facility or combine with the runoff effects of the action alternatives.

***CEQA Conclusion*:** Implementing these projects in combination with any of the action alternatives would not result in a significant cumulative impact due to contribution of runoff water that would exceed capacity of existing and future drainage facilities or increase polluted runoff.

Mitigation Measure SW-4 will reduce the severity of impacts created by action alternatives by implementing activities such as designing the facilities, to be flood neutral, not increase the runoff volume and rate from the land, and not increase the sediment or pollutant discharge from the construction sites. The mitigation measure also requires a hydraulic analysis of any existing channels prior to use of these channels for conveyance of dewatering flows.

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 in Appendix A of this RDEIR/SDEIS.

Impact SW-17: Cumulative Impact—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 Due to the Operation of New Conveyance Facilities

Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A could contribute to increase risk of flooding depending upon the final construction plans of the conveyance facilities. These impacts are considered significant.

None of the cumulative projects would result in new facilities near the facilities action alternatives that would change the risk of flooding.

NEPA Effects: Implementing the cumulative projects in combination with any of the action alternatives would not result in cumulative adverse effects on exposing 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 due to the operation of new conveyance facilities because all of these cumulative projects including the action alternatives would be required to be designed reduce flooding affects prior to project approval.

***CEQA Conclusion*:** Implementing the cumulative projects in combination with any of the action alternatives would not result in a significant cumulative impact due to an increase in the risk of flooding because all of these cumulative projects including the action alternatives would be required to be designed reduce flooding affects prior to project approval.

Mitigation Measure SW-4 and SW-7 will reduce the severity of impacts created by action alternatives by implementing activities such as designing the facilities, to be flood neutral and provide adequate flood protection in the design of levees and facilities.

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 in Appendix A of this RDEIR/SDEIS.

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 in Appendix A of this RDEIR/SDEIS.

Impact SW-18: Cumulative Impact—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 Due to the Operation of Habitat Restoration Areas

Alternatives 1A through 9 and Alternatives 4A, 2D, and 5Acould contribute to increase risk of flooding due to levee failure or wind fetch depending upon the final locations of the habitat restoration areas. These impacts are considered significant.

None of the cumulative projects would result in projects near the habitat restoration areas under Alternatives 1A through 9 that would change the risk of flooding. Some of the cumulative projects could result in flood protection benefits

NEPA Effects: Implementing the cumulative projects in combination with any action alternatives would not result in cumulative adverse effects on exposing 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

wind fetch due to the operation of habitat restoration areas because none of the cumulative projects are in close proximity to each other and some of the cumulative projects would improve Delta flood protection.

***CEQA Conclusion*:** Implementing the cumulative projects in combination with any of the action alternatives would not result in a significant adverse cumulative impact including flooding as a result of the failure of a levee or wind fetch due to the operation of habitat restoration areas because none of the cumulative projects are in close proximity to each other and some of the cumulative projects would improve Delta flood protection.

Mitigation Measure SW-4 and SW-8 will reduce the severity of impacts created by BDCP-related activities by implementing activities such as designing the facilities, to be flood neutral and reduce potential impact of wind fetch.

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 in Appendix A of this RDEIR/SDEIS.

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 in Chapter 5, *Water Supply*, of the Draft EIR/EIS.

Impact SW-19: Cumulative Impact—Place within a 100-Year Flood Hazard Area Structures Which Would Impede or Redirect Flood Flows, or Be Subject to Inundation by Mudflow

Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A could contribute to increase risk of flooding depending upon the final construction plans of the conveyance and habitat restoration facilities. These impacts are considered significant.

None of the cumulative projects would result in new facilities or habitat restoration areas near the facilities under the action alternatives that would change the risk of flooding.

NEPA Effects: Implementing the cumulative projects in combination with any of the action Alternatives would not result in cumulative adverse effects on increased risk from floods, because none of the cumulative projects are in close proximity to each other and some of the cumulative projects would flood hazards.

***CEQA Conclusion*:** Implementing the cumulative projects in combination with any of BDCP Alternatives 1A through 9 would not result in a significant adverse cumulative impact on increased risk from floods because none of the cumulative projects are in close proximity to each other and some of the cumulative projects would flood hazards.

Mitigation Measure SW-4 will reduce the severity of impacts created by BDCP-related activities by implementing activities such as designing the facilities, to be flood neutral.

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 Appendix A of this RDEIR/SDEIS.

5.2.2.3 Groundwater

This cumulative effects analysis considers the combined effects on groundwater as a result of the action alternatives and past, present, and reasonably foreseeable future projects. For this analysis, the projects considered are those listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and in Table 5.2.2.3-1. For a complete list of such projects, consult Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, in Appendix A of this RDEIR/SDEIS.

Table 5.2.2.3-1. Effects on Groundwater from Additional Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Status	Description of Program/Project	Effects on Groundwater
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Most of the actions do not have a direct effect on groundwater, except for the improved groundwater management action, which would have a beneficial effect on groundwater resources.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for direct and indirect effects on groundwater conditions adjacent to tidal habitat restoration sites.
California Department of Water Resources (in collaboration with State Water Resources Control Board)	Sustainable Groundwater Management Act (SGMA) Implementation	Signed into law September 2014	Defines rules and regulations that DWR needs to implement to help local agencies manage groundwater resources sustainably.	The SGMA requires the formation of locally controlled Groundwater Sustainability Agencies (GSAs), which must develop Groundwater Sustainability Plans (GSPs) in groundwater basins or subbasins that DWR designates as medium or high priority. This will have a beneficial effect on groundwater resources, as most areas will manage groundwater extractions to not exacerbate further groundwater level declines.
Bay Area Water Quality and Supply Reliability Program	San Francisco Bay Area Integrated Regional Water Management Plan	Final Released September 2013	The Bay Area Integrated Regional Management Plan (IRWMP) is an evolving plan that will be used to prioritize projects and provide information for projects to be funded by state and federal agencies, such as the Proposition 50 projects.	Program identifies local water supply projects to increase water supply reliability in the Bay Area, including for SWP and CVP water users. One of the identified goals is for better conjunctive use and groundwater management. This would have a beneficial effect on groundwater resources.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Groundwater
Placer County Water Agency	Sacramento River Water Reliability Study	Notice of Preparation in 2003. Project is on hold during recent recession. Reclamation was preparing a joint NEPA document; however, the NEPA process was halted in 2009	PCWA, Sacramento Suburban Water District, and the cities of Roseville and Sacramento, are investigating the viability of a joint water supply diversion from the Sacramento River, consistent with the Water Forum Agreement to meet planned future growth within the Placer-Sacramento region, maintain reliable water supply while reducing diversions of surface water from the American River in future dry years to preserve the river ecosystem, and enhance groundwater conjunctive management to help sustain the quality and availability of groundwater.	Outcomes of this study could help with improved groundwater and management in the region and reduced impacts on groundwater levels and quality.
Semitropic Water Storage District	Delta Wetlands Projects	Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	Project is inconsistent with Contra Costa County General Plan Policy for Agricultural Lands and Delta Protection Commission's Land Use Plan Principles for Agriculture and Recreation. Project will also result in conversion of existing agricultural land. Reservoir islands might affect shallow groundwater levels and agricultural drainage patterns.
U.S. Bureau of Reclamation	Shasta Lake Water Resources Investigation	Draft Environmental Impact Statement published in June 2013	The project is a multiple purpose plan to modify Shasta Dam and Reservoir to increase survival of anadromous fish populations in the upper Sacramento River; increase water supplies and water supply reliability; and, to the extent possible through meeting these objectives, include features to benefit other identified ecosystem, flood damage reduction, and related water resources needs which could result in additional storage capacity of 256,000 to 634,000 acre-feet.	Program identifies water supply plans to maintain and possibly increase water supply reliability for CVP water users, which would indirectly benefit groundwater resources by helping reduce the amount of groundwater that needs to be pumped for agricultural irrigation.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Groundwater
California Department of Water Resources and U.S. Bureau of Reclamation	North-of-the-Delta Offstream Storage Investigation	Preliminary Administrative Draft Environmental Impact Statement published in December 2013	The plan will provide offstream storage in the northern Sacramento Valley for improved water supply and water supply reliability, improved water quality, and enhanced survival of anadromous fish and other aquatic species. All alternatives include a new reservoir at the Sites location, with various facilities for water conveyance.	Program identifies water supply plans to maintain and possibly increase water supply reliability for CVP and non-CVP water users. This would help with decreasing the reliance on groundwater supply in dry years.
U.S. Bureau of Reclamation	Upper San Joaquin River Basin Storage Investigation	Draft Environmental Impact Statement published in August 2014	The Upper San Joaquin Storage would contribute to restoration of the San Joaquin River, improve water quality of the San Joaquin River, and facilitate additional conjunctive management and water exchanges that improve the quality of water deliveries to urban communities.	Program identifies water supply plans to maintain and possibly increase water supply reliability for CVP and non-CVP water users. This would help with decreasing the reliance on groundwater supply in dry years in the San Joaquin and Tulare Service Areas.
Western Municipal Water District and Reclamation	Riverside-Corona Feeder Conjunctive Use Project	Final Supplemental Environmental Impact Statement and Environmental Impact Report published in 2011	The project would allow WMWD to purchase water from SWP and store up to 40,000 acre-feet of water in the San Bernardino Basin Area and Chino Basin and to extract the water from the groundwater basins. The facilities would convey local water supplies and deliver treated imported water.	Program would maintain and possibly increase water supply reliability for SWP water users, especially in drier years. This program would allow for better conjunctive use and management.
Metropolitan Water District of Orange County	Seawater Desalination Project at Huntington Beach	Final CEQA documents published in 2010. Awaiting permits	Water treatment plant would provide up to 50 mgd of desalinated water.	Program would maintain and possibly increase water supply reliability for SWP water users. This would help with decreasing the reliance on groundwater supply.
San Diego County Water Authority and other water suppliers	Carlsbad Seawater Desalination Plant	Under construction.	Water treatment plant would provide up to 50 mgd of desalinated water.	Program would maintain and possibly increase water supply reliability for SWP water users. This would help with decreasing the reliance on groundwater supply.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Groundwater
San Diego County Water Authority	Emergency Storage Project	Under construction	The project will increase the amount of water stored locally. New water storage and pipeline connections will distribute water throughout the region if imported water supplies are reduced. The Emergency Storage Project is expected to meet the county's emergency water needs through 2030.	Program would maintain and possibly increase water supply reliability for SWP water users. This would help with decreasing the reliance on groundwater supply.
U.S. Bureau of Reclamation	San Luis Reservoir Expansion	Draft Appraisal Report published in December 2013	The plan is to increase the storage capacity of San Luis Reservoir (behind B.F. Sisk Dam) to improve the reliability of CVP and SWP water supplies dependent upon San Luis Reservoir. Seismic risks under the dam and in the Delta, regulatory constraints to operating Delta export facilities, algae blooms at low water levels, and future climate change have and will reduce the reliability of CVP/SWP deliveries dependent upon the San Luis Reservoir.	Program identifies water supply plans to maintain and possibly increase water supply reliability for CVP and SWP water users. This would help with decreasing the reliance on groundwater supply.
California Department of Water Resources	South Delta Temporary Barriers Project	Ongoing Program	The program was initiated in 1991, and includes four rock barriers across South Delta channels. The objectives of the project are to increase water levels, improve water circulation patterns and water quality in the southern Delta for local agricultural diversions, and improve operational flexibility of the SWP to help reduce fishery impacts and improve fishery conditions.	Program identifies water supply plans to maintain water supply reliability for CVP and SWP water users. This would help with decreasing the reliance on groundwater supply.
California Department of Water Resources	Implementation of Senate Bill X7 7	Legislation was adopted in 2009	This legislation requires the state to achieve a 20% reduction in urban per capita water use by December 31, 2020; require each urban retail water supplier to develop urban water use targets; agricultural water suppliers to implement efficient water management practices; and DWR in consultation with other state agencies, to develop a single standardized water use reporting form.	The legislation would reduce water demands for existing water users; and reduce projected demands for future growth.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Groundwater
State Water Resources Control Board	Bay-Delta Water Quality Control Plan Update	Ongoing development.	The State Water Board is updating the 2006 Bay-Delta Water Quality Control Plan (WQCP) in four phases: Phase I: Modifying water quality objectives (i.e., establishing minimum flows) on the Lower San Joaquin River and Stanislaus, Tuolumne, and Merced Rivers to protect the beneficial use of fish and wildlife and (2) modifying the water quality objectives in the southern Delta to protect the beneficial use of agriculture; Phase II: Evaluating and potentially amending existing water quality objectives that protect beneficial uses and the program of implementation to achieve those objectives. Water quality objectives that could be amended include Delta outflow criteria; Phase III: Requires changes to water rights and other measures to implement changes to the WQCP from Phases I and II; Phase IV: Evaluating and potentially establishing water quality criteria and flow objectives that protect beneficial uses on tributaries to the Sacramento River.	Water supplies of water rights users and SWP and CVP water users could be affected if increased instream flow and/or Delta outflow objectives are established in the regulatory process to protect beneficial uses. This could result in increased groundwater pumping and decreased groundwater levels in some areas.

Delta Region

Impact GW-1: Cumulative Depletion of Groundwater Supplies or Interference with Groundwater Recharge, Alteration of Local Groundwater Levels, or Reduction in the Production Capacity of Preexisting Nearby Wells, as a Result of Construction and Operation of the Proposed Conveyance Facilities

NEPA Effects: Construction dewatering activities associated with each action alternative would result in temporary altered groundwater levels and associated potential decreases in well yields. The sustainable yield of some wells might temporarily be affected by the lower water levels such that they are not able to support the existing land uses. Alternatives 1B, 1C, 2B, 2C, 6B, and 6C, which include canals as conveyance options, have a larger construction impact footprint. In addition, the alternatives that include canal options might trigger groundwater discharge into some canal sections (mostly the unlined option), and locally lower groundwater levels by approximately up to 10 feet, which could reduce the sustainable yield of shallow wells and affect associated land uses.

Other projects that would potentially affect groundwater levels and well yields through construction dewatering have been or are being completed. Implementing these projects in combination with any of Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A would result in cumulative adverse effects. Mitigation Measure GW-1 would be available to reduce those effects created by action alternatives.

***CEQA Conclusion*:** Construction dewatering activities associated with each action alternative would result in temporary decreases in groundwater levels and associated well yields. Ongoing operations associated with the canal alignments would result in long-term discharge of groundwater to some canal sections. Other projects that would potentially affect groundwater levels and well yields through construction dewatering have been or are being completed. Implementing these projects in combination with any of Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A would result in significant cumulative impacts because the number of wells in the region affected by construction dewatering from cumulative projects would increase. The action alternatives contribution to this cumulative impact is cumulatively considerable because of the scale of the conveyance facility construction. Mitigation Measure GW-1 provides a monitoring procedure and options for maintaining an adequate water supply for land owners that experience a reduction in groundwater production from wells within 2,600 feet of construction-related dewatering activities. Implementing Mitigation Measure GW-1 would help address these effects; however, the impact may remain significant because replacement water supplies may not meet the preexisting demands or planned land use demands of the affected party. In some cases the BDCP-related impact might temporarily be cumulatively considerable and unavoidable until groundwater elevations recover to preconstruction conditions, which could require several months after dewatering operations cease.

Mitigation Measure GW-1: Maintain Water Supplies in Areas Affected by Construction Dewatering

Please see Mitigation Measure GW-1 under Impact GW-1 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Impact GW-2: Cumulative Degradation of Groundwater Quality as a Result of Construction and Operation of the Proposed Conveyance Facilities

NEPA Effects: Construction and ongoing operations associated with each action alternative would not substantially alter regional groundwater flow patterns and therefore would not change the quality of groundwater in the locally affected areas. Other projects that would potentially alter groundwater quality are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and Table 5.2.2.3-1 The North Delta Flood Control and Ecosystem Restoration Project would have a less than significant effect on groundwater quality. None of these projects are anticipated to alter groundwater flow and quality. Implementing these projects in combination with Alternatives 1A though 9 and Alternatives 4A, 2D, and 5A would not result in cumulative adverse effects because cumulative projects are not expected to combine to exacerbate localized groundwater quality conditions.

***CEQA Conclusion*:** Construction and ongoing operations associated with each action alternative would not substantially alter regional groundwater flow patterns and therefore would not change the quality of groundwater in the locally affected areas. None of the projects listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and Table 5.2.2.3-1would affect groundwater flow and quality. Therefore, implementing these projects in combination with Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A would not result in a significant cumulative impact because cumulative projects are not expected to combine to exacerbate localized groundwater quality conditions.

Impact GW-3: Cumulative Interference with Agricultural Drainage in the Delta, as a Result of Construction and Operation of the Proposed Conveyance Facilities

NEPA Effects: Construction dewatering activities associated with the action alternatives might temporarily and locally alter flow patterns near the dewatering centers; however, they are not anticipated to cause any significant effects on agricultural drainage. Ongoing operations of the action alternatives would alter groundwater flow patterns and groundwater levels in the vicinity of some canal segments. Operation of forebays is not expected to result in changes in groundwater flow patterns on adjacent lands, due to the DSD design provisions, which would minimize seepage under the embankments and onto adjacent properties. However, groundwater recharge from surface water could result in local groundwater level increases. If agricultural drainage systems adjacent to these forebays are not adequate to accommodate the additional drainage requirements, operation of the forebays could interfere with agricultural drainage in the Delta.

The Intermediate and Byron Tract Forebays, as well as the expanded Clifton Court Forebay under Alternatives 4, 4A, 2D, and 5A would be constructed to comply with the requirements of the DSD which includes design provisions to minimize seepage. These design provisions would minimize seepage under the embankments and onto adjacent properties. Once constructed and placed in operation, the operation of the forebays would be monitored to ensure seepage does not exceed performance requirements. In the event seepage were to exceed these performance requirements, the project proponents would modify the embankments or construct seepage collection systems that would ensure any seepage from the forebays would be collected and conveyed back to the forebay or other suitable disposal site. Constructing the forebays to DSD standards, monitoring for seepage, and making modifications to the forebays or constructing measures to attenuate seepage if it were to occur will ensure that existing agricultural drainage systems would not be adversely affected.

For Alternatives 1B, 1C, 2B, 2C, 6B, and 6C, however, some canal segments might lose water to the shallow aquifer, especially for the unlined canal option. The increase in groundwater levels might affect agricultural drainage in those areas, if current agricultural drainage systems are not adequate to accommodate the additional drainage requirements in the vicinity of these conveyance features. For other cases, in which the canal segments are gaining water from the surrounding aquifer, agricultural drainage might be improved.

Other projects that would potentially alter groundwater levels and agricultural drainage are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and in Table 5.2.2.3-1. The North Delta Flood Control and Ecosystem Restoration Project and the Dutch Slough Tidal Marsh Restoration Project as well as other California EcoRestore projects have a potential for groundwater seepage onto adjacent islands or tracts of the Delta, which could impair local agricultural drainage. In addition, the Delta Wetlands Project includes the conversion of two Delta islands into reservoir islands that would store water for future supplies. This additional water storage might affect shallow groundwater levels and agricultural drainage patterns and present a potential for groundwater seepage onto adjacent islands or tracts of the Delta. However, the EIRs associated with these projects report a less-than-significant impact after mitigation. Implementing these projects in combination with any of Alternatives 1B, 1C, 2B, 2C, 6B, or 6C would result in cumulative adverse effects. Mitigation Measure GW-5 would be available to reduce those effects created by the action alternatives.

***CEQA Conclusion*:** Construction dewatering activities associated with each project alternative would not substantially affect agricultural drainage. However, ongoing operations associated with BDCP Alternatives 1B, 1C, 2B, 2C, 6B, or 6C would discharge water to the aquifer from some canal segments for the unlined canal options. Other projects that would potentially alter groundwater levels and agricultural drainage are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and in Table 5.2.2.3-1. None of these projects would have a significant effect on agricultural drainage after mitigation. Implementing these projects in combination with any of Alternatives 1B, 1C, 2B, 2C, 6B, or 6C would result in a significant cumulative impact on agricultural drainage due to the potential water seepage from some canal segments. These impacts would be due to the implementation of Alternatives 1B, 1C, 2B, 2C, 6B, or 6C. Mitigation Measure GW-5 would reduce the severity of impacts created by project-related activities in most instances. Occasionally, however, mitigation may be determined infeasible and the impact would be considered unavoidable.

Mitigation Measure GW-5: Agricultural Lands Seepage Minimization

Please see Mitigation Measure GW-5 under Impact GW-5 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Impact GW-4: Cumulative Depletion of Groundwater Supplies or Interference with Groundwater Recharge, Alteration of Local Groundwater Levels, Reduction in the Production Capacity of Preexisting Nearby Wells, or Interference with Agricultural Drainage as a Result of Implementing CM2–CM21 or Environmental Commitments 3, 4, 6–12, 15, and 16

NEPA Effects: Increased frequency of inundation of areas associated with the proposed tidal habitat, channel margin habitat, and seasonally inundated floodplain restoration actions would result in groundwater recharge which could in turn affect agricultural drainage in areas of shallow groundwater levels. Other projects that would potentially alter groundwater levels and agricultural drainage are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and in Table 5.2.2.3-

1. These cumulative restoration projects combined with the action alternatives could create adverse effects on groundwater resources in the Delta.

For Alternatives 4A, 2D, and 5A, the only environmental commitments identified with potential impacts on groundwater resources are environmental commitments 4 and 10, due to the locations and types of implementation measures described for these commitments. Combined with other cumulative projects, these action alternatives would result in adverse effects on groundwater resources because combined restoration actions could affect ground water levels adjacent to project sites. Mitigation Measures GW-1 and GW-5 would be available to reduce those effects created by project-related activities.

***CEQA Conclusion*:** Increased frequency of inundation of areas associated with the proposed restoration actions for CM2–CM21 or Environmental Commitments 3, 4, 6–12, 15, and 16 would result in groundwater recharge which could affect agricultural drainage in areas of shallow groundwater levels. Other projects that would potentially alter groundwater levels and agricultural drainage are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and in Table 5.2.2.3-1. Implementing these projects in combination with any of Alternatives 1A though 9 and Alternatives 4A, 2D, and 5A would result in a significant cumulative impact and the incremental contribution to this impact of any of the action alternatives would be cumulatively considerable. Mitigation Measures GW-1 and GW-5 would be available to reduce the severity of impacts created by the action alternatives.

Mitigation Measure GW-1: Maintain Water Supplies in Areas Affected by Construction Dewatering

Please see Mitigation Measure GW-1 under Impact GW-1 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure GW-5: Agricultural Lands Seepage Minimization

Please see Mitigation Measure GW-5 under Impact GW-5 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Impact GW-5: Cumulative Degradation of Groundwater Quality as a Result of Implementing CM2–CM21 or Environmental Commitments 3, 4, 6–12, 15, and 16

NEPA Effects: Increased inundation frequency in restoration areas would increase the localized areas exposed to saline and brackish surface water, which could result in increased groundwater salinity beneath such areas. Other projects that would potentially affect groundwater quality are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and in Table 5.2.2.3-1. Implementing these projects in combination with any of Alternatives 1A though 9 and Alternatives 4A, 2D, and 5A would result in cumulative adverse effects on groundwater quality due to the implementation of the alternatives because groundwater quality adjacent to cumulative restoration actions could be affected.

For Alternatives 4A, 2D, and 5A, the only environmental commitments identified with potential impacts on groundwater resources are environmental commitments 4 and 10, due to the locations and types of implementation measures. Combined with other cumulative restoration projects these environmental commitments could have a cumulative adverse effect on groundwater quality at locations adjacent to the restoration sites.

Mitigation Measure GW-7 would be available to reduce those effects created by the action alternatives.

***CEQA Conclusion*:** Increased inundation frequency in restoration areas would increase the localized areas exposed to saline and brackish surface water, which could result in increased groundwater salinity beneath such areas. Other projects that would potentially alter groundwater levels and agricultural drainage are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and Table 5.2.2.3-1. Implementing these projects in combination with any of Alternatives 1A though 9 and Alternatives 4A, 2D, and 5A would result in a significant cumulative impact because groundwater quality adjacent to cumulative restoration actions could be affected.

Mitigation Measure GW-7 would be available to reduce the severity of impacts created by project-related activities.

Mitigation Measure GW-7: Provide an Alternate Source of Water

Please see Mitigation Measure GW-7 under Impact GW-7 in the discussion of Alternative 1A in Chapter 7, *Groundwater*, of the Draft EIR/EIS.

SWP/CVP Export Service Areas

Impact GW-6: Cumulative Depletion of Groundwater Supplies or Interference with Groundwater Recharge, Alteration of Local Groundwater Levels, or Reduction in the Production Capacity of Preexisting Nearby Wells, as a Result of Operation of the Proposed Conveyance Facilities

NEPA Effects: Ongoing operations associated with each action alternative could have effects on groundwater levels in the Export Service Areas. Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4, 4A, 5, and 5A could increase surface water deliveries to some of the service areas compared to the No Action Alternative, which could decrease groundwater pumping. The resulting increase in groundwater levels would be a beneficial effect.

Alternatives 4, 6A, 6B, 6C, 7, 8, and 9 could decrease surface water deliveries to some of the export service areas in most years compared to the No Action Alternative, which could result in an increase in groundwater pumping as an alternative water supply source. This increase in groundwater pumping would cause a decrease in groundwater levels and associated well yields, such that existing and future land uses for which permits have been granted might be affected. Other projects that would potentially affect groundwater levels are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and Table 5.2.2.3-1. The San Joaquin River Restoration Program would result in a decrease in surface water deliveries to Friant Division long-term contractors which would result in an increase in groundwater pumping and subsequent decrease in groundwater levels. This program could result in potentially significant and unavoidable effects on groundwater levels (Bureau of Reclamation 2011: 12-121). In addition, the implementation of the Bay-Delta Water Quality Control Plan Update might affect water supplies of water rights users and SWP and CVP water users if increased instream flow and/or Delta outflow objectives are established in the regulatory process to protect beneficial uses. This could result in increased groundwater pumping and decreased groundwater levels in some areas.

Implementing these projects in combination with any of the action alternatives could result in cumulative adverse effects on groundwater levels and associated well yields.

However, opportunities for additional pumping might be limited by basin adjudications and other groundwater management programs. Additionally, as discussed in Appendix 5B, *Responses to Reduced South of Delta Water Supplies* (Draft EIR/EIS), adverse effects might be avoided due to the existence of various other water management options that could be undertaken in response to reduced exports from the Delta. These options include wastewater recycling and reuse, increased water conservation, water transfers, construction of new local reservoirs that could retain Southern California rainfall during wet years, and desalination. Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and Table 5.2.2.3-1, lists some projects that could enhance local water supply reliability and thus reduce reliance on groundwater pumping and help manage the groundwater basins more sustainably. Other projects, such as projects that could be implemented under the CWAP would also provide beneficial effects on groundwater levels, storage, and conjunctive use. The implementation of the SGMA in high and medium groundwater basins would further reduce the impacts on groundwater levels, storage and groundwater supply by implementing sustainable groundwater management plans and actions at the local level.

As part of the SGMA and CWAP actions and implementation, there will be several measures available to SWP and CVP contractors, even with reduced surface water supply reliability. First, State Water Contractors currently and traditionally have received variable water supplies under their contracts with DWR due to variations in hydrology and regulatory constraints and are accustomed to responding accordingly. Any reductions associated with this impact would be subject to these contractual limitations. Under standard state water contracts, the risk of shortfalls in exports is borne by the contractors rather than DWR. As a result of this variability, many Southern California water districts have complex water management strategies that include numerous options, as described above, to supplement SWP surface water supplies. These water districts are in the best position to determine the appropriate response to reduced imports from the Delta. Second, as noted above, it may be legally impossible to extract additional groundwater in adjudicated basins without gaining the permission of watermasters and accounting for groundwater pumping entitlements and various parties under their adjudicated rights.

CEQA Conclusion: Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, and 5A, could increase surface water deliveries to the service areas compared to Existing Conditions, which could decrease groundwater pumping. The resulting increase in groundwater levels would be a beneficial effect. Alternatives 2A, 2B, 2C, 4, 4A, 5, 5A, 6A, 6B, 6C, 7, 8, and 9 could decrease surface water deliveries to some of the export areas (notably in the San Joaquin and Tulare areas) in most years compared to Existing Conditions, which would result in an increase in groundwater pumping. This increase in groundwater pumping could cause a decrease in groundwater levels and associated well yields, such that existing and future land uses for which permits have been granted might be affected. Other projects that would potentially affect groundwater levels are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS and Table 5.2.2.3-1. Implementing these projects in combination with any of the action alternatives that would reduce surface water flows to export areas would result in a significant cumulative impact and the incremental contribution to this impact of these alternatives would be cumulatively considerable. However, opportunities for additional pumping might be limited by basin adjudications and other groundwater management programs, and adverse effects might be avoided due to the existence of various other water management options that could be undertaken in response to reduced exports from the Delta. In particular, certain projects listed in Table 7-8 in the Draft EIR/EIS could enhance local water supply reliability and thus reduce reliance on groundwater pumping and help manage the groundwater basins more sustainably. Further, the implementation of the SGMA in high and medium groundwater basins would further reduce the impacts on groundwater

levels, storage and groundwater supply by implementing sustainable groundwater management plans and actions at the local level.

Impact GW-7: Cumulative Degradation of Groundwater Quality as a Result of Operation of the Proposed Conveyance Facilities

NEPA Effects: Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4, 4A, 5, and 5A would not result in a degradation of groundwater quality compared to the No Action Alternative. On the other hand, Alternatives 4, 6A, 6B, 6C, 7, 8, and 9 could induce additional groundwater pumping compared to the No Action Alternative and thus create the potential for a migration of poor-quality groundwater into areas of good quality groundwater, degrading local groundwater supplies. Other projects that would potentially affect groundwater levels are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS. The San Joaquin River Restoration Program would result in a decrease in surface water deliveries to Friant Division long-term contractors which would result in an increase in groundwater pumping and a potential for upwelling of poorer quality groundwater. This program could result in potentially significant and unavoidable effects on groundwater quality (Bureau of Reclamation 2011: 12-122). Implementing these cumulative projects in combination with any of the action alternatives that would decrease surface water exports could result in cumulative adverse effects on groundwater quality. However, without the implementation of actions described in the CWAP and the SGMA, there is no feasible mitigation available to mitigate any changes in regional groundwater quality.

CEQA Conclusion: Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, and 5A, would increase surface water deliveries to the service areas compared to Existing Conditions, which would decrease groundwater pumping. The resulting increase in groundwater levels would be a beneficial effect. Alternatives 2A, 2B, 2C, 4, 4A, 5, 5A, 6A, 6B, 6C, 7, 8, and 9 could decrease surface water deliveries to the export areas in most years compared to Existing Conditions, which would result in an increase in groundwater pumping. This increase in groundwater pumping could create the potential for a migration of poor-quality groundwater into areas of good quality groundwater, degrading local groundwater supplies. Other projects that would potentially affect groundwater levels are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS. Implementing these projects in combination with action alternatives that would decrease surface water exports could result in a significant cumulative impact and the incremental contribution to this impact of these alternatives would be cumulatively considerable. However, without the implementation of actions described in the CWAP and the SGMA, there is no feasible mitigation available to mitigate any changes in regional groundwater quality.

Impact GW-8: Cumulatively Result in Groundwater Level-Induced Land Subsidence

NEPA Effects: None of the action alternatives would result in groundwater level-induced land subsidence. Other projects that would potentially affect groundwater level-induced land subsidence are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS. None of these projects report a potential for inducing groundwater level-induced land subsidence as a significant effect. Implementing these projects in combination with any of Alternatives 1A through 9 and Alternatives 4A, 2D, and 5A would not result in cumulative adverse effects on groundwater level-induced land subsidence.

CEQA Conclusion: None of the action alternatives would result in groundwater level-induced land subsidence. Other projects that would potentially affect groundwater level-induced land subsidence

are listed in Table 7-8 in Chapter 7, *Groundwater*, of the Draft EIR/EIS. None of these projects report a potential for inducing groundwater level-induced land subsidence as a significant effect. Implementing these projects in combination with any of Alternatives 1A through 9 and Alternatives 4A, 2D, and 5Awould not result in cumulative significant effects on groundwater level-induced land subsidence because ground water levels would not be substantially affected at cumulative project locations.

5.2.2.4 Water Quality

This cumulative water quality assessment updates the cumulative assessment presented Chapter 8, *Water Quality* (in Appendix A of the RDEIR/SDEIS), to identify new projects or projects that have changed in status relative to that assessment. In addition, this section describes the cumulative effects from implementing cumulative projects with Alternatives 4A, 2D, and 5A.

Consideration of Additional/Changed Projects

Table 5.2.2.4-1, below, lists two projects that have changed in status relative to their status identified in Chapter 8, *Water Quality*, Table 8-73 (in Appendix A of the RDEIR/SDEIS): the SRWTP Facility Upgrade Project (also called the EchoWater Project) and the Dutch Slough Tidal Marsh Restoration Project. Final Environmental Impact Reports have been published for these projects. The change in status of these projects does not affect the cumulative assessment presented in Chapter 8, *Water Quality* (in Appendix A of the RDEIR/SDEIS), because these projects were considered in that cumulative assessment. Two additional plans are listed that were not included in the previous cumulative assessment—the California Water Action Plan and the California EcoRestore

Table 5.2.2.4-1. Effects on Water Quality from Additional Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Status	Description of Program/Project	Effects on Water Quality
Sacramento Regional County Sanitation District	SRWTP Facility Upgrade Project (EchoWater Project)	Final Environmental Impact Report certified September 2014 (previous status: Proposed)	Upgrade existing secondary treatment facilities to advanced unit processes including improved nitrification/denitrification and filtration.	Reduced discharge concentration and mass of many constituents in wastewater to Sacramento River.
California Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	Final Environmental Impact Report, September 2014 (previous status: Future)	Seasonal wetland and tidal marsh restoration actions in western Delta.	Changes in tidal prism and salinity patterns; potential incremental increase methylmercury formation and contribution to Delta load.
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Actions implemented may affect seasonal and long-term Delta water quality conditions.
Department of Water Resources	North Bay Aqueduct Alternative Intake	Notice of Preparation issued on December 2, 2009. CEQA documentation under preparation.	Plan to construct and operate an alternative intake on the Sacramento River, generally upstream of the Sacramento Regional Wastewater Treatment Plant, and connect it to the existing North Bay Aqueduct system by a new pipeline. The proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct intake at Barker Slough.	

Agency	Program/ Project	Status	Description of Program/Project	Effects on Water Quality
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for effects on water quality at various Delta locations related to changes in hydrodynamics near restoration actions.

A number of the actions identified in the California Water Action Plan would directly or indirectly affect the cumulative water quality condition. Implementation of water conservation and water reuse projects would change the amount of discharges from agricultural lands and municipal wastewater facilities, and implementation of stormwater infiltration projects would reduce discharges into storm sewer systems and associated receiving waters. The State Water Board continuing its update of the Bay-Delta Water Quality Control Plan (WQCP) will provide a regulatory framework for protecting beneficial uses affected by water quality. Actions that involve flow restoration and water supply reliability could potentially affect Delta water quality to the degree source water proportions would change. With the addition of the California Water Action Plan as part of the cumulative condition, the cumulative water quality assessment described for the project alternatives in Chapter 8, *Water Quality* (in Appendix A of the RDEIR/SDEIS), is still applicable.

As discussed in Chapter 8, *Water Quality* (in Appendix A of the RDEIR/SDEIS), the cumulative water quality condition for constituents that could be discharged as a result of project construction (e.g., TSS/turbidity) and petroleum contaminants is not expected to be adverse. Further, construction-related effects on water quality are temporary in nature and tend not to be cumulative over time. The California Water Action Plan does not specify any actions that would make the cumulative water quality condition for construction-related contaminants adverse.

Similarly, conclusions regarding the cumulative water quality effects from operations and maintenance of water conveyance facilities (CM1) and implementation of CM2–CM21 are still applicable when the California Water Action Plan is considered as part of the cumulative condition. The Chapter 8, *Water Quality* assessment (in Appendix A of the RDEIR/SDEIS) concluded that the cumulative condition for following constituents would not be adverse: ammonia, boron, dissolved oxygen, nitrate+nitrite, pathogens, phosphorus, trace metals, and turbidity/TSS. Actions identified by the California Water Action Plan and California Eco Restore would not contribute to making the cumulative condition adverse for these constituents. Rather, water efficiency and reuse actions identified in these plans would contribute to lessening the discharge of these constituents into Delta waters and tributary upstream waters. Further, the cumulative assessment in Chapter 8, *Water Quality* (in Appendix A of the RDEIR/SDEIS), concluded that the cumulative condition would be adverse, or have reasonable potential to be adverse, for the following constituents: bromide, chloride, electrical conductivity, mercury, organic carbon, pesticides and herbicides, and selenium. The California Water Action Plan actions and California EcoRestore would not eliminate the potential for the cumulative conditions for these constituents to be adverse.

Alternatives 4A, 2D, and 5A Cumulative Assessment

The cumulative assessment for Alternatives 4A, 2D, and 5A follows the same format as, and tiers from, the assessment presented in Chapter 8, Section 8.3.3.17, in Appendix A of the RDEIR/SDEIS for Alternatives 1A–9. This is because the past, present, and foreseeable actions identified for that cumulative assessment are relevant for this assessment. While the scope of proposed actions, habitat restoration actions in particular, under Alternatives 4A, 2D, and 5A is considerably less than would occur under Alternatives 1A–9, a portion of the habitat restoration actions in the Delta are still assumed to occur as a part of separate actions (i.e., California Water Action Plan/California EcoRestore) and, thus, part of the cumulative condition.

The potential for cumulative impacts on water quality with construction and implementation of Alternatives 4A, 2D, and 5A is assessed for: 1) construction-related activities; 2) water conveyance facilities operations and maintenance and implementation of environmental commitments. Assessment of operations and maintenance and implementation of environmental commitments is addressed separately for Upstream of Delta region, and the Delta Region and SWP/CVP Export Service Areas.

Cumulative Impact WQ-1: Cumulative Impacts on Water Quality Resulting from Construction-Related Activities

The construction of new water conveyance facilities under Alternatives 4A, 2D, and 5A, and construction associated with implementing the environmental commitments for these alternatives, particularly Environmental Commitments 3, 4, 6, 7, 9, and 10, has the potential to result in elevated turbidity/TSS in surface water adjacent to construction activities due to disturbed soils eroding and entering waterways. There also is potential for other construction-related wastes (e.g., concrete, asphalt, cleaning agents, paint, and trash) to enter adjacent waterways if not properly controlled and disposed of. In addition, the use of heavy earthmoving equipment adjacent to surface waters may result in spills and leakage of oils, gasoline, diesel fuel, and related petroleum contaminants used in the fueling and operation of such construction equipment. The extensive construction activities that would be necessary to implement the water conveyance facilities and environmental commitments would involve a variety of land disturbances, including vegetation removal; grading and excavation of soils; establishment of roads-bridges, staging, and storage areas; in-water sediment dredging and dredge material storage; and hauling and placement or disposal of excavated soils and dredge materials. Construction activities, if conducted improperly, could adversely affect water quality of the Delta or surface waters upstream.

As stated in Section 4.3.4 (Water Quality Impacts of Alternative 4A), Section 4.4.4 (Water Quality Impacts of Alternative 2D), and Section 4.5.4 (Water Quality Impacts of Alternative 5A), adverse water quality effects will be avoided or reduced to less-than-significant levels by implementing construction-related Environmental Commitments (Appendix 3B, *Environmental Commitments*, in Appendix A of the RDEIR/SDEIS) and obtaining and abiding by agency-issued permits needed for construction activities (e.g., State Water Board NPDES Stormwater General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities [Order No. 2009-0009-DWQ/NPDES Permit No. CAS000002], possibly project-specific waste discharge requirements [WDRs], CWA Section 401 water quality certification from the Central Valley Water Board, CDFW Streambed Alteration Agreements, and USACE CWA Section 404 dredge and fill permits). Moreover, the cumulative condition for turbidity/TSS and petroleum contaminants in the Delta and upstream surface waters are not expected to be adverse. This is due, in large part, to the implementation (or

planned implementation) of construction-related Environmental Commitments (Appendix 3B in Appendix A of the RDEIR/SDEIS) and agency permitted construction best management practices (BMPs) for construction of not only the project alternatives, but also other past, present, and reasonably foreseeable future projects. Because construction-related effects on all water quality constituents/parameters would be minimized through Environmental Commitments and permitted construction BMPs in the agency-issued permits discussed above, construction activities associated with the project alternatives would not contribute considerably to any adverse cumulative water quality condition, nor would construction-related effects make an otherwise non-adverse cumulative water quality condition adverse in the Delta or upstream surface waters.

Because construction-related activities are not expected to contribute considerably to any adverse cumulative water quality condition, including conditions at the Banks and Jones pumping plants in the Delta, which are the primary locations of water export to the SWP/CVP Export Service Areas, the construction of these alternatives would not contribute considerably to any adverse cumulative water quality condition in water bodies located in the SWP/CVP Export Service Areas.

***NEPA Effects*:** Construction of water conveyance facilities and environmental commitments for Alternatives 4A, 2D, and 5A could potentially result in elevated turbidity/TSS levels and petroleum contaminants in the Delta waters in the vicinity of the construction activity. However, the cumulative condition for turbidity/TSS and petroleum contaminants in surface waters upstream of the Delta and in the Delta would not be adverse for several reasons. First, there are currently no adverse conditions for turbidity/TSS levels and petroleum contaminants upstream of the Delta or in the Delta. Second, implementation of construction-related Environmental Commitments for Alternatives 4A, 2D, and 5A (Appendix 3B in Appendix A of the RDEIR/SDEIS), and use of related construction BMPs for other projects would reduce effects on these and other water quality constituents/parameters. Third, because construction-related effects on water quality are temporary in nature, they tend not to be cumulative over time (i.e., construction effects on water quality are not permanent). Therefore, effects of construction of Alternatives 4A, 2D, and 5A are considered to be not adverse.

CEQA Conclusion. The temporary construction-related effects on water quality resulting from constructing Alternatives 4A, 2D, and 5A, including the associated environmental commitments, would not contribute considerably to any significant adverse cumulative water quality condition in the Delta or surface waters upstream, nor would construction-related effects make an otherwise non-adverse cumulative water quality condition for any constituent/parameter potentially significant. Because construction-related activities are not expected to contribute considerably to any adverse cumulative water quality condition in the Delta, they also would not contribute considerably to any adverse cumulative water quality condition in water bodies located in the SWP/CVP Export Service Areas. Based on these findings, this impact is considered to be less than significant. No mitigation is required.

Cumulative Impact WQ-2: Cumulative Impacts on Water Quality Upstream of the Delta Resulting from Facilities Operations and Maintenance and Implementation of Environmental Commitments

Constituent loading from upstream watersheds and resultant concentrations/levels in the water bodies upstream of the Delta would remain unchanged, or would be negligibly affected, by implementation of facilities operations and maintenance under Alternatives 4A, 2D, and 5A. Changes in seasonal reservoir storage levels and river flows from altered system-wide operations under

these alternatives would have negligible, if any, effects on water quality in the rivers and reservoirs upstream of the Delta. Consequently, facilities operations and maintenance under Alternatives 4A, 2D, and 5A would not be expected to contribute considerably to any cumulative water quality condition within the affected environment, upstream of the Delta. No environmental commitments would be implemented upstream of the Delta, thus, these would have no effect on upstream of Delta surface water quality.

***NEPA Effects*:** Implementation of Alternatives 4A, 2D, and 5A facilities operations and maintenance and associated environmental commitments would have negligible, if any, water quality effects on water bodies of the affected environment located upstream of the Delta. Any negligible effects that may occur would not contribute considerably to any adverse cumulative water quality condition in water bodies upstream of the Delta, nor would effects of these alternatives make an otherwise non-adverse cumulative water quality condition for any constituent/parameter adverse.

CEQA Conclusion. Because the potential effects of facilities operations and maintenance and associated environmental commitments on water quality upstream of the Delta would be minimal, implementation of Alternatives 4A, 2D, and 5A in combination with other cumulative projects would result in a less-than significant cumulative impact. No mitigation is required.

Impact WQ-3: Cumulative Impacts on Water Quality in the Delta and SWP/CVP Export Service Areas Resulting from Facilities Operations and Maintenance and Implementation of Environmental Commitments

The cumulative water quality assessment provided in Chapter 8, *Water Quality* (in Appendix A of the RDEIR/SDEIS) identified the cumulative conditions for the following constituents to be adverse, or have reasonable potential to be adverse, in the Delta: bromide, chloride, electrical conductivity (EC), mercury, organic carbon, pesticides and herbicides, and selenium. The cumulative assessment for Alternatives 4A, 2D, and 5A addresses these constituents only, because the implementation of these alternatives would not introduce any new adverse constituent conditions.

Bromide

The cumulative condition in the Delta under Alternative 4 was considered adverse because of the marked increases in bromide concentrations anticipated to occur as a result of the alternative in the northwest Delta, including at the North Bay Aqueduct intake at Barker Slough. The primary driver of the adverse cumulative condition was the assumed amount and location of tidal habitat restoration to be implemented as part of the alternative. The amount of tidal habitat restoration assumed for Alternatives 4A, 2D, and 5A is substantially less than assumed for Alternative 4, such that it is not expected to significantly affect Delta hydrodynamics and source water fractions. However, a substantial amount of tidal habitat restoration is still anticipated to occur in the future as part of separate actions (e.g., the California Water Action Plan/EcoRestore), which could result in a greater portion of higher-bromide concentration water in the restored areas, thus contributing to elevated long-term average and drought period bromide concentrations in those areas. Thus, the cumulative condition for bromide is still considered adverse. However, construction and implementation of the North Bay Aqueduct Alternative Intake Project (NBAAIP) would provide water from the Sacramento River that is very low in bromide to the existing service area of the North Bay Aqueduct, reducing the potential effects of bromide on water treatment facilities and end-users of water. Furthermore, modeling results (see Tables Br-1 and Br-2 in Appendix B of the RDEIR/SDEIS) show that long-term average bromide with implementation of Alternatives 4A, 2D, and 5A water conveyance facilities,

and some assumed habitat restoration, would be similar to or decrease relative to Existing Conditions. Thus, Alternatives 4A, 2D, and 5A would not contribute substantially to the adverse cumulative condition in the Delta for bromide.

Increased bromide concentrations would not be anticipated to occur in the SWP/CVP Export Service Areas south of the Delta due to greater source fraction of Sacramento River water on an annual average basis at the south Delta pumps under all action alternatives. Therefore, the cumulative condition for bromide in the SWP/CVP Export Service Areas with implementation of these alternatives is not expected to be adverse.

Chloride

The cumulative condition for chloride is considered adverse in the Delta, mainly because of periodic instances of elevated chloride concentrations in the western Delta associated with sea water intrusion. Implementation of facilities operations and maintenance under these action alternatives would not be expected to contribute substantially to this adverse cumulative condition for chloride. Additionally, unlike Alternative 4, implementation of tidal habitat restoration would not be expected to contribute to increased chloride concentrations, because the areal extent of the new restoration area would be a relatively small portion of the existing and planned Delta tidal habitat areas and, thus, not expected to measurably affect the Delta hydrodynamics. As such, implementation of environmental commitments associated with these alternatives would not contribute substantially to this adverse cumulative condition.

The cumulative condition for chloride would also not be adverse in the SWP/CVP Export Service Areas due to greater source fraction of Sacramento River water on an annual average basis at the south Delta pumps under Alternatives 4A, 2D, and 5A.

Electrical Conductivity

The cumulative condition for EC is considered to be adverse in the Delta due primarily to periodically high levels of EC in the western Delta associated with sea water intrusion, and also in the south Delta. Implementation of facilities operations and maintenance under these action alternatives, along with Mitigation Measure WQ-11, would not be expected to contribute substantially to this adverse cumulative condition for EC, because no additional exceedance of Bay-Delta WQCP EC objectives would be expected, and substantial long-term degradation with respect to EC would be avoided. Additionally, unlike Alternative 4, implementation of tidal habitat restoration would not be expected contribute to increased EC levels, because the areal extent of the new restoration area would be a relatively small portion of the existing and planned Delta tidal habitat areas and, thus, not expected to measurably affect the Delta hydrodynamics. As such, implementation of environmental commitments is not expected to contribute to this adverse cumulative condition.

EC levels at the south Delta export pumps would improve under these alternatives and, thus, the cumulative EC condition at the export pumps would not be adverse. As such, cumulative EC levels in the SWP/CVP Export Service Areas would not be adverse.

Mercury

Mercury levels in Delta waters are considered to be adverse in the cumulative condition, because the current pool of mercury deposited in the Delta sediments cannot be expected to be readily or rapidly reduced, despite efforts to reduce future loads in Delta tributaries. Facilities operations and

maintenance of Alternatives 4A, 2D, and 5A would not be expected to substantially alter the cumulative condition for mercury and the mercury impairment in the Delta or contribute considerably to the cumulative mercury condition in the SWP/CVP Export Service Areas. Mercury and methylmercury concentrations in water are not expected to change substantially under Alternatives 4A, 2D, and 5A. Fish tissue concentrations showed increases at some locations, but because the increases would be relatively small, and it is not evident that substantive increases are expected at numerous locations throughout the Delta, the changes were considered to be within the uncertainty inherent in the modeling approach, and would likely not be measurable in the environment.

The amount of new habitat restoration to be implemented for the environmental commitments of Alternatives 4A, 2D, and 5A would be relatively small compared to the areal extent of the Delta, but implementation would be expected to contribute considerably to certain localized areas (i.e., near where the wetland restoration areas are planned) within the Delta through the potential for increased mercury methylation in these restored wetland habitats. Design of restoration sites would be guided by Environmental Commitment 12 of the action alternatives, which requires development of site-specific mercury management plans as restoration actions are implemented. The effectiveness of minimization and mitigation actions implemented according to the mercury management plans is not known at this time, although the potential to reduce methylmercury concentrations exists based on current research. Although Environmental Commitment 12 would be implemented with the goal to reduce this potential effect, the uncertainties related to site-specific restoration conditions and the potential for increases in methylmercury concentrations in the Delta could contribute substantially to the cumulative condition for mercury in the Delta.

As such, conveyance facility operation and maintenance is not expected to contribute to the adverse cumulative condition for mercury, but tidal habit restoration environmental commitments implemented under Alternatives 4A, 2D, and 5A could contribute to this adverse condition in localized areas.

Microcystis Blooms

The cumulative condition for *Microcystis* and, thus, microcystin concentrations is considered adverse in the Delta, due to anticipated future increased water temperatures associated with climate change and increased water residence times associated with climate change/sea level rise and habitat restoration unrelated to Alternatives 4A, 2D, and 5A, that will enhance conditions for *Microcystis* blooms. Climate change projected for the future is expected to cause an increase in average Delta water temperatures during the summer and early fall months. Increased water temperatures could lead to earlier attainment of the water temperature threshold of 19°C required to initiate *Microcystis* bloom in the Delta, and thus earlier occurrences of *Microcystis* blooms, relative to Existing Conditions. Warmer water temperatures could also increase bloom duration and magnitude, relative to Existing Conditions. In addition to the effects from increased water temperatures, substantial increases in water residence times due to factors unrelated to the action alternatives, including cumulative habitat restoration (e.g., 8,000 acres of tidal habitat, enhancements to the Yolo Bypass and other California EcoRestore actions), sea level rise and climate change, are expected to occur in the Delta, relative to Existing Conditions. These conditions would occur under the No Action Alternative and, thus, are not associated with Alternatives 4A, 2D, and 5A.

Change in flow paths of water through the Delta would occur under Alternatives 4A, 2D, and 5A, which could result in localized increases in residence time in various Delta sub-regions, and

decreases in residence time in other areas. Implementation of the small amount of habitat restoration within the Delta, associated with the alternatives environmental commitments, also could affect residence times at the affected areas. While there is uncertainty regarding the degree to which the alternatives would affect water residence times in the Delta, it is anticipated that the combined effects of restoration activities, sea level rise and climate change will drive the residence time changes and that the alternatives and other cumulative projects would not contribute considerably to the adverse *Microcystis* and microcystins condition in the Delta, in particular because the amount of habitat restoration by the alternatives to be implemented would be so limited in area and location as it would not be able to affect residence times Delta-wide.

The water flowing through the Delta that would reach the south Delta intakes is expected to be influenced by the increased frequency, magnitude, and geographic extent of *Microcystis* blooms associated with restoration activities, sea level rise, and climate change unassociated with the alternatives, as discussed above. Water diverted from the Sacramento River in the north Delta that would be conveyed to the south Delta intakes is expected to be unaffected by *Microcystis* and microcystins. Therefore, the addition of Sacramento River water from the north Delta under Alternatives 4A, 2D, and 5A at the south Delta intakes would serve to dilute *Microcystis* and microcystins-containing water diverted from the south Delta with water that is not expected to contain them. Because the degree to which *Microcystis* blooms, and thus microcystins concentrations, will increase in source water from the south Delta is unknown, it cannot be determined whether levels of microcystins in the mixture of source waters exported from Banks and Jones pumping plants will be higher or lower, relative to Existing Conditions. However, because the Sacramento River water contributed to the south Delta intakes will likely be unaffected by *Microcystis* and microcystins, the alternatives would not contribute considerably to any future adverse *Microcystis* and microcystins condition in the SWP/CVP Export Service Areas.

Organic Carbon

Delta water quality conditions for DOC are anticipated to be adverse under the cumulative condition. However, unlike Alternative 4, there would not be expected to be substantial contributions of DOC from habitat restoration areas under Alternatives 4A, 2D, and 5A, because the area to be converted for new habitat would be small compared to areal extent of the Delta and existing habitat areas and loading sources. As such, facilities operations and maintenance and environmental commitments implemented under Alternatives 4A, 2D, and 5A would be minimal and are not expected to considerably contribute to this adverse condition.

Pesticides and Herbicides

While factors such as TMDLs and future development of more target specific and less toxic pesticides will ultimately influence the future cumulative condition for pesticides, forecasting whether these various efforts will ultimately be successful at resolving current pesticide related impairments requires considerable speculation. As such it is conservatively assumed that the cumulative condition will be adverse with respect to pesticides. Alternatives 4A, 2D, and 5A are not expected to contribute considerably to the adverse cumulative condition due to facilities operations and maintenance, because the changes in the source water fractions of Sacramento River, San Joaquin River, and Delta agriculture water due to these alternatives would not be expected to be of sufficient magnitude to substantially alter the long-term risk of pesticide-related toxicity to aquatic life, nor adversely affect other beneficial uses of the Delta. The greater source fraction of Sacramento River water, on an annual average basis, at the south Delta pumping plants would be expected to

result in the cumulative condition for pesticides and herbicides in the SWP/CVP Export Service Areas to be not adverse.

Selenium

Despite improvements in reducing selenium loading to the San Joaquin River and Delta, it is anticipated that the cumulative condition for selenium in the lower San Joaquin River and Delta will remain adverse.

Facilities operations and maintenance of Alternatives 4A, 2D, and 5A would not be expected to substantially alter the cumulative condition for selenium and selenium impairment in the Delta. Modeling estimates indicate these alternatives would result in essentially no change in selenium concentrations in water or most biota throughout the Delta, with no exceedances of benchmarks for biological effects. Concentrations of selenium in sturgeon would exceed only the lower benchmark, indicating a low potential for effects. Overall, these alternatives would not be expected to substantially increase the frequency with which applicable benchmarks would be exceeded in the Delta (there being only a small increase for sturgeon exceedance relative to the low benchmark for sturgeon and no exceedance of the high benchmark) or substantially degrade the quality of water in the Delta, with regard to selenium. The greater Sacramento River flow fraction at the south Delta pumps under Alternatives 4A, 2D, and 5A would result in reduced selenium concentrations in the SWP/CVP Export Service Areas and thus would not contribute to the adverse cumulative condition.

While the implementation of Environmental Commitment 4 (tidal habitat restoration) would create shallow backwater areas that could result in local increased water residence times, the extent of these areas would be minimal relative to the area of the Delta, and environmental changes associated with their development are unlikely to be of magnitude that would measurably change selenium concentrations in water or biota, relative to Existing Conditions. Further, although water residence times associated with restoration could increase, they are not expected to increase without bound, and selenium concentrations in the water column would not continue to build up and be recycled in sediments and organisms as may be the case within a closed water system. Further, proposed avoidance and minimization measures would require evaluating risks of selenium exposure at a project level for each restoration area, minimizing to the extent practicable potential risk of additional bioaccumulation, and monitoring selenium levels in fish and/or wildlife to establish whether, or to what extent, additional bioaccumulation is occurring. See Appendix 3.C, *Avoidance and Minimization Measures*, of the Draft BDCP for additional detail on this AMM27. Because selenium concentrations are not expected to build up in these areas and because Avoidance and Minimization Measure 27: Selenium Management, which affords for site-specific measures to reduce effects, would be available to reduce effects associated with selenium, the restored habitats are not expected to contribute considerably to the adverse cumulative condition.

While there have been improvements to selenium concentrations in San Francisco Bay, due in part to the petroleum refineries implementing controls that have decreased selenium in their discharges, the bay is currently CWA Section 303(d) listed as impaired for elevated selenium. TMDLs that will be developed to address the impairment would be expected to contribute to some reduction in selenium in the bay, including the North Bay, which is partially influenced by Delta outflow. Thus, it is anticipated that the future cumulative condition would be no worse, and possibly better than, existing conditions. Facilities operations and maintenance of Alternatives 4A, 2D, and 5A would not be expected to substantially alter the cumulative condition for the selenium impairment in the Delta or contribute considerably to the cumulative selenium condition in North Bay. Selenium

concentrations in water in the Delta are not expected to change substantially under Alternatives 4A, 2D, and 5A, and thus these alternatives would not be expected to contribute considerable additional loading to the North Bay that would worsen the impairment.

NEPA Effects: The cumulative water quality conditions are considered to be adverse for chloride, EC, mercury, *Microcystis*, organic carbon, pesticides and herbicides, and selenium in areas of the Delta, and thus may adversely affect beneficial uses of the Delta such as domestic, agricultural, municipal and industrial water supply and recreation, aesthetic, and fish and wildlife resources. The implementation of the water conveyance facilities operations and maintenance component of Alternatives 4A, 2D, and 5A, including Mitigation Measure WQ-11 proposed for EC, would not contribute considerably to adverse cumulative water quality conditions for these constituents. With respect to chloride and EC, implementation of Alternatives 4A, 2D, and 5A would improve water quality conditions for these constituents at the Banks and Jones pumping plants in the south Delta and thus in the SWP/CVP Export Service Areas. The implementation of habitat restoration environmental commitments could contribute considerably to the adverse cumulative water quality condition for mercury. No mitigation measures for mercury would be available until specific restoration actions are proposed.

***CEQA Conclusion*:** The cumulative Delta water quality conditions are anticipated to be significant for chloride, EC, mercury, *Microcystis*, organic carbon, pesticides and herbicides, and selenium.

The incremental effects of the water conveyance facilities operations and maintenance component of Alternatives 4A, 2D, and 5A, including Mitigation Measure WQ-11 proposed for EC, would not be expected to be cumulatively considerable for chloride and EC conditions in the Delta. Implementation of Alternatives 4A, 2D, and 5A would, in fact, improve conditions for these constituents at the Banks and Jones pumping plants in the south Delta and thus in the SWP/CVP Export Service Areas.

Action Alternative facilities operations and maintenance would not be expected to contribute considerably to the significant cumulative *Microcystis* condition in the Delta through increased residence times in the Delta during the summer period. Similarly, environmental commitments are not expected to contribute to this significant cumulative condition, because the area of restoration would be so small as to have no net effect on through-Delta residence time.

Facilities operations and maintenance would not be expected to contribute considerably to the significant cumulative mercury and selenium conditions in the Delta. Implementation of habitat restoration environmental commitments could contribute considerably to the significant cumulative mercury condition at certain localized areas within the Delta (i.e., near where the wetland restoration areas are planned) through the potential for increased mercury methylation in these restored wetland habitats. Although Environmental Commitment 12 is designed to reduce these effects for mercury, it is not known if these actions would be feasible and could effectively reduce the incremental contribution to the adverse cumulative condition to a less-than-significant level. With implementation of Selenium Management (AMM27), which affords for site-specific measures to reduce effects, the incremental effects of habitat restoration on selenium would not be expected to be cumulatively considerable.

Implementation of facilities operations and maintenance for Alternatives 4A, 2D, and 5A would not contribute considerably to the significant cumulative organic carbon condition in the Delta. Habitat restoration environmental commitments would potentially load additional organic carbon to Delta waters, but contributions are not expected to be cumulatively considerable, because the land area

proposed for restoration would be relatively small compared to existing land area and sources of DOC as to not have an effect on DOC concentrations.

Implementation of facilities operations and maintenance for Alternatives 4A, 2D, and 5A would not contribute considerably to the adverse cumulative pesticide and herbicide condition in the Delta, because the changes in the source water fractions of Sacramento River, San Joaquin River, and Delta agriculture water, due to the alternatives, would not be expected to be of sufficient magnitude to substantially alter the long-term risk of pesticide-related toxicity to aquatic life, nor adversely affect other beneficial uses of the Delta. Further, the environmental commitments would not involve actions that would contribute to additional pesticide loading, and thus would not contribute considerably to the significant cumulative pesticide condition in the Delta.

5.2.2.5 Geology and Seismicity

The following section provides an update to the Chapter 9, *Geology and Seismicity*, cumulative impact analysis in the Draft EIR/EIS. This section considers additional projects (Table 5.2.2.5-1) not previously included in the Draft EIR/EIS cumulative analysis, as well as those previously considered, which are identified in Table 9-31 in the Draft EIR/EIS. For a complete list of plans, policies, programs and projects considered, see Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, in Appendix A of this RDEIR/SDEIS. These projects would have the potential to result in geologic and seismic hazards in the Plan Area. This section also includes a discussion of the cumulative impacts associated with Alternatives 4A, 2D, and 5A.

Table 5.2.2.5-1. Cumulative Effects on Geology and Seismicity from Plans, Policies, and Programs

Agency	Program/ Project	Status	Description of Program/Project	Effects on Geology and Seismicity
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Could have potential effects associated with geology and seismicity hazards.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Restoration actions could have potential effects associated with geology and seismicity hazards.
California Department of Water Resources	FloodSAFE California	Ongoing Program	Promotes public safety through integrated flood management while protecting environmental resources; emphasizes action in the Delta. This program is very broad, but is designed to improve flood safety throughout the state while encouraging sound conservation actions that benefit California's native fish and wildlife and promote wildlife-friendly agricultural practices. The program should not reduce habitat values in the Delta.	No direct effect on increased risks at BDCP construction locations from earthquakes, groundshaking, liquefaction, slope instability, seiche or tsunami.
California Department of Fish and Wildlife	San Joaquin River Restoration Program: Salmon Conservation and Research Facility and Related Management Actions Project	Final EIR certified in June 2014	The Proposed Project entails five primary actions: 1. Construct and operate the Salmon Conservation and Research Facility; 2. Reintroduce Chinook salmon to the Restoration Area (including donor stock collection, broodstock development, and/or direct translocation); 3. Manage Chinook salmon runs in the Restoration Area; 4. Conduct fisheries research and monitoring in the Restoration Area; and 5. Manage and support recreation within the Restoration Area.	The EIR for this project indicated that the soils underlying the proposed Salmon Conservation and Research Facility site have a low expansive potential, and that the proposed project is not likely to be affected by lateral spreading,. However, the variable and loose consistency of the alluvium found in some boring makes it unsuitable for direct support of additional fill or building improvements in its existing condition and that the fill material that the project site overlies may impact soil and thus structure stability. Additionally, relatively shallow groundwater levels could potentially affect the stability of soils beneath the proposed project, which could result in subsidence and collapse.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Geology and Seismicity
Natural Resources Agency, Salton Sea Authority, California Department of Fish and Wildlife, California Department of Water Resources	Salton Sea Species Conservation Habitat Project	Ongoing	The Natural Resources Agency, in partnership with the Salton Sea Authority, will coordinate state, local and federal restoration efforts and work with local stakeholders to develop a shared vision for the future of the Salton Sea. Restoration will include construction of 600 acres of near shore aquatic habitat to provide feeding, nesting and breeding habitat for birds. This project is permitted to increase to 3,600 acres and could be scaled even greater with additional resources. Additional restoration projects may follow.	No direct effect on increased risks at BDCP construction locations from earthquakes, groundshaking, liquefaction, slope instability, seiche or tsunami.

Impact GEO-1: Cumulative Impacts Related to Geology and Seismicity Hazards

NEPA Effects: Implementation of the action alternatives and other local and regional projects as presented in Table 5.2.2.5-1 and Draft EIR/EIS Table 9-31 could contribute to regional impacts and hazards associated with geology and seismicity. The geologic and seismic hazards that would exist and the potential adverse effects that could occur to structures and persons in association with construction and operation of all action alternatives, including Alternatives 4A, 2D, and 5A would be restricted to the locations of the construction and the operational activities of these alternatives. Depending on which alternative is chosen, the location of these impacts would vary slightly. These impacts include the potential for loss, injury or death as a result of strong seismic shaking, settlement or collapse caused by dewatering, ground settlement, slope failure (including decreased levee stability from construction and operation activities), seismic-related ground failure (including liquefaction), ground shaking, fault rupture, seiche or tsunami. All of the impacts are mitigated by incorporating standard construction and structural measures into project design and construction. No impacts related to construction or operation of any of the action alternatives, including Alternatives 4A, 2D, and 5A or from implementation of the conservation measures or environmental commitments were identified for this resource area. These cumulative impacts would result from construction activities and development of additional structures that may be subject to geologic, seismic, or slope failure and could be reduced by implementing measures similar to those described in the Draft EIR/EIS. However, these projects would not increase the risks to structures and people at the specific locations affected by alternatives. Therefore, the risks of loss of property, personal injury, or death associated with the alternatives would not combine with the geologic and seismic risks from other projects or programs to create a cumulatively adverse effect at any one locality in the Plan Area. There would be no cumulative adverse effect.

CEQA Conclusion: The geologic and seismic hazards that would exist and the potential adverse effects that could occur in association with construction and operation of the action alternatives would be restricted to the locations of the construction and the operational activities of these alternatives. Other past, present and probable future projects and programs in the Plan Area that are identified in Table 5.2.2.5-1 and Draft EIR/EIS Table 9-31 would not increase the risks of loss, injury or death at the specific locations affected by project alternatives. Therefore, the risks of loss,

injury or death associated with the project alternatives would not combine with the geologic and seismic risks from other projects or programs to create a substantial cumulative effect at any one locality in the Plan Area. This cumulative impact is considered less than significant. No mitigation is required.

5.2.2.6 Soils

The cumulative effects analysis for soils considers the effects of implementation of the alternatives in combination with the potential effects of other past, present, and reasonably foreseeable future projects and programs. Implementation of the alternatives and other local and regional projects as presented in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1, could contribute to regional impacts and hazards associated with soils.

Table 5.2.2.6-1. Programs and Projects Considered in the Soils Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Soils
Semitropic Water Storage District	Delta Wetlands Projects	Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	Loss of approximately 10,000 acres of topsoil from inundation.
DWR	Cache Slough Area Restoration	Currently under study	Restoration of lands within the Cache Slough Complex located in the Delta. Could include roughly 45,000 acres of existing and potential open water, marsh, floodplain and riparian habitat.	This project is examined under Alternatives 1A–4 and 5–9 of the BDCP.
Reclamation District 2093	Staten Island Wildlife-Friendly Farming Demonstration	Ongoing program	Habitat restoration project allowing longer flooding duration on agricultural lands	Longer inundation period over 2,500–5,000 acres of agricultural land. Construction of new internal levees could accelerate erosion or disturb soil.
California Department of Fish and Wildlife	Fremont Landing Conservation Bank	Construction completed in 2013.	4,500 acres of farmland and floodplain operating as conservation bank for endangered and threatened salmon and steelhead.	Unknown but probably significant acreage of overcovering of topsoil from tidal inundation, excavation and overcovering.
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential effects on soil resources from restoration and other actions
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential effects on soil resources from restoration actions

The analysis focuses on projects and programs within the Plan Area that involve substantial grading, excavation, overcovering, or inundation. The principal programs and projects considered in the analysis are listed in Table 10-9 of the Draft EIR/EIS as well as Table 5.2.2.6-1 and could have potential cumulative effects on soils could range from beneficial to potentially adverse. The specific programs, projects and policies with the potential to combine with effects of the alternatives to create a cumulatively considerable impact are identified below for each impact category. The potential for cumulative impacts on soils is described for construction of the conveyance facilities and CM2–CM21 within the Plan Area.

Impact SOILS-1: Cumulative Impact on Accelerated Erosion Caused by Vegetation Removal and Other Soil Disturbances as a Result of Constructing the Proposed Water Conveyance Facilities

Construction activities associated with Alternatives 1A–9, including Alternatives 4A, 2D, and 5A could result in accelerated erosion due to vegetation removal and other activities which cause soil disturbance. Accelerated water and wind erosion are expected to affect soils as a result of past, present, and reasonably foreseeable future projects.

NEPA Effects: Although the action alternatives, including Alternatives 4A, 2D, and 5A are not expected to result in adverse effects on soil erosion, when combined with projects listed above there may be a cumulative effect on soil erosion. However, the projects listed above would be required to comply with state water quality regulations (i.e., the storm water General Permit for Construction and Land Disturbance Activities) to control accelerated erosion and movement of sediment to receiving waters. Though past, current, and future projects may result in accelerated soil erosion, the various regulatory frameworks that govern within the Plan Area are expected to mitigate any potential adverse effects on soil erosion. Action alternatives are also subject to the same regulations as the projects listed in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1 would have no adverse effect on soil erosion. Consequently, there would not be a significant cumulative impact and the incremental contribution of the action alternatives, including Alternatives 4A, 2D, and 5A would not be cumulatively considerable.

CEQA Conclusion: The soil erosion that could occur in association with construction of all action alternatives, including Alternatives 4A, 2D, and 5A would be mitigated through compliance with state water quality regulations. Other past, present and probable future projects and programs in the Plan Area that are identified in Table 10-9 in the Draft EIR/EIS and Table 5.2.2.6-1 might also result in accelerated erosion, but would also have to comply with state water quality regulations. Therefore, the impact of accelerated soil erosion associated with the action alternatives would not combine with the soil erosion risks from other projects or programs to create a substantial cumulative effect. The incremental contribution of the action alternatives would not be cumulatively considerable. This cumulative impact is considered less than significant. No mitigation is required.

Impact SOILS-2: Cumulative Impact on Topsoil from Construction Activities Occurring Within the Plan Area

For all action alternatives, including Alternatives 4A, 2D, and 5A, the construction of conveyance facilities under CM1 could result in adverse effects on soils involving the substantial loss of topsoil. For Alternatives 1A–2C, 3, 4, 5, 6–9 and Alternatives 4A, 2D, and 5Athe construction of restored habitats associated with CM2–CM21 or Environmental Commitments could also result in similar construction-related effects, respectively.

Other projects that may involve construction and habitat restoration activities with similar effects on the loss of topsoil are provided in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1.

NEPA Effects: Implementing the projects and programs listed in Table 10-9 in the Draft EIR/EIS in combination with any of Alternatives 1A–9, including Alternatives 4A, 2D, and 5A would result in a substantial loss of topsoil. It is assumed that environmental commitments and mitigation measures to reduce topsoil loss similar to those identified for the alternatives analyzed in this document would also be implemented for at least some of these projects. However, it is assumed that a net loss of topsoil would occur despite the use of mitigation measures by the BDCP or other projects. Consequently, these effects, in combination with the BDCP, could result in a cumulatively adverse effect on the loss of topsoil. Due to the magnitude of the project footprints of all action alternatives, the amount of topsoil lost from construction would be substantial in comparison to the other projects considered in this cumulative analysis. The effect from Alternatives 4A, 2D, and 5A would be significantly less, but would remain significant and considerable. Therefore, the incremental contribution of all action alternatives would be cumulatively considerable.

CEQA Conclusion. Alternatives 1A–9, including Alternatives 4A, 2D, and 5A would result in adverse impacts on soils involving a significant loss of topsoil. Construction of the past, present, and reasonably foreseeable future projects listed in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1, taken in conjunction with all action alternatives would result in a cumulative impact on topsoil loss. The effect from Alternative 4A, 2D, and 5A would be significantly less, but would remain significant and considerable. This cumulative impact is considered significant. Due to the magnitude of the project footprint of all action alternatives, the contribution from any of these alternatives would be cumulatively considerable. The following mitigation measures could reduce this effect, but not to a less-than-significant level. Therefore this cumulative impact is considered significant and unavoidable.

Mitigation Measure SOILS-2a: Minimize Extent of Excavation and Soil Disturbance

Please see Mitigation Measure SOILS-2a under Impact SOILS-2 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure SOILS-2b: Salvage, Stockpile, and Replace Topsoil and Prepare a Topsoil Storage and Handling Plan

Please see Mitigation Measure SOILS-2b under Impact SOILS-2 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Impact SOILS-3: Cumulative Impact on Property Loss, Personal Injury, or Death from Instability, Failure, and Damage from Construction on or in Soils Subject to Subsidence as a Result of Constructing the Proposed Water Conveyance Facilities

It is expected that past, present, and reasonably foreseeable future projects would be required to comply with design requirements (i.e., CBC) to offset potential adverse effects of subsidence. Moreover, this soil hazard existing at other project sites would be local to those sites and would not act in combination with those of the BDCP project. While the incremental contribution of Alternatives 1A through9, including Alternatives 4A, 2D, and 5A, could be cumulatively considerable due to the scale of the alternatives, conforming to CBC and other BMPs would reduce the effects of

the action alternatives to acceptable levels and they would not be adverse. Accordingly, there would not be a significant cumulative impact.

NEPA Effects: Construction activities associated with Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A could result in an adverse effect on life and property as a result of construction of project facilities on compressible soils that are subject to subsidence. However, the BDCP alternatives are not expected to result in adverse effects on life and property as a result of constructing project facilities on compressible soils because all action alternatives would conform to design requirements (i.e., CBC) to offset potential adverse effects of subsidence.

Given the extent of compressible soils in the Plan Area, past, present, and reasonably foreseeable future projects will likely have some project features located on these types of soils. However, these projects would not increase the risks to structures and people at the specific locations affected by the action alternatives. Additionally, the projects listed in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1 would also be required to conform to the same design requirements under which BDCP would be constructed.

Therefore, the risks of loss, injury, or death associated with the alternatives would not combine with the compressible soil risks from other projects or programs to create a cumulatively adverse effect at any one locality in the Plan Area. There would be no cumulative adverse effect.

CEQA Conclusion: The hazard from compressible soils that would exist and the potential adverse effects that could occur in association with construction of Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A would be restricted to the locations of the construction activities of these alternatives. Other past, present and probable future projects and programs in the Plan Area that are identified in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1 would not increase the risks of loss, injury or death at the specific locations affected by project alternatives. Therefore, the risks of loss, injury or death associated with the project alternatives would not combine with the compressible soil risks from other projects or programs to create a substantial cumulative effect at any one locality in the Plan Area. This cumulative impact is considered less than significant. No mitigation is required.

Impact SOILS-4: Cumulative Impact on Risk to Life and Property as a Result of Constructing the Proposed Water Conveyance Facilities in Areas of Expansive, Corrosive, and Compressible Soils

It is expected that past, present, and reasonably foreseeable future projects would be required to comply with design requirements (i.e., CBC) to offset potential adverse effects of subsidence and compressible, expansive, and corrosive soils. Moreover, these soil hazards existing at other project sites would be local to those sites and would not act in combination with those of the action alternatives. While the incremental contribution of the BDCP could be cumulatively considerable due to the scale of all alternatives, conforming to CBC and other BMPs would reduce the effects of the BDCP to acceptable levels and they would not be adverse. Accordingly, there would not be a significant cumulative impact.

NEPA Effects: Construction activities associated with Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, could result in an adverse effect on life and property as a result of construction of project facilities on expansive, corrosive and/or compressible soils. However, the action alternatives are not expected to result in adverse effects on life and property as a result of constructing project facilities on expansive, corrosive and/or compressible soils because the

alternatives would conform with design requirements (i.e., CBC) to offset potential adverse effects of subsidence and compressible, expansive, and corrosive soils.

Given the extent of expansive, corrosive and/or compressible soils in the Plan Area, past, present, and reasonably foreseeable future projects will likely have some project features located on these types of soils. However, these projects would not increase the risks to structures and people at the specific locations affected by Alternatives 1A through 9, including Alternative 4A, 2D, and 5A. Additionally, the projects listed in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1 would also be required to conform to the same design requirements BDCP would be building under.

Therefore, the risks of loss, injury, or death associated with the alternatives would not combine with the risks from other projects or programs to create a cumulatively adverse effect at any one locality in the Plan Area. There would be no cumulative adverse effect.

CEQA Conclusion: The hazard from expansive, corrosive and/or compressible soils that would exist and the potential adverse effects that could occur in association with construction of Alternatives 1a through 9, including 4A, 2D, and 5A, would be restricted to the locations of the construction activities of these alternatives. Other past, present and probable future projects and programs in the Plan Area that are identified in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1 would not increase the risks of loss, injury or death at the specific locations affected by all action alternatives. Therefore, the risks of loss, injury or death associated with the project alternatives would not combine with the soil risks from other projects or programs to create a substantial cumulative effect at any one locality in the Plan Area. This cumulative impact is considered less than significant. No mitigation is required.

Impact SOILS-5: Cumulative Impact on Accelerated Bank Erosion from Increased Channel Flow Rates as a Result of Operations

Project operational components would cause changes in the tidal flows in some Delta channels, specifically those that lead into the major habitat restoration areas (Suisun Marsh, Cache Slough, Yolo Bypass, and South Delta ROAs). In major channels leading to the restoration areas (e.g., Lindsey, Montezuma, and Georgiana sloughs and Middle River), tidal flow velocities may increase by an unknown amount; any significant increases could cause some localized accelerated erosion/scour. This effect would not be as significant in Alternative 4A, 2D, or 5A. Detailed hydrodynamic (tidal) modeling would be conducted prior to any BDCP habitat restoration work in these ROA areas, and the changes in the tidal velocities in the major channels connecting to these restoration areas would be evaluated. If there is any indication that tidal velocities would be substantially increased, the restoration project design would be modified so that bed scour would not increase sufficiently to cause an erosion impact.

For most of the existing channels that would not be subject to tidal flow restoration, there would be no adverse effect to tidal flow volumes and velocities. The tidal prism would increase by 5–10%, but the intertidal (i.e., mean higher high water [MHHW] to mean lower low water [MLLW]) cross-sectional area also would be increased such that tidal flow velocities would be reduced by 10–20% compared to the existing condition. Consequently, no appreciable increase in scour is anticipated. The effect would not be adverse because there would be no net increase in river flow rates and, accordingly, no net increase in channel bank scour.

NEPA Effects: Very few, if any, of the past, present, and reasonably foreseeable future projects listed in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1 would involve increases in river channel flow rates. This, combined with the fact that the project would not cause a net increase in river flow rates, would not result in a substantial cumulative effect on bank erosion in the Plan Area under any of the action alternatives.

***CEQA Conclusion*:** Changes in operational flow regimes could cause increases in flow rates in channels and sloughs, potentially leading to increases in channel bank scour. However, where such changes are expected to occur (i.e., at the mouths of tidal marsh channels), the project would also entail expansion of the channel cross-section to increase the tidal prism at these locations. The net effect would be to reduce the channel flow rates by 10–20% compared to Existing Conditions. Consequently, no appreciable increase in scour is anticipated. Because few, if any, of the past, present, and reasonably foreseeable future projects listed in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1 would involve increases in river channel flow rates, any cumulative effects would be less than significant. No mitigation is required.

Impact SOILS-6: Cumulative Impact on Accelerated Erosion Caused by Clearing, Grubbing, Grading, and Other Disturbances Associated with Implementation of Environmental Commitments 2–11, 18, and 19

Construction activities associated with Alternatives 1A–2C, 3, 4, 5, 6–9, could result in accelerated erosion due to vegetation removal and other activities which cause soil disturbance. The effect from Environmental Commitments under Alternatives 4A, 2D, and 5A would be significantly less. Accelerated water and wind erosion are expected to affect soils as a result of past, present, and reasonably foreseeable future projects.

NEPA Effects: Although the BDCP alternatives are not expected to result in adverse effects on soil erosion, when combined with projects listed above that may generate a cumulative effect on soil erosion. However, the projects listed in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1 would be required to comply with state water quality regulations (i.e., the storm water General Permit for Construction and Land Disturbance Activities) to control accelerated erosion and movement of sediment to receiving waters. Though past, current, and future projects may result in accelerated soil erosion, the various regulatory frameworks that govern within the Plan Area are expected to mitigate any potential adverse effects on soil erosion. BDCP is also subject to the same regulations as the projects listed in Table 10-9 in the Draft EIR/EIS and Table 5.2.2.6-1 and would have no adverse effect on soil erosion. Consequently, there would not be a significant cumulative effect and the incremental contribution of the BDCP would not be cumulatively substantial.

CEQA Conclusion: The soil erosion that could occur in association with construction of all project alternatives would be mitigated through compliance with state water quality regulations. Other past, present and probable future projects and programs in the Plan Area that are listed in Table 10-9 in the Draft EIR/EIS and Table 5.2.2.6-1 might also result in accelerated erosion, but would also have to comply with state water quality regulations. Therefore, the impact of accelerated soil erosion associated with the project alternatives would not combine with the soil erosion risks from other projects or programs to create a substantial cumulative impact. This cumulative impact is considered less than significant. No mitigation is required.

Impact SOILS-7: Cumulative Impact on Loss of Topsoil from Excavation, Overcovering, and Inundation Associated with Restoration Activities as a Result of Implementing the Proposed Conservation Measures CM2–CM11

Construction activities associated with Alternatives 1A through 9 would result in the loss of topsoil caused by excavation, overcovering, and inundation associated with implementing the restoration activities.

NEPA Effects: Implementation of habitat restoration activities under Alternatives 1A-2C, 3, 4, 5, 6–9 at the ROAs would result in excavation, overcovering, or inundation of a minimum of 77,600 acres of topsoil. Alternatives 4A, 2D, and 5A would result in excavation, overcovering, or inundation of many fewer acres However, this effect for all actions alternatives. Tt would be adverse because it would result in a substantial loss of topsoil. Combined with the loss of topsoil that would occur from most or all of the past, present, and reasonably foreseeable future projects listed in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1, there would be a substantial cumulative adverse effect. Mitigation Measures SOILS-2a and SOILS-2b would to reduce the severity of this effect, but the level of the effect would remain substantial after mitigation because a large extent of topsoil would be temporarily or permanently lost.

***CEQA Conclusion*:** Implementation of conservation measures CM2–CM11 under Alternatives 1A–2C, 3, 4, 5, 6–9 and environmental commitments under Alternatives 4A, 2D, and 5A, would involve excavation, overcovering, and inundation (to create aquatic habitat areas) of topsoil over extensive areas, thereby resulting in a substantial loss of topsoil. Combined with the loss of topsoil that would occur from most or all of the past, present, and reasonably foreseeable future projects listed in Table 10-9 in the Draft EIR/EIS and Table 5.2.2.6-1, there would be a significant and unavoidable impact. Mitigation Measures SOILS-2a and SOILS-2b would to reduce the severity of this effect, but the impact would remain significant after mitigation because a large extent of topsoil would be temporarily or permanently lost. Mitigation Measures SOILS-2a and SOILS-2b would minimize and compensate for these impacts to a degree, but not to a less-than-significant level. Therefore, this impact is considered significant and unavoidable and the action alternative contribution would be cumulatively considerable.

Mitigation Measure SOILS-2a: Minimize Extent of Excavation and Soil Disturbance

Please see Mitigation Measure SOILS-2a under Impact SOILS-2 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure SOILS-2b: Salvage, Stockpile, and Replace Topsoil and Prepare a Topsoil Storage and Handling Plan

Please see Mitigation Measure SOILS-2b under Impact SOILS-2 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Impact SOILS-8: Cumulative Impact on Property Loss, Personal Injury, or Death from Instability, Failure, and Damage from Construction on Soils Subject to Subsidence as a Result of Implementing the Proposed Conservation Measures CM2–CM11

It is expected that past, present, and reasonably foreseeable future projects would be required to comply with design requirements (i.e., CBC) to offset potential adverse effects of subsidence. Moreover, where this soil hazard exists at the other project sites, the potential impact would be local

to those sites and would not act in combination with that of Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A.

NEPA Effects: The risks of loss, injury, or death associated with implementation of CMs 2–11 under Alternatives 1A–2C, 3, 4, 5, 6–9 and Environmental Commitments under Alternatives 4A, 2D, and 5A, would not combine with the risks from other projects or programs to create a cumulatively adverse effect at any one locality in the Plan Area. There would be no cumulative adverse effect.

CEQA Conclusion: The hazard from soils subject to subsidence that would exist and the potential adverse effects that could occur in association with construction of all action alternatives, including Alternatives 4A, 2D, and 5A, would be restricted to the locations of the construction activities of these alternatives. Other past, present and probable future projects and programs in the Plan Area that are identified in Table 10-9 in Chapter 10, *Soils*, of the Draft EIR/EIS and Table 5.2.2.6-1 would not increase the risks of loss, injury or death at the specific locations affected by project alternatives. Therefore, the risks of loss, injury or death associated with the project alternatives would not combine with the soil risks from other projects or programs to create a substantial cumulative effect at any one locality in the Plan Area. This cumulative impact is considered less than significant. No mitigation is required.

Impact SOILS-9: Cumulative Impact on Risk to Life and Property from Construction in Areas of Expansive, Corrosive, and Compressible Soils as a Result of Implementing the Proposed Conservation Measures CM2–CM11

It is expected that past, present, and reasonably foreseeable future projects would be required to comply with design requirements (i.e., CBC) to offset potential adverse effects of expansive, corrosive, and compressible soils. Moreover, where these soil hazards exist at the other project sites, the potential impact would be local to those sites and would not act in combination with that of the BDCP project.

NEPA Effects: The risks of loss, injury, or death associated with implementation of CMs 2–11 under Alternatives 1A–2C, 3, 4, 5, 6–9 and Environmental Commitments under Alternatives 4A, 2D, and 5A would not combine with the risks from other projects or programs to create a cumulatively adverse effect at any one locality in the Plan Area. There would be no cumulative adverse effect.

CEQA Conclusion: Soils subject to expansion, corrosion, and compression that would exist and the potential adverse effects that could occur in association with construction of all project alternatives would be restricted to the locations of the construction activities of these alternatives. Other past, present and probable future projects and programs in the Plan Area that are identified in Table 10-9 in the Draft EIR/EIS and Table 5.2.2.6-1 would not increase the risks of loss, injury or death at the specific locations affected by project alternatives. Therefore, the risks of loss, injury or death associated with the project alternatives would not combine with the soil risks from other projects or programs to create a substantial cumulative effect at any one locality in the Plan Area. This cumulative impact is considered less than significant. No mitigation is required.

5.2.2.7 Fish and Aquatic Resources

Assessment Methodology

The cumulative effects analysis for fish and aquatic resources addresses the potential for the action alternatives to act in combination with other past, present, and probable future projects or

programs to create a cumulatively significant adverse impact. The geographic scope of the cumulative analysis for each of the covered and non-covered species varies, depending on the potential for other projects or programs to influence individuals that rely on the BDCP Plan Area for some stage of their life history. While these areas extend beyond the Plan Area, the primary focus for these resource effects is the Delta Region, where BDCP conservation and operational efforts are concentrated, and areas upstream of the Delta where operational effects would be the primary mechanism to affect aquatic habitat conditions. For some species, such as anadromous fish, the analysis area extends well beyond the Plan Area. Other fish species whose individuals do not range beyond the Plan Area, such as Delta smelt, the geographic range of the cumulative analysis has been limited to this smaller area.

When the effects of the changes in aquatic habitat or species resources under the alternatives are considered in connection with the potential effects of projects Table 11-13 below, the potential effects range from beneficial to potentially adverse cumulative effects on fish and aquatic resources.

The projects and programs that have been considered as part of the cumulative analysis have been drawn primarily from a list developed for this EIR/EIS and contained in Appendix 3D. This list was compiled in part by reviewing the projects addressed in the cumulative impacts analysis for the Delta Land Use and Resource Management Plan (Delta Protection Commission 2010). The list was augmented by reviewing the alternatives development information presented in Appendix 3A, *Identification of Water Conveyance Alternatives, Conservation Measure 1*, and other recent environmental documents for Delta-area projects, Central Valley diversion-related projects, and by coordinating with local, state, and federal agencies that are sponsoring activities in the Delta area or on other areas within the relevant range of individual fish species. The list of past, present and probable future projects has been evaluated to determine which may have effects on aquatic habitats and species that occur within the Plan Area. The list of projects relevant to fish and aquatic resources is contained in Table 11-13. This analysis is qualitative in nature.

A determination of the potential adverse effects of each individual alternative was used to assess whether implementation of the alternatives would contribute to an adverse cumulative effect on the fish and aquatic resources of the Plan Area. Based on the analyses presented in earlier parts of this chapter, the alternatives would often have a beneficial effect on many of the aquatic resources in the Plan Area. However, there are many instances where the alternatives would have adverse effects on fish and aquatic resources. While construction and restoration activities in the near-term period of the alternatives would temporarily or permanently alter the available habitat for the covered species, the near-, mid- and long-term conservation actions would replace, enhance and in most cases expand habitat for these species. The potential construction-related adverse effects of implementing the alternatives are limited to short-term effects. The potential operation-related adverse effects of implementing the alternatives can be either short-term or long-term, varying among the specific types of effects and alternatives.

The modeling of operations included a number of operational assumptions in addition to the action alternatives, e.g., diversions by the Freeport Regional Water Authority and City of Stockton Delta Water Supply Project; these assumptions are described in the public draft EIR/EIS Appendix 5A Section B: CALSIM II and DSM2 Modeling Simulations and Assumptions. There are some known future projects that were not included in the modeling. Those projects are addressed qualitatively in this cumulative analysis. Similarly, there are numerous projects that would entail construction and maintenance activities, extending through portions of the same time period as BDCP, which are also addressed in this cumulative analysis. The specific programs, projects and policies that are

considered in combination with the BDCP are identified below for each relevant impact category based on the potential to contribute to a BDCP impact that could be considered cumulatively considerable.

Many of the projects and programs included in the cumulative effect analysis, would be similar to those included in the action alternatives, and would have similar potential effects. These effects would also be similar between the different covered species because the timing and location of the effects would likely span periods and areas that would similarly affect these species. Therefore, the following assessment addresses all the covered species as a group, for the most part, rather than individual species.

When the effects of the BDCP on fish and aquatic resources are considered in connection with the potential effects of projects listed in Table 11-14, the combined effects range from beneficial to potentially adverse. There are elements of the BDCP that will have negative effects (construction and, in some situations, operations) and others that will have positive effects (conservation and restoration). The cumulative analysis looks at the whole of these actions.

Table 11-13. Effects on Covered Fish Species from the Plans, Policies, and Programs Included in the Cumulative Effects Analysis

Agency	Programs, Projects, and Policies	Comments
Department of Fish and Wildlife	California Aquatic Invasive Species Draft Rapid Response Plan	Program under development. Draft Plan issued in 2007.
Department of Fish and Wildlife	Fremont Landing Conservation Bank	Project completed.
Department of Fish and Wildlife	Fish Screen Project at Sherman and Twitchell Islands	Program included in Delta Initiatives List.
Department of Parks and Recreation	Central Valley Vision	Implementation Plan completed in 2009.
Department of Water Resources	North Delta Flood Control and Ecosystem Restoration Project	Completed in 2012.
Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	Project implementation began in 2012. Estimated completion in 2016.
Department of Water Resources	State Water Project Contract Extension	
Contra Costa Water District, U.S. Bureau of Reclamation, and Department of Water Resources	Los Vaqueros Reservoir Expansion Project	Project completed in 2012.
Davis, Woodland, and University of California, Davis	Davis-Woodland Water Supply Project	Project under development. Final EIR in 2009. Specific design and operations criteria not identified.
Northeastern San Joaquin County Groundwater Banking Authority	Eastern San Joaquin Integrated Conjunctive Use Program	Final Programmatic EIR in 2011.
University of California, Davis, California Department of Water Resources, Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and U.S. Bureau of Reclamation	Delta Smelt Permanent Refuge	Program under development to develop a permanent facility, possibly at the proposed FWS Science Center at Rio Vista.
U.S. Bureau of Reclamation	Delta-Mendota Canal/ California Aqueduct Intertie	Project completed in 2012.
U.S. Bureau of Reclamation and San Luis & Delta Mendota Water Authority	Grassland Bypass Project, 2010–2019	Final EIS/EIR in 2009.
U.S. Bureau of Reclamation and San Luis & Delta Mendota Water Authority	Agricultural Drainage Selenium Management Program	Program under development. Draft EIS/EIR in 2008.
Water Forum and U.S. Bureau of Reclamation	Lower American River Flow Management Standard	Program under development. Draft EIR in 2010. Recommendations included in NMFS Biological Opinion.
West Sacramento Area Flood Control Agency and U.S. Army Corps of Engineers	West Sacramento Levee Improvements Program	Program under development. Construction initiated in several areas. Further environmental and engineering documentation required for future projects.

Agency	Programs, Projects, and Policies	Comments
California Department of Fish and Wildlife	Calhoun Cut/ Lindsey Slough Restoration	Increase intertidal marsh habitat and adjacent riparian habitat on 927 acres in Cache Slough ROA.
California Department of Fish and Wildlife	Ecosystem Restoration Program Conservation Strategy	Created in 2000. Ongoing program to preserve, restore, and enhance terrestrial natural communities and ecosystems in the San Francisco Bay and Sacramento-San Joaquin Delta. Protected and restored more than 150,000 acres of habitat, including 3,900 acres and 59 miles of riparian and riverine aquatic habitat (as of 2010) after 7 of the planned 30 years of the project.
California Department of Fish and Wildlife	Lower Sherman Island Wildlife Area Land Management Plan	Ongoing program. Directs habitat and species management on 3,100 acres of marsh and open water.
California Department of Fish and Wildlife	Yolo Bypass Wildlife Area Land Management Plan	Ongoing program. Provides for multiple use management of 16,000 acres of mixed agricultural, grassland and managed wetland habitats.
California Department of Water Resources	Central Valley Flood Protection Plan	Proposes significant expansion of flood protection features in the study area, including expansion of the Yolo Bypass.
California Department of Water Resources	Delta Levees Flood Protection Program	Ongoing program. Includes modification to Delta levees within the Sacramento-San Joaquin Delta and portions of the Suisun Marsh. The project works with 60 reclamation districts and strives to complete levee rehabilitation projects with no net loss of habitat in the Delta.
California Department of Water Resources	FloodSAFE California	Promotes public safety through integrated flood management while protecting environmental resources; emphasizes action in the Delta.
California Department of Water Resources	Levee Repair-Levee Evaluation Program	Ongoing program. Upgrading levees along the Sacramento and San Joaquin Rivers and Delta; 1,600 miles of levees included in Central Valley.
California Department of Water Resources	Emergency Drought Barriers Project	Proposed project to limit salinity intrusion into the Delta and preserve upstream reservoir water for other beneficial uses such as instream flows for fish. Only would occur during severe drought conditions, as part of Drought Contingency Strategy.
California Department of Water Resources and MOA Partners	Lower Yolo Restoration Project	In Cache Slough ROA, reintroduce tidal action to half of 3,408-acre Yolo Ranch.
Contra Costa Water District	Contra Costa Canal Fish Screen Project	Completed in 2011. Designed to restore Delta ecosystems. Minor terrestrial impact at fish screen sites.

Agency	Programs, Projects, and Policies	Comments
Contra Costa Water District, U.S. Bureau of Reclamation, and California Department of Water Resources	Contra Costa Water District Middle River Intake and Pump Station (Alternative Intake Project)	Completed in 2010. Resulted in permanent conversion of 6–8 acres of rural agricultural land. Features about 12,000 feet of pipe across Victoria Island and under Old River.
National Marine Fisheries Service, U.S. Bureau of Reclamation, and Department of Water Resources	Biological Opinion (BiOp) on the Long-Term Operations of the Central Valley Project and State Water Project	Ongoing program. Action area consists of the Oroville Reservoir, Feather River downstream of Oroville, Sacramento River downstream of Feather River, Sacramento-San Joaquin Delta, and adjacent habitats that are dependent on or influenced by waterways. Designed to conserve freshwater, estuarine, nearshore, and offshore sites.
U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, and Department of Water Resources	Biological Opinion (BiOp) on the Long-Term Operations of the Central Valley Project and State Water Project	Ongoing program. Action area consists of the Sacramento-San Joaquin Delta, and adjacent habitats that are dependent on or influenced by waterways. Designed to protect delta smelt. Includes 8,000-acre tidal wetland restoration requirement.
Reclamation District 2093	Liberty Island Conservation Bank	Under implementation. Permits and approvals acquired in 2009. Project site is on northern tip of Liberty Island. Over 160 acres in the project site with about 50 proposed to be converted to open water channels, emergent marsh wetland, and riparian habitat. Focuses on Delta fish habitat but will restore 2.7 acres of riparian habitat.
Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, and U.S. Army Corps of Engineers	Central Valley Flood Management Program	Ongoing program. Supports flood management planning in Sacramento and San Joaquin Valleys. To be updated every 5 years with first update to be completed in 2017. Combined total of about 2.2 million acres of land within the Central Valley.
Semi Tropic Water District	Delta Wetlands	Water supply, flood storage, and habitat conservation project on three Delta islands.
U.S. Army Corps of Engineers	CALFED Levee Stability Program	Includes maintaining and improving levee stability in the Delta. Long-term strategy will include ecosystem restoration. Partially funds McCormack-Williamson Tract Restoration in Cosumnes-Mokelumne ROA; 1,500 acres of tidal and floodplain restoration.
U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Department of Water Resources and Department of Fish and Wildlife	San Joaquin River Restoration Program	Initiated in 2006. Ongoing program; 150 miles of the river is planned for restoration, including within the BDCP Plan Area.

Agency	Programs, Projects, and Policies	Comments
U.S. Fish and Wildlife Service	Recovery Plan for Sacramento-San Joaquin Delta Native Fishes	Includes developing additional shallow water habitat, riparian vegetation zones and tidal marsh to restore wetland habitats throughout the Bay-Delta ecosystem.
U.S. Army Corps of Engineers	Sacramento River Bank Protection Project	Provides erosion control to levees of the federally authorized flood control project along the Sacramento River and its tributaries. Ongoing program with NOA/NOP for an additional 80,000 linear feet issued in 2009.
San Luis & Delta-Mendota Water Authority and Bureau of Reclamation	Long Term Water Transfers	Project would facilitate the transfer of up to 600,000 AF per year from willing sellers north of the Delta to buyers south of the Delta or in the San Francisco Bay Area over a 10-year period (2015–2024). Transfers would be conveyed using SWP and CVP south Delta facilities or facilities owned by other agencies in the San Francisco Bay Area. Transfer methods could include groundwater substitution, reservoir release, cropland idling, crop shifting, and conservation.
State Water Resources Control Board	Update to Bay-Delta Water Quality Control Plan: Phase I	Update to the 2006 Bay-Delta Water Quality Control Plan by the State Water Board evaluating and potentially amending existing water quality objectives that protect beneficial uses and the program of implementation to achieve those objectives on the Lower San Joaquin River and Stanislaus, Tuolumne, and Merced Rivers to protect the beneficial use of fish and wildlife and modifying the water quality objectives in the southern Delta to protect the beneficial use of agriculture. Approximate date of completion is 2016.
State Water Resources Control Board	Update to Bay-Delta Water Quality Control Plan: Phase II	A comprehensive update to the 2006 Bay-Delta Plan by the State Water Board that will include evaluating and potentially amending existing water quality objectives that protect beneficial uses and the program of implementation to achieve those objectives. Water quality objectives that could be amended include Delta outflow criteria. Approximate date of completion is 2018.
State Water Resources Control Board	Update to Bay-Delta Water Quality Control Plan: Phase IV	Evaluating and potentially establishing water quality criteria and flow objectives that protect beneficial uses on tributaries to the Sacramento River. Approximate date of completion is 2018.

Agency	Programs, Projects, and Policies	Comments
U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Department of Water Resources and Department of Fish and Wildlife	Interagency Drought Contingency Strategy	Specific to 2015, but reasonably forseeable to occur in similar form in future extreme drought years. Includes the Drought Contingency Plan (see below), as well as other drought-related measures.
U.S. Bureau of Reclamation, Department of Water Resources, and State Water Resources Control Board	Drought Contingency Plan	Specific to 2015, but reasonably forseeable to occur in similar form in future years.
West Sacramento Area Flood Control Agency	Southport Sacramento River Early Implementation Project	The project implements flood risk–reduction measures along the Sacramento River South Levee in West Sacramento. The project brings the levee up to Federal and state flood protection standards, and provides substantial ecosystem restoration (floodplain habitat) and public recreation benefits. Final EIR/EIS completed in 2014/2015, 90% design completed in 2014.
US Bureau of Reclamation and Department of Water Resources	Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan	Plan submitted to NMFS in October 2012; ongoing environmental compliance and implementation process as required by the NMFS 2009 BiOp.
San Joaquin County and California Department of Transportation	Woodward Island Bridge Project (Ferry Ramp Replacement) over Middle River	Currently undergoing ESA-related agency consultation.
US Bureau of Reclamation	Shasta Lake Water Resources Investigation	Draft EIS published 2013. Alternatives include dam modifications (e.g., raising) and ecosystem restoration (e.g., spawning gravel placement).
Delta Stewardship Council	Delta Plan	Became effective with legally-enforceable regulations on September 1, 2013.
U.S. Army Corps of Engineers, San Francisco District/Port of Stockton	San Francisco Bay to Port of Stockton Deepening Project	The Corps is assessing the feasibility of deepening the existing 35-foot channel from the San Francisco Bay to the Port of Stockton to realize significant transportation cost savings. The Program Phase One would deepen the western reach only, with the eastern reach deepened in a second phase. Program and project under development. Draft EIS/EIR expected in 2015.
US Fish and Wildlife Service, Reclamation Districts	Anadromous Fish Screen Program	Ongoing program as part of CVPIA to screen unscreened intakes.

Agency	Programs, Projects, and Policies	Comments
Department of Water Resources	California Water Action Plan	Initiated in January 2014. This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.
Delta Conservancy	California EcoRestore	Initiated in 2015. This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.
U.S. Army Corps of Engineers, Sacramento District	River Islands at Lathrop Section 408 Permission	Construction of a large-scale, mixed-use project consisting of residential development and a commercial complex, which may include open space and recreational amenities. Potential for significant effects on fish caused by entrainment or mortality from suction dredging, pile driving, boat and marina operation. Final Subsequent EIR certified by City of Lathrop in 2003. Draft EIS expected in 2015.
San Joaquin Area Flood Control Agency	Smith Canal Gate Project	Project under development. Construction of a gate-type closure structure at the mouth of Smith Canal adjacent to the San Joaquin River/Stockton Deep Water Ship Channel (DWSC). Draft and Final EIR expected in 2015.
California Department of Water Resources	North Bay Aqueduct Alternate Intake Project	A new alternate intake structure and pump station to draw water from the Sacramento River with state-of-the-art, positive barrier fish screens; a new pipeline segment to convey the water from the alternate intake to a point of connection with the existing NBA near the North Bay Regional Water Treatment Plan. Operations of the NBA (although not at the Alternative Intake site) are included the modeling of the BDCP alternatives, although it is not a component of Alternatives 4A, 2D, or 5A.

Covered Fish Species

Construction and Maintenance of CM1

Impact AQUA-CUM1: Effects of Construction of Facilities on Covered Fish Species

The potential exposure of covered fish species to the cumulative effects of constructing the proposed project and the other projects listed in Table 11-13 include increased turbidity, accidental spills, disturbance of contaminated sediment, underwater noise, fish stranding, in-water work activities,

loss of spawning, rearing or migration habitat, and predation. The construction and maintenance activities occurring under the cumulative effects analysis, would have similar effects on all the covered fish species; therefore, the analysis below is combined for all the covered species instead of analyzed by individual species.

Turbidity

As described in detail under Alternative 1A, in-water and nearshore construction and maintenance activities have the potential to generate and release suspended sediments to the water column, altering aquatic habitat conditions the covered species, as well as other fish species occurring in the area.

Construction and maintenance of projects or programs under the Cumulative Effects analysis (Table 11-13), such as the Sacramento River Bank Protection Project, the tidal restoration projects (Cache Slough, Dutch Slough, etc.), and the Battle Creek Salmon and Steelhead Restoration Project which would involve substantial in-channel and near-channel construction activities (e.g., dredging, dam removal, bank restructuring), would result in the temporary generation and release of suspended sediments to the water column, and other potential construction-related water quality effects. Similarly, routine construction activities that may occur from urbanization and infrastructure to accommodate population growth would generally be anticipated to involve relatively dispersed, temporary, and intermittent land disturbances across the affected environment. Further, certain maintenance activities, such as levee repair and maintenance, could result in temporary increases in water turbidity. Erosion of disturbed soils and associated sediment load would potentially enter surface water bodies. Increased suspended sediments would temporarily increase water column turbidity, altering habitat conditions in the immediate areas of disturbance for fish and other aquatic species. However, adverse effects on fish from increases in turbidity during in- or near-water construction and maintenance activities would be minimized through adherence to applicable federal, state, and local regulations. In addition, project-specific designs, BMPs, and environmental commitments would be required to avoid, prevent, or minimize turbidity (e.g., implementation of site-specific erosion and sediment control plans). Each project would also require its own separate environmental compliance process.

As described in Chapter 8, *Water Quality*, water conveyance operations under the NAA would alter the magnitude and timing of water releases from reservoirs upstream of the Delta as well as alter downstream river flows relative to Existing Conditions. Delta turbidity levels are affected by turbidity in Delta inflows (and associated sediment load), and the influence of tidal actions in the Delta, as they relate to re-suspension of sediments. Overall however, the cumulative effects of turbidity would be similar to Existing Conditions, as many of the projects listed in Table 11-13 are on-going, completed, or very similar to activities that already periodically occur in the Plan Area. Therefore, because no significant cumulative changes in turbidity are expected to occur in the long-term upstream of the Delta, in the Plan Area or in the SWP/CVP Export Service Areas; applicable regulations pertaining to increased turbidity would be adhered to during project-specific construction activities; and BDCP-related changes in turbidity are limited to the Plan Area over a relatively short period of time, covered fish species would not be adversely affected by turbidity changes.

Accidental Spills

As described in detail under Alternative 1A, in-water and nearshore construction and maintenance activities increase the potential for accidental spills entering the area waterways. Potential

construction-related water quality effects associated with the proposed project and other construction projects associated with program actions occurring under the NAA, may include the inadvertent release of construction-related chemicals (e.g., fuels, solvents, and oils) and construction-related wastes (e.g., concrete, asphalt, cleaning agents, paint, and trash) to surface waters, which would result in localized water quality degradation. This could in turn result in adverse effects on covered fish species through direct injury and mortality or delayed effects on growth and survival, depending on the nature and extent of the spill and the contaminants involved. Generally, though, adverse effects on fish from inadvertent spills would be avoided through adherence to applicable federal, state, and local regulations, project-specific design, BMPs, and environmental commitments intended to avoid, prevent or minimize hazardous spills and construction-related hazards and/or mitigate for such occurrences (e.g., spill prevention and control plans and hazardous materials management plans). The likelihood of unmitigated accidental spills occurring in the same area over the same period is extremely low, and each project implemented would require its own separate environmental compliance process. As such, any cumulative effect related to accidental spills would not be significant.

Disturbance of Contaminated Sediments

Sediment in many locations throughout the Plan Area has been affected by historical and current urban discharges (e.g., hydrocarbons, metals, and PCBs), agricultural runoff containing persistent pesticides (e.g., organochlorines), and mercury from historic mining. Projects and programs implemented through the NAA (see Table 11-13) that require in-water construction activities or sediment-disturbing maintenance activities (e.g., periodic channel dredging) have the potential to disturb and re-suspend contaminated sediments, which could result in direct and indirect effects on covered fish species. Additionally, restoration activities included in the alternatives may result in contaminated soil disturbances. However, appropriate BMPs are expected to be implemented to minimize the disturbance and redistribution of these sediments, and because the duration of these activities would typically be limited, it is unlikely that exposure would be prolonged and therefore the potential for adverse effects on fish related to toxicants is minimal. Further, exposure of covered fish species to any disturbed contaminated sediments would be minimized by project permit restrictions on in-water work that would limit times to those when covered fish species are least abundant in the construction or maintenance area. Therefore the effect would not be adverse.

Underwater Noise

With the exception of the proposed project, very few projects identified in Table 11-13 would require the installation of extensive in-channel structures where the use of pile driving is necessary (e.g., cofferdams and diversion intakes), and are not likely to overlap with the BDCP construction period. Additionally, the BDCP alternatives and any other project that would result in underwater noise would be limited to a work window intended to minimize and avoid effects to sensitive fish species. For the BDCP alternatives, the main species of concern is the green sturgeon which has the potential to be in the Plan Area year-round. Through project-specific environmental review, mitigation similar to that proposed for the BDCP alternatives would be required to minimize effects of any other under-water noise. Additionally, none of the projects listed in Table 11-13 are expected to occur within the same area of effects or during the same time period as the underwater noise created for BDCP. Therefore, the potential for adverse cumulative effects on covered fish species would be minimized. As described in detail for Alternative 1A, the effects of exposure to loud underwater noise can range from temporary hearing loss to physical injury sufficient to cause direct mortality or increased predation risks. The degree of effect is a function of the intensity of the sound,

the distance from the source, the duration of exposure, the size of the fish exposed (smaller fish are more sensitive), and the species-specific sensitivity.

Implementation of Mitigation Measure AQUA-1a under the proposed project (see Impact AQUA-1, Alternative 1A) would effectively avoid and minimize adverse effects from impact pile driving. Similar measures are also expected to be required for other projects constructed in the Plan Area, when unmitigated construction noise levels could exceed the potential disturbance or injury thresholds. In addition, other projects are more likely to be of sufficiently small scale that they will have better potential to incorporate additional pile-driving attenuation measures (e.g., bubble curtains), thus reducing their impact further. Therefore, the cumulative effects on covered fish species would be minimized or avoided through project-specific AMMs, BMPs, environmental commitments and/or mitigation measures, which could include seasonal timing restrictions on in-water activities; the use of vibratory pile drivers when possible; the use of noise attenuation devices; and limitations on the duration of impact pile driving activities. In addition, the chance of any individual fish being exposed to more than one project identified in Table 11-13 would be unlikely. Therefore the cumulative effect would not be adverse.

Fish Stranding and Direct Injury

As discussed above, for underwater noise, few projects are expected to require extensive cofferdam construction, and most projects can be implemented in a manner to eliminate or minimize fish stranding effects. In addition, fish would likely avoid the noise and activity of in-water construction and/or maintenance activities. However, direct injury and potential effects of fish stranding would be minimized by implementation of project-specific AMMs, BMPs, environmental commitments and/or mitigation measures, which could include seasonal timing restrictions on in-water activities, and implementation of species-specific fish rescue and salvage plans. As a result, effects would not be adverse.

Loss of Spawning, Rearing, or Migration Habitat

In-water construction and maintenance activities of programs and projects implemented through the late long-term period could temporarily or permanently alter habitat conditions for covered fish species in the vicinity of these activities and thereby adversely affect spawning, rearing and/or migration habitat. For example, any activities that occurs in a species' migration corridor has the potential to affect the behavior (i.e., through a change in migration route within the channel, delay from a noise deterrent, artificial light sources, etc.). Cofferdams used during in-water construction to isolate the work areas, temporarily reduce the width of riverine habitat available to fish for migration and rearing in the area. Further, in-water maintenance activities such as dredging and riprap placement can reduce habitat values. For example, dredging decreases the number of macroinvertebrates in the dredged area, which can cause a temporary loss of prey resources for benthic feeders such as splittail, green sturgeon, and juvenile Chinook salmon.

The fish species affected and the severity or magnitude of any adverse effects on spawning, rearing or migration habitat would depend on several factors including the seasonal timing of the activity, the suitability and/or quality of the habitat to begin with, and the quantity of habitat disturbed. As indicated above, for other in-water construction factors, effects are not expected to be adverse due to the implementation of project-specific AMMs, BMPs, environmental commitments and/or mitigation measures, which could include seasonal timing restrictions on in-water activities, and implementation of species-specific fish rescue and salvage plans. The proposed project and any other activities that would affect spawning, rearing, or migration habitat would require mitigation

for temporary and permanent habitat losses and many of these activities are intended to benefit species through the creation of new or improved rearing and migration habitat (i.e., Southport, Yolo Bypass, Dutch Slough restoration). Most of the BDCP alternatives also include substantial aquatic habitat restoration to benefit rearing and migration conditions for fish, beyond what is required for mitigation. As such, this effect would not be adverse.

Predation

Programs and projects contributing to the cumulative effects on the covered fish species, that involve the construction of in- and over-water structures (e.g., docks and associated pilings) could potentially result in increased predation relative to Existing Conditions. These types of structures can provide suitable predator habitat by providing shade and cover for predatory fishes, and perching areas for piscivorous birds.

Overall, predation risks to covered fish species is expected to increase due to a number of factors, including the continued spread of nonnative species and alteration of habitat conditions in the Plan Area, due primarily to climate change and the continuation of existing conditions. This includes non-native predator fish species that directly prey on native species, as well as invasive aquatic plants, such as water hyacinth and *Egeria.* Increases in these non-native aquatic vegetation species is believed to provide excellent habitat for nonnative ambush predators, such as bass and sunfish, which prey on native fish species. *Egeria* is thought to reduce turbidity through a reduction in water velocity, which has been hypothesized to increase predation rates on some native fish (Brown and Michniuk 2007).

However, structural and operational improvements implemented at the SWP/CVP facilities and programs implemented elsewhere in the Plan Area, to reduce predator habitat, are expected to reduce site-specific predation levels. In addition, the expected amount of in-water and overwater structures likely to be permitted would be small compared to the overall habitat occurring in the Plan Area. Therefore, the effect would not be adverse.

NEPA Effects: Overall, the potential cumulative effects on covered fish species from construction and maintenance activities occurring in the Plan Area would include effects from increased turbidity, accidental spills, disturbance of contaminated sediment, underwater noise, fish stranding, in-water work activities, loss of spawning, rearing or migration habitat, and predation. These effects would be similar to those described for Alternative 1A (Impact AQUA-1 and Impact AQUA-2). Also as described in those sections, these effects would not be adverse because of the limited extent, intensity, and duration of expected construction projects in the Plan Area, and the low likelihood that these effects would overlap in space or time to result in a cumulative effect. In addition, any such construction projects would be subject to a separate environmental compliance process, with permit stipulations which would include the implementation of project-specific AMMs, BMPs, environmental commitments and/or mitigation measures. This would include project-specific erosion and sediment control plans; hazardous materials management plans; SWPPPs; spill prevention and control plans; and limiting in-water activities to periods of low flow and/or to times when covered fish species are not likely to be present.

The construction activity with the greatest potential to affect fish species is the installation of cofferdams (pile driving). While other projects could also require some pile driving activities that could result in cumulative effects, the extent and duration of such activities would be substantially less than those of the alternatives and the potential to overlap in time or space is minimal. However, the implementation of Mitigation Measures AQUA-1a and AQUA-1b, and other similar measures for

other projects, would effectively avoid and minimize adverse effects from impact pile driving. Therefore, the cumulative effects of construction and maintenance projects on covered fish species would not be adverse, and no additional mitigation would be required.

CEQA Conclusion: The potential impact on covered fish species from construction and maintenance activities is considered less than significant due to implementation of the measures described in Appendix 3B, *Environmental Commitments.* Similar measures are expected to be required for other construction and maintenance projects occurring in the Plan Area through the late long-term period. These measures would reduce the amount of turbidity from in-water construction and will guide rapid and effective response in the case of inadvertent spills of hazardous materials. Construction would not be expected to increase predation rates relative to Existing Conditions, but would likely result in both temporary and permanent alteration of rearing and migratory habitats used by some or all of the covered fish species. However, these effects are not expected to be significant because the loss of habitat would not be substantial compared to the amount of habitat currently available in combination with the amount of new habitat that would result from the various restoration actions. Thus, the cumulative effects of most construction or maintenance activities would be less than significant.

While most construction activities would result in less-than-significant effects, the direct effects of underwater construction noise from impact pile driving could be a significant impact because of the high likelihood that it would cause injury or death to fish in the immediate vicinity of the activity. However, implementation of Mitigation Measures AQUA-1a would reduce the potential for effects from underwater noise and would reduce the severity of impacts to a less-than-significant level. Similar measures are expected to be required for other construction and maintenance projects such as levee improvements projects and the construction of the NBA (which is not included in Alternatives 4A, 2D, and 5A) occurring in the Plan Area through the late long-term period, although it is highly unlikely that these effects would occur in the same area and over the same period to result in a cumulative effect.

Mitigation Measure AQUA-1a: Minimize the Use of Impact Pile Driving to Address Effects of Pile Driving and Other Construction-Related Underwater Noise

Please refer to Mitigation Measure AQUA-1a under Alternative 1A, Impact AQUA-1 in Appendix A of this RDEIR/SDEIS.

Impact AQUA-CUM2: Effects of Maintenance of Facilities on Covered Fish Species

NEPA Effects: The discussion of maintenance activity effects are provided above with the construction effects (Impact AQUA-CUM1), and the conclusions would also be the same.

CEQA Conclusion: Maintenance activities would result in similar types of effects as described for construction, but the magnitude, duration, and frequency of effects would likely be much less. As such, the conclusions provided above for the construction activity effects (Impact AQUA-CUM1), would typically be very similar to those expected to occur during maintenance activities.

Water Operations of CM1

Operational impacts on fish may include changes in spawning, migration, and rearing habitat associated with changes in Sacramento River and tributary flows due to reservoir operations, water diversions, and the consequent changes in water quality and circulation through the Delta. These

impacts range from not adverse to adverse, depending on the specific upstream and Delta operations assumed for each alternative. Similarly, cumulative impacts on fish as a result of changes in water operations are likely to vary across alternatives. Considering the projects included in Table 11-13, there are several water operations plans or projects that were not assumed to be operational in the analysis of the action alternatives (e.g., not included in the modeling) but would likely have some impact on water operations as they relate to fish and aquatic resources. Table 11-14 provides a summary of these projects.

Table 11-14. Effects on Fish from the Programs, Projects, and Policies Considered for Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Fish
Contra Costa Water District and Bureau of Reclamation	Los Vaqueros Reservoir Expansion Project	Program under development. Draft EIS/EIR in 2009. Final EIS/EIR in 2010. Completed in 2012.	Project increases the storage capacity of Los Vaqueros Reservoir and diverts additional water from the Delta intake near Rock Slough to fill the additional storage volume (Bureau of Reclamation and Contra Costa Water District 2009).	The Los Vaqueros Expansion Project provides water to South Bay water agencies that otherwise would receive all of their Delta supplies through the existing SWP and CVP export pumps. The purpose of the project is to improve water quality to Bay Area water users and to adjust the pattern of diversions from the Delta to reduce impacts to aquatic resources. The project provides water supplies for previously identified water demands and not for additional non-identified growth. There are no new demands or increased water rights or contract amounts. An environmental impact report has been completed and indicates no significant adverse effects on fish and aquatic resources.
Davis, Woodland, and University of California, Davis	Davis-Woodland Water Supply Project	Program under development. Final EIR in 2009. Specific design and operations criteria not identified, but operation is expected to begin in 2016.	Project that will divert water on the Sacramento River upstream of the American River confluence to be conveyed to a new water treatment plant (City of Davis 2007).	Water diversions under the Davis-Woodland Water Supply Project would be made in compliance with Standard Water Right Permit Term 91, which prohibits surface water diversions when water is being released from CVP or SWP storage reservoirs to meet in-basin entitlements, including water quality and environmental standards for protection of the Sacramento- San Joaquin Delta. Water supply needs during periods applicable to Term 91 would be satisfied by entering into water supply transfer agreements with senior water rights holders within the Sacramento River watershed. The total diversion would be up to 45,000 acre-feet/year. An environmental impact report has been completed and indicates no significant adverse effects on fish and aquatic resources.

Agency	Program/Project	Status	Description of Program/Project	Effects on Fish
U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Services, Department of Water Resources, and Department of Fish and Wildlife	San Joaquin River Restoration Program	Final EIS/EIR and Record of Decision completed in 2011.	Program that aims at restoring flows to the San Joaquin River from Friant Dam to the confluence of Merced River (Bureau of Reclamation 2011).	The San Joaquin River Restoration Program would modify the release pattern of water from Friant Dam into the San Joaquin River, implement a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduce Chinook salmon into portions of the San Joaquin River. Part or all of water released from Friant Dam could be recirculated to upstream water users. A final environmental impact report has been completed and indicates no significant adverse effects on fish and aquatic resources. The project has the potential to result in beneficial impacts for salmonids.
San Luis & Delta-Mendota Water Authority and Bureau of Reclamation	Long Term Water Transfers	Program under development. Draft EIS/EIR in 2014. Final EIS/EIR expected in early 2015.	Project would facilitate the transfer of up to 600,000 AF per year from willing sellers north of the Delta to buyers south of the Delta or in the San Francisco Bay Area over a 10-year period (2015–2024). Transfers would be conveyed using SWP and CVP south Delta facilities or facilities owned by other agencies in the San Francisco Bay Area. Transfer methods could include groundwater substitution, reservoir release, cropland idling, crop shifting, and conservation.	An environmental impact report has been completed and indicates no significant adverse effects on fish and aquatic resources.
State Water Resources Control Board	Update to Bay-Delta Water Quality Control Plan: Phase I	Planning	An update to the 2006 Bay-Delta Water Quality Control Plan by the State Water Board evaluating and potentially amending existing water quality objectives that protect beneficial uses and the program of implementation to achieve those objectives on the Lower San Joaquin River and Stanislaus, Tuolumne, and Merced Rivers to protect the beneficial use of fish and wildlife and modifying the water quality objectives in the southern Delta to protect the beneficial use of agriculture.	Analysis not yet completed. Approximate date of completion is 2016.

Agency	Program/Project	Status	Description of Program/Project	Effects on Fish
State Water Resources Control Board	Update to Bay-Delta Water Quality Control Plan: Phase II	Planning	A comprehensive update to the 2006 Bay-Delta Plan by the State Water Board that will include evaluating and potentially amending existing water quality objectives that protect beneficial uses and the program of implementation to achieve those objectives. Water quality objectives that could be amended include Delta outflow criteria.	Analysis not yet completed. Approximate date of completion is 2018.
State Water Resources Control Board	Update to Bay-Delta Water Quality Control Plan: Phase IV	Planning	Evaluating and potentially establishing water quality criteria and flow objectives that protect beneficial uses on tributaries to the Sacramento River.	Analysis not yet completed. Approximate date of completion is 2018.
U.S. Bureau of Reclamation, Department of Water Resources, and State Water Resources Control Board	Drought Contingency Plan (includes Emergency Drought Barriers project)	Completed for 2015; reasonably forseeable to occur in future years with drought.	Modification of Bay-Delta Water Quality Objectives (e.g., Delta outflow and electrical conductivity requirements) and requirements from 2008/2009 SWP/CVP BiOps to balance supplying human needs, repelling saltwater in the Delta, and providing for cold water needs of Chinook salmon.	Modifications to Delta Cross Channel operations and installation of Emergency Drought Barriers would increase potential for downstream migrating fish to enter the interior Delta (lowering survival). Modification of channel flow requirements (e.g., for San Joaquin River at Vernalis) may reduce survival based on increased travel time/distance. Temporary modification of OMR flow criteria (e.g., < -5,000 cfs) may increase entrainment susceptibility, although intensive monitoring would be done to limit such changes to periods with lower risk. Reduced Delta outflow may reduce delta smelt abiotic habitat and increase potential for negative effects from flow-related stressors (e.g., *Microcystis*).

Agency	Program/Project	Status	Description of Program/Project	Effects on Fish
California Department of Water Resources	North Bay Aqueduct Alternate Intake Project	Notice of Preparation completed in 2009.	A new alternate intake structure and pump station to draw water from the Sacramento River with state-of-the-art, positive barrier fish screens; a new pipeline segment to convey the water from the alternate intake to a point of connection with the existing NBA near the North Bay Regional Water Treatment Plan. Operations of the NBA (although not at the Alternative Intake site) are included the modeling of the BDCP alternatives; Alternative 4A does not include operations of the NBA as a covered activity.	As noted for all alternatives except Alternatives 4A, 2D, and 5A (which do not include operations of the NBA Alternate Intake Project), creation of a new point of diversion on the Sacramento River for the NBA would reduce entrainment of fish less than 25 mm occurring in the Cache Slough subregion.
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential for beneficial and adverse effects on fish species depending on the specific water management strategy
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential beneficial effects on fish habitat from construction of restoration actions.

As noted in Table 11-14, some of these plans and projects have completed final environmental documents that analyzed their potential impacts on fish and aquatic resources. According to these documents, the impacts on fish and aquatic resources would be less than significant or less than significant after mitigation measures are implemented.

Implementation of these plans and projects in combination with the BDCP generally is not anticipated to result in a significant change in flows in the locations considered in environmental documentation for these projects related to surface water resources beyond those changes presented above in the analysis of action alternatives. However, climate change conditions are predicted to negatively affect fish habitat throughout the Central Valley and Delta as a result of warmer temperatures and sea level rise. Some of the projects included in Table 11-14 will mitigate for some of these effects, including the NMFS 2009 BiOp RPA which accounted for climate change effects on NMFS-managed species. However, the actual projects and programs that are considered as part of the cumulative analysis would not cumulatively cause significant negative changes to the entrainment of covered fish species, or on the spawning, rearing, and migration habitat conditions for these species beyond those changes presented above in the analysis of action alternatives (when climate changes is factored out). There is the potential for several plans or projects to improve spawning and rearing habitat upstream of and within the Plan Area (e.g., NMFS 2009 BiOp RPA, Battle Creek Salmon and Steelhead Restoration Project, California Water Action Plan, and Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan). The following impact discussions present these conclusions. In addition to the projects and plans with completed environmental documentation, other projects and plans (in particular the State Water Resources Control Board Update to Bay-Delta Water Quality Control Plan Phases I, II, and IV) and the California Water Action Plan could result in substantial changes to flows in upstream areas and within the Plan Area.

Impact AQUA-CUM3: Effects of Water Operations on Entrainment of Covered Fish Species

Numerous methods were used to estimate entrainment losses under the NAA, and a complete analysis can be found in the *BDCP Effects Analysis – Appendix B*, *Entrainment, Section B.5 – Methods of Biological Analysis* (hereby incorporated by reference). Overall the primary mechanism for entrainment losses in the Plan Area is the operation of the existing south Delta export facilities, and the implementation of the proposed project would be the primary mechanism for altering the level of these entrainment losses. Simulations of entrainment conditions differ depending on the time period modeled and the variables included in the entrainment assessment method. However, overall, the general decrease in exports from the south Delta export facilities under all alternatives, together with other measures to limit entrainment (e.g., operable barriers under Alternative 4, Alternative 4A, and Alternative 9) would be expected to generally reduce entrainment relative to existing conditions, with variation in the life stages affected, water year types in which reductions occur, and the overall magnitude of the reduction. Accounting for climate change and sea level rise, entrainment under the alternatives was similar or slightly lower than under NAA, although compared to existing conditions, the NAA would increase entrainment. The alternatives would similarly increase entrainment compared to Existing Conditions. Despite the modeled increases in entrainment under alternatives relative to Existing Conditions, entrainment loss is not expected to reach the level of adverse effects on delta smelt under any alternative (or, indeed NAA or Existing Conditions), primarily due to the continued implementation of restrictions implemented as part of the USFWS 2008 BiOp, and continued improvements in water export and fish salvage operations, as well as efforts to divert covered fish species from exposure to the south Delta facilities.

There is also no evidence of substantial entrainment at other intakes in the Plan Area, and any future or recently completed intakes (e.g., the Los Vaqueros Reservoir Expansion Project, the Davis-Woodland Water Supply Project, and the North Bay Aqueduct Alternative Intake Project [a cumulative project for Alternative 4A]; Table 11-14), would be screened appropriately to minimize or eliminate entrainment, although some entrainment will continue to occur. Whatever entrainment is occurring would be reduced by continued efforts to screen the existing intakes in the Plan Area, including under the USFWS Anadromous Fish Screen Program (Table 11-13). While the effectiveness of the salvage operations at the south Delta facilities is relatively low, it has improved in recent years (e.g., with the 2014 implementation of some traveling screens instead of some of the louvers at the CVP fish salvage facility), and will continue to improve in the future (U.S. Fish and Wildlife Service 2008a). A substantial portion of this improvement would occur through the reduced use of the SWP/CVP south Delta facilities as part of the proposed project and alternatives.

General improvements implemented during the NAA timeframe are expected to reduce entrainment losses of covered fish species through the implementation of the NMFS and USFWS BiOp requirements (National Marine Fisheries Service 2009; U.S. Fish and Wildlife Service 2008a), particularly the reverse OMR flow criteria, court-ordered restrictions on water operations, and actions taken by the water project operators in accordance with biological opinions (National Marine Fisheries Service 2009; U.S. Fish and Wildlife Service 2008). In addition, on-going and future operational improvements at the SWP/CVP south Delta facilities, and reduced use of these facilities under the proposed project, are expected to continue to reduce the rate of entrainment from water exports from the Delta, under the NAA. As noted in Table 11-14, drought-related modifications to some regulations may be put in place temporarily, e.g., OMR flows below the typical -5,000-cfs winter/spring limit of the SWP/CVP BiOps in order to capitalize on brief increases in flows because of short storms during otherwise critically dry conditions; this could slightly increase entrainment risk, although intensive monitoring efforts (such as occurred in 2014 and 2015) would aim to minimize any such risks. Diversions at the proposed north Delta intakes would be exceedingly limited in critically dry years because of bypass flow requirements. Additionally, real-time operations included in Alternative 4A would allow for adjustments at the north and south Delta export facilities to minimize entrainment risks under all hydrologic conditions.

NEPA Effects: The cumulative effects of water operations on entrainment would not be adverse to the covered fish species.

CEQA Conclusion: Implementation of south Delta export pumping restrictions under the NMFS and USFWS BiOp requirements (National Marine Fisheries Service 2009; U.S. Fish and Wildlife Service 2008a) has considerably limited entrainment loss of covered fish species. This would continue into the future, under the cumulative effects assumptions, along with enhancements to reduce overall entrainment at the SWP/CVP facilities and improve operation procedures. The reduced use of the SWP/CVP south Delta facilities under the BDCP alternatives is also expected to substantially reduce overall entrainment rates from water exports in the Delta. Therefore, the cumulative impact would be less than significant and no mitigation would be required.

Impact AQUA-CUM4: Effects of Water Operations on Spawning and Egg Incubation Habitat for Covered Fish Species

***NEPA Effects*:** Hydrology would change under implementation of the action alternatives, as previously described in this chapter. These changes are a result of implementing the various operational scenarios associated with each alternative. Plans and projects in Tables 11-13 and 11-14

also have the potential to change hydrology and/or spawning habitat through physical modifications to habitat, increased access to habitat, and/or changes in flows. Cumulative effects to the extent and quality of spawning habitat would occur if physical habitat was modified or if changes in flow on the Sacramento and San Joaquin rivers and/or their tributaries result in substantially reduced spawning habitat, increased water temperatures, or increased occurrences of redd dewatering. Plans such as the CWAP, SJRRP, Battle Creek winter-run reintroduction plan, and components of the NMFS BiOp (2009) have the potential to substantially improve spawning and egg incubation conditions for fish that spawn in upstream tributaries. In the Delta, the conditions are expected to decline a result of climate change conditions, which may have adverse effects on delta smelt and longfin smelt spawning habitat as a result of increased salinities and temperatures. Depending on timing and volume, SWRCB regulations and water transfers may also contribute to improved conditions. Although the purpose of most of these programs is to improve or protect conditions for fish, the total cumulative benefit of these activities is speculative because these activities have not completed environmental review. Additionally, climate change is expected to substantially increase temperatures over time and may result in adverse effects on these species. Other projects would be implemented to offset these effects to the extent possible. For example, the current BiOps for SWP and CVP operations address climate change effects through changed operations, habitat restoration, and other measures designed to improve species resiliency. However, climate change effects may still occur. Alternatives 1A–1C, 2A–D, 3, 5, and 8 would contribute to cumulative adverse effects on spawning habitat, with other projects potentially mitigating these effects. However, implementation of other projects in combination with Alternatives 4, 4A, 5A, 6A–6C, 7, and 9 would not result in cumulative adverse effects on spawning habitat because these alternatives do not cause effects to spawning habitat of covered species, and would therefore not contribute to the cumulative effect.

CEQA Conclusion: Alternatives 1A–1C, 2A–D, 3, 5, and 8 could result in significant cumulative impacts on spawning habitat when considered with other projects, some of which could cause additional degradation of spawning habitat (climate change) and some of which could potentially mitigate these effects, as described above in NEPA Effects for this impact. However, implementation of these projects in combination with Alternatives 4, 4A, 5A, 6A–6C, 7, and 9 would not result in significant cumulative effects on spawning habitat because these alternatives do not cause effects to spawning habitat of covered species. No mitigation is required.

Impact AQUA-CUM5: Effects of Water Operations on Rearing Habitat for Covered Fish Species

NEPA Effects: As described above for spawning and egg incubation habitat, hydrology would change under implementation of the action alternatives, as previously described in this chapter. These changes are a result of implementing the various operational scenarios associated with each alternative. Plans and projects in Tables 11-13 and 11-14 also have the potential to change hydrology and/or rearing habitat. Cumulative effects to the extent and quality of rearing habitat would occur if physical habitat was modified or if changes in flow on the Sacramento and San Joaquin rivers and/or their tributaries result in substantially reduced rearing habitat because of substantially reduced Delta outflow or increased water temperatures, depending on specific-species tolerances and needs. Plans such as the CWAP, SJRRP, Dutch Slough restoration, Cache Slough restoration, Southport restoration, Yolo Bypass restoration, and components of the NMFS BiOp (2009) have the potential to substantially improve rearing habitat for salmonids and splittail. Depending on timing and volume, the updated SWRCB WQCP may also contribute to improved rearing conditions. Although the purpose of most of these programs is to improve or protect

conditions for fish, the total cumulative benefit of these activities is speculative because these activities have not completed environmental review. Other activities, however, may adversely affect rearing habitat, but environmental review is not complete. Additionally, climate change is expected to substantially increase temperatures over time and may result in adverse effects on these species. In the Delta, the conditions are expected to decline a result of climate change conditions, which may have adverse effects on delta smelt and longfin smelt rearing habitat as a result of increased salinities and temperatures. Other projects would be implemented to offset these effects to the extent possible. Alternatives 1A–1C, 2A–2C, 3, 5, 7, and 8 may contribute to cumulative adverse effects on rearing habitat if combined with other projects that would adversely affect rearing habitat. However, Alternatives 2D, 4, 4A, 5A, 6A–6C, and 9 would not contribute to cumulative adverse effects on rearing habitat because these alternatives do not cause effects to rearing habitat of covered species. However, as noted in section 5.1.2 and above, the Delta Reform Act specifies that no construction of any conveyance facilities can begin until the State Water Board approves any new points of diversion, and that such approval must include appropriate flow criteria. The Act also specifies that the flow criteria be subject to modification through adaptive management. Accordingly, operations and flows proposed and analyzed in the Draft EIR/EIS and RDEIR/SDEIS may ultimately be modified through the State Water Board permitting process to comply with the terms of the updated Bay-Delta Plan (see Table 11-14). The flow objectives provided by the State Water Board would be implemented to achieve Delta environmental objectives, and therefore would be adhered to under any of the considered alternatives.

CEQA Conclusion: Alternatives 1A–1C, 2A–2C, 3, 5, 7, and 8 could result in significant cumulative impacts on rearing habitat, when considered with other projects, some of which could cause additional degradation of rearing habitat and some of which could potentially mitigate these effects. However, implementation of these projects in combination with Alternatives 2D, 4, 4A, 5A, 6A–6C, and 9 would not result in significant cumulative impacts on rearing habitat because these alternatives do not cause effects to rearing habitat of covered species.

Impact AQUA-CUM6: Effects of Water Operations on Migration Habitat for Covered Fish Species

NEPA Effects: As described above for spawning and egg incubation habitat and rearing habitat, hydrology would change under implementation of the action alternatives, as previously described in this chapter. These changes are a result of implementing the various operational scenarios associated with each alternative. Plans and projects in Tables 11-13 and 11-14 also have the potential to change hydrology and/or migration habitat. Cumulative impacts to migration habitat would occur if changes in flow on the Sacramento and San Joaquin Rivers and/or their tributaries result in substantially reduced migration habitat because of reduced flows or increased water temperatures, which provide environmental cues for some species to trigger the timing of migration. However, the completed environmental analyses for many of these plans and projects indicates that there would not be any adverse effects on fish and aquatic resources, including migration habitat. Plans such as CWAP and water transfers and future SWRCB regulations may improve migration conditions, depending on timing and volume of water added to the current flows. Additionally, the restoration of Yolo Bypass can substantially improve migration conditions for salmonids entering the Delta from the Sacramento River and the SJRRP would provide increased flows for San Joaquin River fish. Combined with reduced use of the south Delta facilities under most of the BDCP alternatives, this would result in substantially improved migration conditions for San Joaquin River fish. However, climate change is expected to substantially increase temperatures over

time and may result in adverse effects on these species. Other projects would be implemented to offset these effects to the extent possible. However, Alternatives 1A–1C, 2A–2D, 3, 4, 5A, 6A–6C, and 8 would result in a considerable contribution to cumulative effects on fall-run migration habitat, due to substantial modeled reductions in flow during their migration period. The alternatives include mitigation (Mitigation Measures 78a, 78b, and 78c) to attempt to make adjustments such that these effects would be avoided or minimized, but the extent to which adjustments can be made without fundamentally changing the alternative is unknown. Combined with ongoing CVP operations, and other activities that have the potential to reduce in-stream flows, there is a potential for a cumulative effect.

Under Alternative 4A, there are modeled flow reductions, but the changes can be mitigated by slight shifts in the timing of reservoir releases that would not fundamentally change the alternative, but that would minimize or avoid migration effects on fall-run Chinook salmon. Mitigation Measure AQUA-78d is included in Alternative 4A (Impact AQUA-78). Combined with ongoing CVP operations, and other activities that have the potential to reduce in-stream flows, there is a potential for a cumulative effect from Alternative 4A. However, Mitigation Measure AQUA-78d would ensure that Alternative 4A's contribution to this cumulative effect is not considerable. Implementation of these projects in combination with Alternatives 5, 7, and 9 would not result in cumulative adverse effects on migration habitat because these alternatives do not cause effects to migration habitat of covered species. However, as noted in section 5.1.2 and above, the Delta Reform Act specifies that no construction of any conveyance facilities can begin until the State Water Board approves any new points of diversion, and that such approval must include appropriate flow criteria. The Act also specifies that the flow criteria be subject to modification through adaptive management. Accordingly, operations and flows proposed and analyzed in the Draft EIR/EIS and RDEIR/SDEIS may ultimately be modified through the State Water Board permitting process to comply with the terms of the updated Bay-Delta Plan (see Table 11-14). The flow objectives provided by the State Water Board would be implemented to achieve Delta environmental objectives, and therefore would be adhered to under any of the considered alternatives.

CEQA Conclusion: Implementation of the projects in Tables 11-13 and 11-14 in combination with Alternatives A–1C, 2A–2D, 3, 4, 5, 4, 5A, 6A–6C, and 8 could result in cumulative impacts on migration habitat when considered with other projects, some of which could cause additional degradation of migration habitat and some of which could potentially mitigate the effects. Under Alternative 4A, there are modeled flow reductions, but the changes can be mitigated by slight shifts in the timing of Shasta, Folsom, and/or Oroville Reservoir releases that would not fundamentally change the alternative, but that would ameliorate changes in instream flows that would cause an adverse effect on fall-run Chinook salmon. Based on the timing of the modeled flow fluctuations, it is expected that adjustments to minimize drastic changes in releases during operations among various months in which there are increases and decreases in flow, will minimize or avoid substantial reductions in flow without effects on existing applicable regulations or operations. Mitigation Measure AQUA-78d is included in Alternative 4A (Impact AQUA-78). Combined with ongoing CVP operations, and other activities that have the potential to reduce in-stream flows, there is a potential for a cumulative effect from Alternative 4A. However, Mitigation Measure AQUA-78d would ensure that Alternative 4A's contribution to this cumulative effect is not considerable. Implementation of these projects in combination with Alternatives 5, 7, and 9 would not result in significant cumulative impacts on migration habitat because this alternative does not cause effects to migration habitat of covered species.

Restoration Measures (CM2, CM4–CM7, and CM10)

Impact AQUA-CUM7: Effects of Restoration Measures on Covered Fish Species

The BDCP conservation measures under most alternatives include implementation of an extensive suite of restoration activities intended to enhance ecosystem functioning and promote conservation and recovery of covered fishes; for Alternative 4A, a considerably smaller extent of restoration is proposed. The effects of restoration under the alternatives are expected to be similar to those resulting from the other programs and projects listed in Table 11-13, e.g., several tidal restoration projects. Therefore, the cumulative effects would incrementally alter the relative level of the effects, but not significantly change the nature of the effects.

NEPA Effects: Overall, the implementation of the conservation measures would result in short-term negative effects on habitat conditions, but the long-term effects would generally be beneficial to the covered fish species. These short-term effects could include the potential for increased turbidity and methylmercury exposure, accident spills, disturbance of contaminated sediments, disturbance from in-water activities, and increased predation.

Even with the large areas of proposed restoration provided by most of the BDCP alternatives, and the other projects and programs throughout the Plan Area, these activities would occur over a number of years and spread out geographically. Additionally most restoration-related effects would occur outside the water until levees are breached, at which time, most effects would be neutral or positive. As a result, simultaneous restoration projects would likely be limited and dispersed, and would have minimal potential for cumulative adverse effects. Therefore, the cumulative effects from short-term restoration activities are not adverse to the covered species, and any effects would likely be localized, sporadic, and of low magnitude, and would be more than offset by the collective benefits of broad-scale habitat restoration programs throughout the Plan Area. Therefore the cumulative effect would be beneficial, and no additional mitigation would be required.

CEQA Conclusion: Habitat restoration activities could result in short-term effects on covered fish species, primarily as a result of the potential for increased turbidity and potential for contaminated sediments to enter the water column. Given the minimal extent of anticipated adverse impacts and the substantial net-benefits of habitat restoration, these cumulative impacts would be less than significant and no additional mitigation would be necessary.

Other Conservation Measures (CM12–CM19 and CM21)

Impact AQUA-CUM8: Effects of Other Conservation Measures on Covered Fish Species

In addition to the conservation measures related to habitat restoration actions, the BDCP includes conservation measures that improve existing habitat conditions or enhance fish populations. Most alternatives include the full suite of conservation measures, whereas Alternatives 4A, 2D, and 5A are limited to CM12, CM15, and CM16. As with the restoration conservation measures, the cumulative effects of these other conservation measures would include similar corresponding activities occurring through other projects or programs in the Plan Area (see Table 11-13). Overall, the effects of most of these measures would be individually and cumulatively beneficial. The following assessment is based on the more detailed analysis included in BDCP *Effects Analysis – Appendix F, Biological Stressors* (hereby incorporated by reference).

As indicated above, the BDCP would provide a long-term comprehensive program to address a wide range of stressors on the covered fish species, and some existing and future conservation measures would complement and cumulatively add to the overall effectiveness of these programs. For example, *CM12 Methylmercury Management* will be developed and implemented in coordination with efforts of the Central Valley Regional Water Quality Control Board to comply with Methylmercury TMDL standards. This conservation measure will minimize conditions that promote production of methylmercury in restored areas and its subsequent introduction to the foodweb and the covered species. Modeling of water operations effects of the BDCP show little changes in methylmercury concentrations in water or fish tissue, although methylmercury concentrations in both media would be expected to continue to exceed criteria under all the action alternatives. For Alternative 4A, CM12 would be implemented for the limited extent of restored habitat required to offset the facilities constructed under CM1.

Under *CM13 Invasive Aquatic Vegetation Control*, the BDCP would contribute to the control of invasive species in the Plan Area, through chemical and mechanical treatment in BDCP restoration sites, to ensure that the benefits of these restoration projects are not eroded by invasive vegetation expansion. The BDCP will provide additional funding for project such as the current California Department of Boating and Waterways (DBW) water hyacinth and *Egeria densa* control programs, and the DWR Watercraft Inspection Program to reduce the spread of invasive aquatic vegetation. Under *CM13 Invasive Aquatic Vegetation Control*, BDCP is expected to treat an average of 1,679–3,358 acres per year of tidal habitat throughout the Delta (5–10% of the acreage of tidal habitat areas within and outside restoration sites).

The BDCP (CM14 *Stockton Deep Water Ship Channel Dissolved Oxygen Levels*) would provide funding for the continued operation of an aeration facility in the ship channel, as well as the implementation of measures to improve the facility's effectiveness in meeting BDCP biological goals and objectives. This conservation measure would also coordinate with the Central Valley Regional Water Quality Control Board to meet EPA water quality standards with regard to the established dissolve oxygen TMDL requirements.

While existing predator control measures would also continue to be implemented, the BDCP (CM15 *Predator Control*) would provide additional funding to expand the programs, and more effectively target specific predation hot spot areas. This conservation measure would be implemented in conjunction with other measures, such as *CM13, Invasive Aquatic Vegetation Control,* to reduce predator habitat as well the direct reduction of predator populations. Alternative 4A's implementation of CM15 would be limited to the proposed north Delta intakes and the south Delta export facilities.

Similarly, the BDCP (CM16 *Nonphysical Fish Barriers*) would enhance and expand the current DWR program for installing non-physical fish barriers to increase survival of covered fish in the Delta. Non-physical barriers control the distribution of covered fish species to minimize movements into areas of high predation or entrainment risks. This conservation measure is expected to benefit some of the covered fish species (particularly juvenile salmonids), although these structures have not been proven to be effective to deter such species as delta smelt and longfin smelt. Alternative 4A's implementation of nonphysical barriers would be limited to a single barrier at the divergence of Georgiana Slough from the Sacramento River. This important location would have the potential to offset negative effects to downstream juvenile salmonid migration from implementation of aspects of Drought Contingency Plans such as additional openings of the Delta Cross Channel and Emergency Drought Barriers.

The expansion of the existing DFG's Delta-Bay Enhanced Enforcement Program, through the BDCP (CM17 *Illegal Harvest Reduction*), would further reduce the illegal harvest of covered fish species. Implementation of this conservation measure will provide funds to DFG to hire and equip about 17 additional game wardens assigned to the Delta-Bay Enhanced Enforcement Program. Enhanced enforcement on poaching will contribute toward reducing mortality and potentially increasing population sizes of covered species, such as sturgeon, Chinook salmon (all races), steelhead and Sacramento splittail.

While the existing University of California, Davis conservation hatchery would continue to operate, the BDCP (CM18 *Conservation Hatcheries*) would provide additional funding and support to improve the performance and/or biological effectiveness of the program through the adaptive management and monitoring process. The goals of this conservation measure is to expand the refugial populations of delta smelt and longfin smelt, and maintain them over the long term.

The implementation of CM19 *Urban Stormwater Treatment*, under the BDCP, would provide an additional source of funding for grants to entities such as the Sacramento Stormwater Quality Partnership, and area cities and counties, whose stormwater contributes to Delta waterways under NPDES MS4 stormwater permits. These grants would help to implement actions from, and in addition to, their respective stormwater management plans. Reducing the amount of pollution in stormwater runoff entering Delta waterways will benefit delta smelt, white sturgeon, steelhead, and Chinook salmon (Essex Partnership DRERIP 2009).

Upgrades to existing nonproject diversions to reduce entrainment of covered fish species, and their prey, would also continue to occur over time under the BDCP (CM21 *Nonproject Diversions*). There are currently over 2,500 nonproject diversions in the Plan Area, used primarily for diverting water for agriculture, and about 95% of these diversions are unscreened (Herren and Kawasaki 2001). Currently, USFWS's Anadromous Fish Screen Program and DFG's Fish Screen and Passage Program are available to update nonproject diversions, and have implemented over 30 projects in recent years throughout the Central Valley, but these programs primarily focus on providing benefits to anadromous salmonids. *CM21, Nonproject Diversions* would provide additional protection for salmonids, as well as for the other covered fish species. Addressing these other species is expected to reduce entrainment of all fish species occurring in the Plan Area.

Summary

As indicated above, the BDCP would provide a long-term comprehensive program to address stressors on the covered fish, and would also complement other existing and future conservation measures in the Plan Area. For example, CM12 *Methylmercury Management* will be developed and implemented in coordination with efforts of the Central Valley Regional Water Quality Control Board to comply with Methylmercury TMDL standards. Ongoing efforts to control invasive aquatic vegetation by DWR will be supplemented by the BDCP (CM13 *Invasive Aquatic Vegetation Control*) through additional programs and as a direct funding source. Implementation of CM14 *Stockton Deep Water Ship Channel Dissolved Oxygen Levels* would also provide funding for the continued operation of an aeration facility in the ship channel, as well as the implementation of measures to improve the facility's effectiveness in meeting BDCP biological goals and objectives. This conservation measure would also be coordinated with the Central Valley Regional Water Quality Control Board efforts, to meet EPA water quality standards with regard to the established dissolve oxygen TMDL requirements.

While existing predator control measures would also continue to be implemented, the BDCP (CM15 *Predator Control*) would expand these efforts and provide direct funding for some of these existing efforts. Similarly, implementation of CM16 *Nonphysical Fish Barriers* will supplement existing efforts by DWR to install non-physical fish barriers to increase survival of juvenile salmonids in the Delta, and expand similar protection to the other covered fish species. The expansion of the existing DFG's Delta-Bay Enhanced Enforcement Program, through the implementation of the BDCP (CM17 *Illegal Harvest Reduction*), would further reduce the illegal harvest of covered fish species, particularly sturgeon, salmon and steelhead. While the existing University of California, Davis conservation hatchery would also continue to operate, the BDCP (CM18 *Conservation Hatcheries*) would provide additional funding and monitoring efforts to improve the efficiency and effectiveness of the program into the future.

All major urban centers in the Delta, including Sacramento, Stockton, and Tracy, and multiple smaller cities will continue to comply with National Pollutant Discharge Elimination System (NPDES) MS4 permits to develop and implement a stormwater management plan or program with the goal of reducing the discharge of pollutants under the Clean Water Act (CWA). The implementation of CM19 *Urban Stormwater Treatment* under the BDCP, would provide an additional source of funding for these and other entities in the Plan Area to implement these programs.

NEPA Effects: These BDCP conservation measures are intended to reduce stressors to covered species and have overall neutral or beneficial effects. They would also be compatible with existing and expected future measures implemented in the Plan Area, thereby enhancing the prospects of benefitting the covered species. Therefore, the overall effects would be beneficial. The reduced suite of other conservation measures under Alternative 4A, in combination with measures from other projects, would be less but still beneficial overall.

CEQA Conclusion: As indicated above, the conservation measures included in the BDCP are designed specifically to benefit the covered fish species. When these are implemented in coordination with, or in addition to, existing or future conservation measures occurring throughout the Plan Area, the cumulative effect would be an overall benefit to the covered species. Therefore, the effect would be less than significant. This conclusion also applies to Alternative 4A, which has a reduced suite of conservation actions, but would still benefit fish species overall.

Non-Covered Fish Species of Primary Concern

Construction and Maintenance of CM1

The cumulative effects of construction and maintenance activities occurring in the Plan Area, with the implementation of the BDCP, would be similar for both the covered and non-covered fish species. These effects would also be similar for all the non-covered species; therefore, the analysis below is combined for all non-covered species instead of analyzed by individual species.

Impact AQUA-CUM7: Effects of Construction of Facilities on Non-Covered Fish Species

Refer to Impact AQUA-199 under Alternative 1A for a detailed discussion of the types of effects that in-water and near water construction and restoration activities would have on the non-covered fish species of primary concern, as these types of effects would be similar for all such construction activities expected to occur in the Plan Area. As indicated above, for the covered fish species (Impact AQUA-CUM1), potential mechanisms of cumulative effects on non-covered fish species would include turbidity, accidental spills, disturbance of contaminated sediment, underwater noise, fish

stranding, in-water work activities, loss of spawning, rearing or migration habitat, and increased predation. However, as described above for the covered fish species, the cumulative effects would not be adverse because of the limited extent, intensity, and duration of expected construction projects occurring outside of the BDCP activities.

In addition, any such construction projects would be subject to separate environmental compliance processes, with permit stipulations which would include the implementation of project-specific AMMs, BMPs, environmental commitments, and mitigation measures. This would include project-specific erosion and sediment control plans; hazardous materials management plans; SWPPPs; spill prevention and control plans; and limiting in-water activities to periods of low flow and/or to times when non-covered fish species are not likely to be present.

NEPA Effects: The cumulative effects of construction projects on the non-covered fish species of primary concern would not be adverse.

CEQA Conclusion: For other projects that include in-water construction and maintenance activities, there would be the potential to stress, injure, or kill non-covered fish species through direct or indirect effects, and the potential to alter spawning, rearing and/or migration habitat of non-covered fish species through direct loss or modification. However, as described above for the covered fish species, the cumulative effects would not be adverse because of the limited extent, intensity, and duration of expected construction projects. Moreover, such projects would be subject to specific environmental permitting processes, which would minimize potential effects through the implementation of project-specific AMMs, BMPs, environmental commitments and/or mitigation measures. Thus, the construction-related cumulative impacts would be less than significant, and no additional mitigation would be required.

Impact AQUA-CUM8: Effects of Maintenance of Facilities on Non-Covered Fish Species

NEPA Effects: The discussion of potential maintenance activity effects would be similar to the discussion provided above with the construction effects (Impact AQUA-CUM1) on the covered fish species, and as concluded, the effect would not be adverse.

CEQA Conclusion: Maintenance activities would result in similar types of effects as described for construction, but the magnitude, duration, and frequency of effects would likely be much less. As such, the effect would be less than significant, and no additional mitigation would be required.

Water Operations of CM1

Impact AQUA-CUM9: Effects of Water Operations on Entrainment of Non-Covered Fish Species

Under Existing Conditions, non-covered fish species are expected to occur in salvage operations at the south Delta facilities throughout the year. This would include eggs, larvae, juvenile, and adult life stages of the various fish species entrained at varying times of the year. The implementation of the BDCP would reduce the use of the south Delta facilities under all alternatives except Alternative 9, while proportionally increasing the use of the proposed north Delta facilities, which would be designed to minimize entrainment of all fish species; however, the very early life stages (eggs and larvae) would be susceptible to entrainment if occurring near the proposed north Delta facilities. The increased flexibility in operations provided by the addition of the north Delta export facilities, improvements over time at the south Delta facilities in terms of water export operations and the salvage processes, and the continued implementation of retrofitting programs for other diversions

throughout the Plan Area, are expected to reduce the overall rate of entrainment and loss for juveniles and adults of all fish species over time, in addition to eggs and larvae for species such as threadfin shad that principally occur in the southeast Delta (Grimaldo et al. 2004; Feyrer et al. 2004). The non-covered fish species include some species such as striped bass and American shad that spawn upstream of the proposed north Delta facilities and would have the potential for greater entrainment of the early life stages (eggs and larvae) that are too small to be effectively screened at the north Delta intakes and other typical fish screens, as they migrate downstream into the Delta. The analysis of potential entrainment at the north Delta intakes, south Delta intakes, Delta island consumptive use (agricultural diversions), and North Bay Aqueduct Barker Slough pumping plant for the recirculated EIR/EIS showed that under all alternatives with proposed north Delta intakes, there is the potential for a severalfold increase in spring (March–June) entrainment of early life stages originating in the Sacramento River that move downstream into the Plan Area (see Table 11-mult-5 in Chapter 11, Section 11.3.5, in Appendix A of this RDEIR/SDEIS). Note that the particle tracking modeling upon which this analysis was based did not assume that North Bay Aqueduct Alternate Intake Project was operational, which would increase entrainment of these life stages relative to the modeled Barker Slough pumping plant location. Note also that the particle tracking did not include other water diversions upstream of the Plan Area that are currently operating and that would also cumulatively contribute to entrainment of the smaller early life stages of striped bass and American shad. In addition to the Davis-Woodland Water Supply Project (Table 11-14), there are numerous other potential entrainment locations, including larger facilities listed by NMFS (2009: 265), smaller facilities listed by Vogel (2013), the City of Sacramento water intake, and the Freeport Regional Water Authority intake, among others.

NEPA Effects: The cumulative effect on entrainment of the non-covered fish species would vary by species and alternative. The minimal spatial overlap with the Plan Area for bay shrimp, hardhead, and Sacramento-San Joaquin roach means that the cumulative effect on entrainment would not be adverse for these species. The primary occurrence of threadfin shad in the south Delta subregion, where entrainment would be reduced (most alternatives) or remain similar to the NAA because of similar south Delta exports (Alternative 9), means that the cumulative effect on entrainment on this species would not be adverse. The occurrence of tule perch primarily in nearshore heavy cover or rip-rap habitat, as well its widespread occurrence and small representation in south Delta salvage, means that the cumulative effect on this species would not be adverse. Similarly, largemouth bass are nearshore littoral species that have not been shown to be entrained in proportion to hydrodynamic factors such as OMR flows (Grimaldo et al. 2009), so the cumulative effect on entrainment on this species would not be adverse. For striped bass and American shad, the analysis presented in section Chapter 11, Section 11.3.5, in Appendix A based on particle tracking modeling demonstrated that there is the potential for an appreciable increase in entrainment of eggs and larvae entering the Plan Area from the Sacramento River under all alternatives except Alternative 9. However, as described in Chapter 11, Section 11.3.5, in Appendix A of this RDEIR/SDEIS, density-dependence during the juvenile stages of the striped bass life cycle means that losses of early life stages do not necessarily translate into proportional reductions in abundance of older individuals, and entrainment has not recently been identified as a significant driver of juvenile abundance (Mac Nally et al. 2010; Thomson et al. 2010). American shad early life stages may rear to sufficiently large size above the Plan Area to avoid entrainment at the north Delta intakes. Entrainment of the early life stages of striped bass and American shad at the north Delta intakes may be moderated by real-time operational adjustments being made under Alternative 4A during the spring to benefit covered fishes such as spring-run Chinook salmon. Note that the results presented in Table 11-mult-5 in Chapter 11, Section 11.3.5, in Appendix A of this RDEIR/SDEIS for Alternative 4 and Alternative 4A

reflect the H3 and H3_ELT scenarios, whereas spring entrainment under the H4 and H4_ELT scenarios would be somewhat less. Note also that although the north Delta intake screens are estimated to include larvae or juvenile fish of around 20–22 mm and larger, they may also exclude smaller fish to some extent, based on observations from other fish screens in the Delta (Nobriga et al. 2004). Nevertheless, the potential for an adverse effect remains for any alternative that includes north Delta intakes. Thus the cumulative effect on entrainment of striped bass and American shad would be adverse for Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 4A, 5, 6A, 6B, 6C, 7, and 8; the cumulative effect on entrainment of striped bass and American shad would not be adverse for Alternative 9.

CEQA Conclusion: The impact of water operations on entrainment of non-covered fish species would be the same as described in the *NEPA Effects* section immediately above. The cumulative effects would likely be a substantial reduction in the entrainment of juvenile and adults of fish species occurring in the Plan Area, including the non-covered fish populations; egg and larval entrainment would also decrease for species occurring primarily in the south Delta, and there would be little effect of entrainment on littoral nearshore species (largemouth bass and tule perch). Hardhead, Sacramento-San Joaquin roach, and bay shrimp have little to no potential for entrainment because of minimal occurrence in regions susceptible to entrainment. Thus, the impact would be less than significant and no mitigation would be required under all alternatives for threadfin shad, largemouth bass, tule perch, hardhead, Sacramento-San Joaquin roach, and bay shrimp. The potential appreciable increase in entrainment of the early life stages (eggs and larvae) of striped bass and American shad means that this impact would be significant and unavoidable, notwithstanding the various uncertainties discussed above in the *NEPA Effects*.

Impact AQUA-CUM10: Effects of Water Operations on Spawning and Egg Incubation Habitat for Non-Covered Fish Species

NEPA Effects: Refer to Impact AQUA-202 under Alternative 1A for a detailed discussion of the types of effects expected to occur from water export operations on the non-covered fish species occurring in the Plan Area. These types of effects would continue into the future, although the distribution or magnitude of effects would vary depending on the differential use of the south and north Delta facilities. The overall results indicate that the operational effects would not be adverse, because they would not result in a substantial reduction in spawning habitat for any of the non-covered fish species of primary concern. As described for covered fish species, the modeling for alternatives included most of the current operational components of the system and there are a number of projects that would be implemented in the future to address climate change impacts and other adverse effects expected upstream. As such, the cumulative effects would also not be adverse.

CEQA Conclusion: As discussed above, and in Impact AQUA-202 under Alternative 1A for non-covered fish species, the increased operational flexibility provided by the north Delta facilities is expected to reduce potential effects of water operations on the non-covered fish species, compared to existing water operations. The results indicate that the operational effects would not result in a substantial reduction in spawning habitat for any of the non-covered fish species of primary concern. As described for covered fish species, the modeling for alternatives included most of the current operational components of the system and there are a number of projects that would be implemented in the future to address climate change impacts and other adverse effects expected upstream. Therefore, the cumulative effects would be less than significant, and no mitigation is necessary.

Impact AQUA-CUM11: Effects of Water Operations on Rearing Habitat for Non-Covered Fish Species

NEPA Effects: Refer to Impact AQUA-203 under Alternative 1A for a detailed discussion of the types of effects expected to occur from water export operations on the non-covered fish species, as these types of effects would continue into the future. As noted in section 11.3.5.2, water operations have the potential to affect rearing habitat for striped bass, American shad, and bay shrimp, as these species have established relationships between indices of abundance or survival and freshwater outflow as indexed by X2 during the early life stages (mostly in spring) (Kimmerer et al. 2009). For striped bass and American shad, the mechanism underlying the relationship may be related to extent of rearing habitat, whereas for bay shrimp the mechanism may be the speed or extent of movement to rearing habitat that could influence survival from hatching to settlement (Kimmerer et al. 2009). As described in more detail in section 11.3.5.2, application of the relationships from Kimmerer et al. (2009) suggested that, in relation to NAA/NAA_ELT, under most alternatives there could be relatively small effects (<5% change) of water operations in mean annual rearing habitat and resulting survival or abundance of juvenile striped bass; the exceptions were Alternatives 1A–1C and 3A–3C, for which the analysis suggested 5–10% reductions in some cases, and Alternative 8, for which increases in the range of >5–15% were found. For American shad, mean annual abundance indices estimated from X2 were <5% different from NAA/NAA_ELT under all alternatives except for Alternative 8, for which increases of 9–12% were found. For bay shrimp, the estimated mean annual bay otter trawl abundance index was <5% different than NAA/NAA_ELT under nearly all alternatives. The exceptions were Alternative 4 scenarios H2 and H4 for which there was around a 5–6% increase because of increased spring outflow; and Alternative 8, for which there was a 13% increase because of appreciably increased spring outflow. These results indicate that the operational effects would not be adverse, because they would not result in a substantial reduction in the rearing habitat for any of the non-covered fish species of primary concern. This is particularly true given that most alternatives also include substantial habitat restoration that would provide additional habitat. As a result and because of additional habitat restoration efforts outside the BDCP (Table 11-13), the cumulative effects also would not be adverse.

CEQA Conclusion: As discussed above, and in Impact AQUA-203 for Alternative 1A for non-covered fish species, the operational effects generally would not result in a substantial reduction in rearing habitat for the non-covered fish species of primary concern. However, the analysis of potential water operations-related rearing habitat effects illustrated that in relation to Existing Conditions, there could be significant impacts of the BDCP alternatives on survival or abundance of striped bass, American shad, and bay shrimp. As discussed in Section 11.3.3, because of differences between the CEQA and NEPA baselines, it is sometimes possible for CEQA and NEPA significance conclusions to vary between one another under the same impact discussion. The baseline for the CEQA analysis is Existing Conditions at the time the NOP was prepared. Both the action alternative and the NEPA baseline (NAA/NAA_ELT) models anticipated future conditions that would occur in the ELT (for Alternative 4A) or LLT (all other alternatives), including the projected effects of climate change (precipitation patterns), sea level rise and future water demands. Because the action alternative modeling does not partition the effects of implementation of the alternative from the effects of sea level rise, climate change, and future water demands, the comparison to Existing Conditions may not offer a clear understanding of the impact of the alternative on the environment. The comparison to the NAA/NAA_ELT is a better approach because it isolates the effect of the alternative from those of sea level rise, climate change, and future water demands. In the case of the X2-related analyses of rearing habitat for striped bass, American shad, and bay shrimp, the effect of sea level rise in

particular confounds the interpretation of the effects of the alternatives. Based on the discussion presented above for the *NEPA Effects*, the change in rearing habitat would be less than significant, particularly given the extensive restoration proposed under most alternatives. With additional restoration occurring under some of the cumulative projects from Table 11-13 as well as future flow requirements that are expected to further protect habitats for fish, the cumulative effects also would be less than significant, and no mitigation is necessary.

Impact AQUA-CUM12: Effects of water operations on Migration Habitat for Non-Covered Fish Species

NEPA Effects: Refer to Impact AQUA-204 under Alternative 1A for a detailed discussion of the types of effects from water export operations on the migration habitat for non-covered fish species, as these types of effects would continue to occur into the future. The results indicate that the operational effects would not be adverse, because they would not result in a substantial change in migration habitat conditions for any of the non-covered fish species of primary concern. Considering other projects that have the potential to affect migration habitat, such as changes in flows or habitat availability during migration, it is expected that the current conditions will be maintained through the implementation of the current BiOps, future SWRCB reviews of flow objectives, and planned restoration projects throughout the system. Projects with the potential to adversely affect migration conditions, such as levee repair projects, will require mitigation to ensure that overall migration conditions are not affected. As such, the cumulative effects would also not be adverse.

CEQA Conclusion: Refer to Impact AQUA-204 under Alternative 1A for non-covered fish species for a detailed discussion of the potential effects of water operations on the migration habitat for the non-covered fish species of primary concern. The results indicate that the operational effects would not result in a substantial reduction in migration habitat conditions for any of the non-covered fish species of primary concern. Considering other projects that have the potential to affect migration habitat, such as changes in flows or habitat availability during migration, it is expected that the current conditions will be maintained through the implementation of the current BiOps, future SWRCB reviews of flow objectives, and planned restoration projects throughout the system. Projects with the potential to adversely affect migration conditions, such as levee repair projects, will require mitigation to ensure that overall migration conditions are not affected. As such, the cumulative effects would be less than significant, and no mitigation is necessary.

Restoration Measures (CM2, CM4–CM7, and CM10)

Impact AQUA-CUM9: Effects of Restoration Measures on Non-Covered Fish Species

As described in detail above for the covered fish species, the BDCP under all alternatives except Alternatives 4A, 2D, and 5A would implement a large-scale, long-term comprehensive habitat restoration program in the Plan Area. Alternatives 4A, 2D, and 5A would implement sufficient habitat restoration, but would be to a lesser extent than under the other alternatives. In addition, restoration activities from other programs in the region would also continue to be implemented, although the extent of these activities would typically be limited compared to the size and distribution of the BDCP activities proposed under all alternatives except Alternatives 4A, 2D, and 5A. All of these restoration activities would include enhancing existing habitat, breaching levees and converting agricultural and other upland areas to tidal, shallow water, open water, and floodplain habitats, as well as enhancement of channel margin habitat. Alternatives 4A, 2D, and 5A include restoration to mitigate the effects of the alternatives, and would include enhancing existing habitat,

breaching levees and converting agricultural and other upland areas to tidal, shallow water, and open water habitats, as well as enhancement of channel margin habitat. Other restoration activities in combination with Alts 4A, 2D, and 5A would result in similar types of construction-related effects as well as benefits that are expected of these types of restoration activities.

NEPA Effects: The overall scope of these restoration actions, regardless of alternative, are expected to result in a substantial improvement in the aquatic habitat condition in the Plan Area, improving conditions for all fish species, including the non-covered fish species of primary concern. Construction-related effects of these restoration activities would be similar to those described for the alternatives and are not likely to result in cumulative effects due to the short duration of time of effects from restoration construction, standard minimization measures such as in-water work windows, and the geographic distribution of potential restoration sites. As the intended purpose of these restoration measures is to benefit aquatic species, the cumulative effects related to the resultant restored sites would be beneficial. As such, the cumulative effect of restoration for all alternatives would not be adverse.

CEQA Conclusion: As described above, the BDCP would implement a large-scale, long-term comprehensive habitat restoration program, which would be compatible with other restoration actions expected to occur in the Plan Area. Although Alternatives 4A, 2D, and 5A do not include such a comprehensive restoration program, the cumulative effects of restoration are similar across all alternatives because the types and magnitudes of effects that would occur when considering all potential restoration activities together would be similar. Construction-related effects of these restoration activities would be similar to those described for the alternatives and are not likely to result in cumulative effects due to the short duration of time of effects from restoration construction, standard minimization measures such as in-water work windows, and the geographic distribution of potential restoration sites. The cumulative effect of the resultant habitat improvements is expected to be beneficial to both the covered and non-covered fish species. Therefore the effect would be less than significant, and no additional mitigation would be required.

Other Conservation Measures (CM12–CM19 and CM21)

Impact AQUA-CUM10: Effects of Other Measures on Non-Covered Fish Species

As indicated above for the covered fish species, the BDCP under all alternatives except Alternatives 4A, 2D, and 5A would provide a long-term comprehensive program to address various stressors on the non-covered fish species of primary concern. Alternatives 4A, 2D, and 5A include Environmental Commitments similar to CMs 15, and 16, and therefore would have less potential for cumulative effects than the other alternatives. Overall, these measures/commitments would also complement other activities expected to occur in the Plan Area, and the overall effects are expected to be beneficial on the non-covered fish species of primary concern. However, the conservation measures would not necessarily be beneficial for all the non-covered species of primary management concern. For example, the effects of invasive aquatic vegetation control would result in minor differences for species associated with vegetation (i.e., largemouth bass for juvenile/adult habitat, threadfin shad for spawning habitat, and Sacramento tule perch for rearing. Consequently, reducing the amount of invasive aquatic vegetation would negatively affect these species. However, there would remain substantial areas of suitable habitat in the Plan Area for these species.

NEPA Effects: In addition to the effects of aquatic vegetation control on habitat conditions for some non-covered aquatic species, the effects of *CM15 Localized Reduction of Predatory Fish* would have a

direct effect on the predatory species that are included as non-covered species of primary concern. These include largemouth and striped bass. However, the numbers of predatory fish are high and the extent of the habitats in which they occur is extensive. CM15 is intended to reduce predation pressure at predation hotspots and not to reduce the overall populations of these species. CM15 would not be expected to affect the other noncovered species, which are either largely outside the Plan Area (e.g., hardhead and Sacramento-San Joaquin roach) or else less likely to be susceptible to capture methods applied at specific locations (e.g., Sacramento tule perch).

CM16 Nonphysical Fish Barriers also would not be expected to negatively affect any of the noncovered aquatic species to any substantial degree. The main effects would be deterrence from migratory pathways and potentially an increase in localized predation pressure if predatory fish use the barriers as ambush habitat. California bay shrimp, hardhead, and Sacramento-San Joaquin roach are largely outside the Plan Area and therefore would not be affected. Largemouth bass and Sacramento tule perch tend to occupy restricted areas, without major movements, and are widespread, so effects would be expected to be limited. Striped bass and American shad adults migrating upstream to spawning areas in the Sacramento River watershed could encounter the nonphysical barriers at the mouths of various channel junctions (e.g., Georgiana Slough); however, depending on the barrier type and location, the fish are likely to be able to migrate beneath or around the barriers: BAFFs would be expected to block only the top half of the water column at deeper sites, based on the pilot studies in 2011 and 2012 at Georgiana Slough, whereas FFGSs block only the top 5–10 feet of the water column and do not stretch across the full channel width, based on the 2014 pilot study at Georgiana Slough. Threadfin shad are found throughout the Delta, but primarily in the south Delta subregion, near the Stockton Deepwater Ship Channel, which contains deep, clear fresh water and high zooplankton densities (Feyrer et al. 2009). Presumably threadfish shad moving through the Delta (e.g., to spawn in the submerged aquatic vegetation of flooded islands) would be able to move around or beneath any nonphysical barriers present, as with striped bass and American shad. If sufficiently large, striped bass and American shad juveniles migrating downstream into the Delta from upstream spawning/rearing areas would be expected to be deterred from entering channels (e.g., Georgiana Slough) by nonphysical barriers which, as for juvenile salmon, would be expected to result in greater survival than for those otherwise entering the interior Delta. However, most striped bass would be expected to pass the barrier as eggs or larvae, and so there would be no such beneficial effects on them if BAFFs were used (which require active avoidance), whereas there would be more potential for beneficial effects on American shad, which are more likely to enter the Delta as juveniles but may do so later in the summer, after the nonphysical barriers' installation periods have ended.

Given the limited effects of these measures on noncovered fishes, and that there are no other comprehensive programs that would implement similar measures related to predation control and non-physical barriers, it is not expected that they would cumulatively affect these species with any of the other projects previously described herein. Therefore the cumulative effects of these measures would not be adverse.

CEQA Conclusion: As indicated above, the conservation measures included in the BDCP are designed to benefit both covered and non-covered fish species, and would complement other conservation measures expected to occur throughout the Plan Area in the future. The results of these measures are expected to be beneficial for most species of primary concern, although *CM13 Invasive Aquatic Vegetation Control* and *CM15 Localized Reduction of Predatory Fish* would negatively affect several of the species of primary concern. However, even when combined with similar programs occurring, or expected to occur, in the Plan Area in the future, the effects would be limited on the populations as a

whole. In addition, the large population sizes of noncovered fishes of primary management concern, and the substantial amount of habitat available to these species in the Plan Area, would also minimize the potential for negative effects. Therefore, the cumulative effects of CMs 12–19 and 21 would be less than significant, and no mitigation would be required.

5.2.4.7 Terrestrial Biological Resources

This cumulative impact assessment updates the cumulative assessment found in Chapter 12, *Terrestrial Biological Resources*, of the Draft EIR/EIS. The assessment has been updated to include consideration of projects or programs that have changed in status relative to the assessment in the Draft EIR/EIS. In addition, this section describes the cumulative effects from implementing Alternative 4A, 2D, and 5A. The methodology used in the assessment remains as described in Section 12.3.3.17 of the Draft EIR/EIS. Table 5.2.2.8-1 includes projects considered for this cumulative effects section in addition to those listed in Table 12-8 of the Draft EIR/EIS; for a complete list of such projects, consult Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, in Appendix A of the RDEIR/SDEIS.

Table 5.2.2.8-1. Additional Programs, Projects, and Policies Included In the Cumulative Impact Analysis for Terrestrial Biological Resources

Agency	Program/Project/Policy	Comments
California Department of Water Resources, U.S. Bureau of Reclamation, Contra Costa Water District	Los Vaqueros Reservoir Expansion	Project will enlarge Los Vaqueros Reservoir to develop water supplies for environmental water management that supports fish protection, habitat management and other environmental needs in the Delta.
Placer County Water Agency and U.S. Bureau of Reclamation	Sacramento River Water Supply Study	Feasibility study underway to assess options for providing water supply to future growth in Sacramento-Placer region. Includes potential new surface diversion from the Sacramento River upstream of the Delta.
U.S. Bureau of Reclamation and San Luis & Delta Mendota Water Authority	Agricultural Drainage Selenium Management Program Plan	San Joaquin Valley agricultural drainage control program designed to reduce agricultural-related discharges of selenium into the San Joaquin River and south Delta.
Department of Water Resources	California Water Action Plan	Initiated in January 2014, this plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.
Delta Conservancy	California EcoRestore	Initiated in 2015, this program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.

Based on the analyses presented in Chapter 12 of the Draft EIR/EIS, the alternatives would have little or no negative effect or would have a long-term beneficial effect on nearly all of the terrestrial biological resources of concern in the study area. The positive effects of implementing the BDCP are similar in all of the project alternatives that utilize the HCP/NCCP approach. There are relatively

small variations in the acres affected by construction of the alternative water conveyance facilities (CM1), but the restoration, protection, enhancement and stressor reduction elements of the alternatives are the same for Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 6A, 6B, 6C, 8, and 9. These elements of the BDCP have the greatest potential to modify natural communities and affect special-status plants and wildlife. There are reductions in tidal marsh restoration (CM4) associated with Alternative 5, and expansion of channel margin habitat enhancement (CM6) and floodplain restoration (CM5) associated with Alternative 7 that create significant variances from the rest of the alternatives. Alternative 4A, 2D, and 5A would have smaller changes in natural communities because of the reduction in the amount of restoration. Where relevant, these differences are addressed in the impact analysis that follows.

While construction and restoration activities in the near-term period of the alternatives would temporarily or permanently remove natural communities and modeled habitat for special-status plant and wildlife species, the near-, mid- and long-term conservation actions would replace, enhance and in most cases expand habitat acres and value for these species. The positive effects the alternatives would have on special-status species would also provide benefits to common terrestrial wildlife and plants.

The potential adverse effects of implementing all of the action alternatives include potential disturbance of nesting colonies of bank swallows, should they be present adjacent to construction activity at the north end of the Yolo Bypass, and the potential that alternative-related changes in river stage upstream of the study area on the Sacramento and Feather Rivers could adversely affect bank swallow colonies. Though the alternatives using the east (Alternatives 1B, 2B, and 6B) and west (Alternatives 1C, 2C, and 6C) alignments would provide the same conservation benefits as the other alternatives, the construction of the canal portions of the conveyance facilities would create substantial barriers to wildlife movement within and through the study area. Also, the canal associated with the east alignment alternatives (1B, 2B, and 6B) would adversely affect movement and connectivity between subpopulations of giant garter snake in the vicinity of White Slough in the eastern Delta.

Because these are the only potential adverse effects that could combine with the projects and programs in Table 12-8 of the Draft EIR/EIS and Table 5.2.2.8-1 above to create a cumulatively considerable effect, the discussion that follows is limited to these issues.

Impact BIO-188: Cumulative Indirect Effects of the Construction of Conservation Components on Bank Swallow

Noise and visual disturbances during restoration activities for Alternatives 1–9 could result in temporary disturbances that cause bank swallow to abandon active nest burrows adjacent to construction areas, and construction-related disturbances could result in an adverse effect on individuals. The noise and visual disturbance could result from implementing *CM2 Yolo Bypass Fisheries Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of earthmoving equipment and human activities at work sites. Bank swallow colonies with occupied burrows have been recorded in CZ 2 and CZ 5. Various activities related to *CM11 Natural Communities Enhancement and Management* could also have indirect impacts on bank swallow. Alternatives 4A, 2D, and 5A would not include the CM2 (Yolo Bypass) restoration activities, so they would not create the potential noise and visual disturbances that could affect bank swallow in CZ 2.

A number of other projects and programs listed in Table 12-8 in the Draft EIR/EIS and 5.2.2.8-1 also have the potential to directly or indirectly affect bank swallow in the study area and in areas upstream of the study area along the Sacramento and Feather Rivers. They include:

- DWR Central Valley Flood Protection Plan (Yolo Bypass widening)
- DWR Delta Levees Flood Protection Program
- DWR FloodSAFE California
- Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, U.S. Army Corps of Engineers Central Valley Flood Management Program
- U.S. Army Corps of Engineers CALFED Levee Stability Program
- Placer County Water Agency and U.S. Bureau of Reclamation Sacramento River Water Supply Study

All of the flood control and levee protection programs and plans listed above could involve modification and armoring of levees within the range of known bank swallow colonies adjacent to and north of the study area. Additional bank protection could further reduce the availability of bank swallow nesting sites and could involve indirect disturbance of active nesting colonies. Alternatives 1–9, in combination with the other projects and programs listed above, could result in adverse effects on bank swallow nesting colonies that are individually limited but cumulatively considerable.

***NEPA Effects*:** The indirect disturbance to bank swallow nesting colonies caused by implementing Alternatives 1–9, in combination with the potential direct and indirect effects on these colonies caused by other past, present, or reasonably foreseeable projects and programs would create an adverse cumulative effect on this species adjacent to and north of the study area. The disturbances could result in take of a state-listed threatened species. Although the potential effect of the alternatives is restricted to few colonies, the state recognizes this species as both imperiled and vulnerable because of its restricted range and low populations. Therefore, the effect of the alternatives represents an adverse cumulative effect. Implementation of Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would be available to address this effect.

***CEQA Conclusion*:** The indirect disturbance to bank swallow nesting colonies caused by implementing Alternatives 1A–9, in combination with the potential direct and indirect effects on these colonies caused by other past, present or reasonably foreseeable projects and programs would create a significant cumulative impact on this species adjacent to and north of the study area. The disturbances could result in take of a state-listed threatened species. Although the potential cumulative effect is restricted to a single colony, the state recognizes this species as both imperiled and vulnerable because of its restricted range and low populations. The contribution of Alternatives 1A-9 to this cumulative impact is considered cumulatively considerable because construction of these alternatives related to the Yolo Bypass could indirectly affect this species. Implementation of Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this impact less than cumulatively considerable.

Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized

Please refer to Mitigation Measure BIO-146 under Impact BIO-146 in the discussion of Alternative 4A of this RDEIR/SDEIS.

Impact BIO-189: Cumulative Upstream Effects of Reservoir and Water Conveyance Facilities Operations on Bank Swallow

Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the species is loss of nesting habitat from the placement of rock revetment for levee stabilization. Because of this limited available habitat, and the reduction of natural river process, the species is highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat creation, and 2) high flows during the breading season. The potential impacts of changes in upstream flows during the breeding season on bank swallows are the flooding of active burrows and destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin to excavate their burrows in March, and the peak egg-laying occurs between April and May (Bank Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the March when the swallows have nested and laid eggs in the burrows could result in the loss of nests. On the Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with localized bank collapses which resulted in partial or complete colony failure (Stillwater Sciences 2007).

The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations on the Sacramento (Sacramento River at Keswick, Sacramento River upstream of Red Bluff, Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-flow channel Thermalito Dam, and Feather River at the Confluence with the Sacramento River). Flows were estimated for wet years (W), above normal years (AN), below normal years (BN), dry years (D), critical years (C) and an average (A) (see Chapter 5, Section 5.3.1, Methods for Analysis, of the Draft EIR/EIS for a description of the model).

On the Sacramento River, at the Keswick and Red Bluff gauges, mean monthly flows under Alternatives 1–9, including Alternatives 4A, 2D, and 5A and potentially other cumulative projects would increase between April and August in some water years which could lead to inundation of active colonies. However, the flows under Existing Conditions and the predicted flows in the late long-term without the project also show increases in flows during the breeding season (April–August) in these water year types. Similar trends occur for the Feather River. In addition, under the action alternatives flows are predicted to be greater than 14,000 cfs during the breeding season (April–August,) during certain water years which could lead to bank collapse. However, flows of this height are recorded under Existing Conditions at this flow gauge and are also predicted for the late long-term time without the project (the No Action Alternative).

***NEPA Effects*:** High spring flows on the Sacramento and Feather Rivers may already be impacting bank swallow colonies during the breeding season, and predicted flows under Alternatives 1–9 would not be substantially greater than under the No Action Alternative. However, because of the complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding the potential for and magnitude of impacts on bank swallow from changes in upstream operations. Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank swallow, and even moderate changes in seasonal flows could have an adverse effect on breeding success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of potential adverse effects of upstream operations on bank swallow. Because the state recognizes this species as both imperiled and vulnerable due to its restricted range and low populations, any

negative effect of the alternatives would represent a cumulatively considerable contribution to an adverse cumulative effect.

***CEQA Conclusion*:** High spring flows on the Sacramento and Feather Rivers may already be impacting bank swallow colonies during the breeding season, and predicted flows under the action alternatives would not be substantially greater than under the No Action Alternative. However, because of the complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding the potential for and magnitude of upstream impacts on bank swallow from changes in operations. There are many variables that dictate suitable habitat for the species that cannot be clearly quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank swallow depending on soil type and location of current colonies. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of the Study Area* would address this significant impact and further determine if additional mitigation is required for bank swallow. Because the state recognizes this species as both imperiled and vulnerable due to its restricted range and low populations, any adverse impact of the alternatives would represent a cumulatively considerable contribution to a significant cumulative impact.

Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of the Study Area

Please refer to Mitigation Measure BIO-147 under Impact BIO-147 in the discussion of Alternative 4A of this RDEIR/SDEIS.

Impact BIO-190: Cumulative Effect of Constructing Conveyance Facilities on Giant Garter Snake Movements and Connectivity between Subpopulations

The construction of the conveyance facilities under the alternatives using the eastern (Alternatives 1B, 2B, and 6B) alignments would adversely affect movement and connectivity for the Coldani Marsh/White Slough subpopulation of giant garter in the study area. The facilities would eliminate Coldani Marsh/White Slough subpopulation connectivity with areas containing current or previous occurrences of giant garter snake, specifically in the vicinity of Stone Lakes NWR to the north and in the Delta to the southwest (Figure 12-15B). An unknown number of small agricultural ditches and drains between Disappointment Slough and Stone Lakes would be lost, rerouted, or directed into culverts and affect species' movements and connectivity. Siphons would be constructed underneath sloughs (Disappointment Slough, White Slough, Sycamore Slough, Hog Slough, and Beaver Slough) and Stone Lakes Drain, and a tunnel would be constructed under the Lost Slough/Mokelumne River area that connects with Snodgrass Slough. These sloughs and drains would still provide some aquatic habitat and opportunities for movement and connectivity between giant garter snakes in the vicinity of Stone Lakes NWR and the Coldani Marsh/White Slough subpopulation.

A number of other factors, projects, or programs also have the potential to directly or indirectly affect giant garter snake movements and connectivity in the study area. They include:

- Urbanization which continues to be one of the greatest threats to the giant garter snake throughout much of its extant range. Environmental impacts associated with urbanization are loss of habitat, introduction of non-native species with a resulting loss of biodiversity, fragmentation of habitat due to road construction, and degradation of habitat due to pollutants. Within the current range of the giant garter snake, cities that are rapidly expanding and, in some instances, intruding upon or otherwise impacting giant garter snake habitat include, but are not limited to: Chico, Woodland, Yuba City/Marysville, Sacramento, Galt, Stockton, Gustine, Los

Banos, Merced, and Fresno. Urbanization increasingly threatens the viability of giant garter snake populations as urban landscapes encroach on ever-diminishing habitat for this listed species, including eliminating rice agriculture that serves as an alternative habitat for the giant garter snake.

- A number of HCP's have been issued by USFWS for projects anticipated to impact the giant garter snake, which include the San Joaquin County multi-species HCP, the East Contra Costa County HCP, and the PG&E San Joaquin Valley HCP. In addition, eight other HCPs which include areas within the range of the giant garter snake are currently being developed and include: Butte County, South Sacramento, Solano County, Yolo County, Yuba/Sutter County, Placer County, PG&E Statewide Operations and Maintenance, and PG&E Bay Area.
- Giant garter snakes found in rice fields or agricultural canals are threatened by conversion of rice crops to non-agricultural land uses and other crops such as grape-producing vineyards, fruit or nut producing orchards, or annual row crops (e.g., cotton). Unlike flood irrigated rice fields, other agricultural cropping systems do not hold sufficient water for long enough time periods to create artificial, temporary wetlands.
- The White Slough Wildlife Management Area (WSWA) is owned by the California Department of Water Resources and managed by the California Department of Fish and Wildlife. WSWA consists of 880 acres of man-made ditches, canals, and freshwater marshes with associated grassland/upland habitats used for hunting and fishing. Between 1974 and 1978, 13 rectangular borrow pits were excavated from one to five miles west of Interstate 5 to provide fill for freeway construction. The pits are fed by groundwater and periodic runoff from precipitation, irrigation, and high canal flows, creating a series of ponds characterized by vegetated sloping or vertical banks and open water with adjacent uplands and high ground. As a management area, WSWA comprises a discontinuous series of properties encompassing ponds 5–13, which occur along a roughly 11-mile stretch between Thornton and Stockton. WSWA supports the preponderance of the Coldani Marsh/ White Slough giant garter snake population, one of 13 giant garter snake populations described in the USFWS 1999 Draft Recovery Plan for the Giant Garter Snake. In the 1970's, CDFW stocked large-mouth bass, channel catfish, and red-eared sunfish in at least two of the ponds: each of these species probably prey on giant garter snakes and compete with them for smaller prey (58 FR 54053).
- DWR Central Valley Flood Protection Plan (Yolo Bypass widening) which proposes expansion of flood protection features in the study, including expansion of the Yolo Bypass. This flood protection improvement project would potentially conflict with BDCP's effort to improve giant garter snake habitat just outside of the current floodway.
- National Marine Fisheries Service, U.S. Bureau of Reclamation, and Department of Water Resources: Biological Opinion (BiOp) on the Long-Term Operations of the Central Valley Project and State Water Project which includes the Sacramento River downstream of Feather River, Sacramento-San Joaquin Delta, and adjacent habitats that are dependent on or influenced by waterways. The BiOp includes landscape designs to conserve freshwater, estuarine, nearshore, and offshore aquatic habitats, for the benefit of federally protected fish species. Including 8,000-acre tidal wetland restoration requirement, which would result in conversion of agricultural land and managed wetland in the Delta and Suisun Marsh, which could negatively affect giant garter snake connectivity and movement in the study area.
- Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, U.S. Army Corps of Engineers Central Valley Flood Management Program is an ongoing program that supports

flood management planning in Sacramento and San Joaquin Valleys. The program supports improvements in flood management structures, including levees and bypasses. Facilities improvements could result in local removal of vegetation in the study area as flood control facilities are improved and expanded which could include effects on giant garter snakes in the study area.

Past development within the study area, including urbanization and the construction of irrigation canals, levees, local roads, highways, agricultural development, and the development of wildlife management areas, has already affected the ability for giant garter snake to move within and through the study area.

NEPA Effects: The construction of the water conveyance facilities under Alternatives 1B, 2B, and 6B, in combination with past, present or reasonably foreseeable projects would create an adverse cumulative effect on giant garter snake movement and connectivity within and in the vicinity of the study area. The alternatives' effects represent a cumulatively considerable contribution to an adverse cumulative effect. The only ways to reduce the effects these Alternatives would have on giant garter snake movement would be to eliminate the canals from these alternatives, which cannot be done because the canals are essential components of these alternatives, or to create numerous overpass structures along the canals, which would substantially increase the costs and would not fully address the habitat connectivity and movement needs of giant garter snake. For these reasons, there is no feasible mitigation to address this effect.

CEQA Conclusion: The construction of the water conveyance facilities under Alternatives 1B, 2B, and 6B, in combination with past, present or reasonably foreseeable projects would create a significant cumulative impact on giant garter snake movement and connectivity within and in the vicinity of the study area. The alternatives' impact would represent a cumulatively considerable contribution to a significant cumulative impact. This impact would be significant and unavoidable. The only ways to reduce the effects these Alternatives would have on giant garter snake would be to eliminate the canals from these alternatives, which cannot be done because the canals are essential components of these alternatives, or to create numerous overpass structures along the canals, which would substantially increase the costs and would not fully address the habitat connectivity and movement needs of giant garter snake. For these reasons there is no feasible mitigation to reduce this impact to a less-than-significant level.

Impact BIO-191: Cumulative Effect of Constructing Conveyance Facilities on Wildlife Corridors

The construction of the conveyance facilities (CM1) under the alternatives using the eastern alignment (Alternatives 1B, 2B, and 6B) and western alignment (Alternatives 1C, 2C, and 6C) would adversely affect wildlife corridors within and through the study area. The intakes, forebays, and canal portions of these alternatives would create barriers to the movement of nonavian wildlife within and through the study area. Nonavian wildlife in large portions of the study area would be restricted to moving across the canals via roads and bridges that would likely act as deterrents to wildlife movement and would be a source of wildlife mortality. The canal for the eastern alignment would act as a major barrier to the movement of nonavian wildlife within the eastern portion of the Delta. The canals for the western alignment would create a substantial barrier to the east-west movement of nonavian wildlife from Clifton Court Forebay north to around the community of Knightsen, and to the north-south movement of wildlife from the town of Hood west to the Sacramento Deep Water Ship Channel. Avian species would also be subject to increased mortality

where new transmission lines are installed; however, these lines would not serve as major barriers to avian species' ability to disperse within and through the study area.

One project listed in the Table 12-8 in the Draft EIR/EIS, the California High Speed Rail, would also have the potential to adversely affect wildlife corridors in the study area and region. One of the proposed alignments for the Sacramento-to-Merced section of the California High Speed Rail would pass through the study area between French Camp and Lathrop, generally following the I-5 corridor and eventually heading east along State Route 120. A proposed option for the Bay Area-to-Central Valley alignment passes through the study area from just west of Tracy east to around Lathrop, a route that generally follows the existing Union Pacific Rail Road corridor. Both of these areas already have barriers to species dispersal, but increased rail traffic and the speed of the trains could serve as deterrents and sources of mortality to wildlife trying to cross these areas.

Past development within the study area, including the construction of irrigation canals, levees, local roads, highways, and agricultural development, has already affected the ability for wildlife to move within and through the study area.

***NEPA Effects*:** The construction of the water conveyance facilities under Alternatives 1B, 1C, 2B, 2C, 6B, and 6C, in combination with past, present or reasonably foreseeable projects, would create an adverse cumulative effect on wildlife corridors within and in the vicinity of the study area. The alternatives' effects represent a cumulatively considerable contribution to an adverse cumulative effect. The only ways to reduce the effects these Alternatives would have on wildlife corridors would be to eliminate the canals from these alternatives, which cannot be done because the canals are essential components of these alternatives, or to create numerous overpass structures along the canals, which would substantially increase the costs and would not fully address all of the movement needs of the wildlife being considered (e.g., giant garter snake). For these reasons, there is no feasible mitigation to address this effect.

***CEQA Conclusion*:** The construction of the water conveyance facilities under Alternatives 1B, 1C, 2B, 2C, 6B, and 6C, in combination with past, present or reasonably foreseeable projects, would create a significant cumulative impact on wildlife corridors within and in the vicinity of the study area. The alternatives' impact would represent a cumulatively considerable contribution to a significant cumulative impact. This impact would be significant and unavoidable. The only ways to reduce the effects these alternatives would have on wildlife corridors would be to eliminate the canals from these alternatives, which cannot be done because the canals are essential components of these alternatives, or to create numerous overpass structures along the canals, which would substantially increase the costs and would not fully address all of the movement needs of the wildlife being considered (e.g., giant garter snake). For these reasons, there is no feasible mitigation to reduce this impact to a less-than-significant level.

5.2.4.8 Land Use

The following cumulative effects analysis considers projects listed in Table 13-17 in Chapter 13, *Land Use*, of the Draft EIR/EIS and new projects in Table 5.2.2.9-1; for a complete list of such projects, consult Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, in Appendix A of the RDEIR/SDEIS. This cumulative impact analysis considers projects that could affect the same resources and, where relevant, in the same time frame as the alternatives, resulting in a cumulative impact. Land use and local communities are expected to change as a result of past, present, and reasonably foreseeable future

projects, related to population growth and changes in economic activity in the study area (for discussion of effects in water delivery regions, see Chapter 30, *Growth Inducement and Other Indirect Effects*, of the Draft EIR/EIS). It is expected that some changes related to land use including compatibility, communities and neighborhoods, property, and environmental justice will take place, even though it is assumed that reasonably foreseeable future projects would include typical design and construction practices to avoid or minimize potential impacts.

When the effects of the alternatives on land use are considered in combination with the potential effects of other initiatives including those listed in Table 13-17 of the Draft EIR/EIS and below in Table 5.2.2.9-1, the cumulative effects on land use are potentially adverse. The specific programs, projects, and policies are identified below for each impact category based on the potential to contribute to an impact that could be deemed cumulatively considerable. The potential for cumulative impacts on land use is described for effects related to the construction of water conveyance facilities and effects stemming from the long-term implementation of CM2–CM21 under Alternatives 1A through 9 and Environmental Commitments under Alternatives 4A, 2D, and 5A.

Table 5.2.2.9-1. Effects on Land Use from a Selection of Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Status	Description of Program/Project	Effects on Land Use
Department of Water Resources	Sustainable Groundwater Management Act (Water Action Plan)	Signed into law September 2014	Defines rules and regulations that DWR needs to implement to help local agencies manage groundwater resources sustainably.	The SGMA requires the formation of locally controlled Groundwater Sustainability Agencies (GSAs), which must develop Groundwater Sustainability Plans (GSPs) in groundwater basins or subbasins that DWR designates as medium or high priority. The Act requires GSPs to show and provide land suitable for potential recharge areas to local planning agencies, which could result in conversion of agricultural land for groundwater recharge uses.
California Department of Parks and Recreation	Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh	Proposal released in 2011	The proposal recommends collaboration with other agencies and other partners to expand wildlife viewing, angling, and hunting opportunities; and expansion of the State Park system in the Delta.	Program advocates for accommodation of recreation in restoration projects.
Semitropic Water Storage District	Delta Wetlands Projects	Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	Project is inconsistent with Contra Costa County General Plan Policy for Agricultural Lands and Delta Protection Commission's Land Use Plan Principles for Agriculture and Recreation. Project will also result in conversion of existing agricultural land.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Land Use
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential for land use effects related to proposed water storage and restoration actions.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for land use effects related to restoration actions.

Projects considered for this cumulative effects section include those in the above table; each project is then described and its relationship to the resource impacts caused by the alternatives is discussed. For a complete list of such projects, consult Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*.

The projects evaluated for cumulative impacts includes a number of projects that would create land use changes and specifically convert agricultural lands to nonagricultural uses. The BDCP alternatives, in conjunction with other projects that affect land use, would not be compatible with state, regional, and local plan designations, goals, and policies that promote the retention and protection of open space and agricultural land as described in this chapter. Overall, cumulative land use changes would involve temporary and permanent changes in land use. Land use conversions could also occur through the urban development of Delta islands, levee improvement and flood control projects, or subsidence-reduction programs. The actual amount of land that may be converted by other projects is not known. Considering two major projects in the vicinity of the BDCP alternatives, Mountain House and River Islands development, an estimated 7,241 acres of agricultural land would be converted to developed uses.

Impact LU-7: Cumulative Incompatibility with Applicable Land Use Designations, Goals, and Policies as a Result of Constructing the Proposed Water Conveyance Facility (CM1)

NEPA Effects: Each alternative would place temporary and permanent structures on lands designated for other uses by the general plans of study area counties and, in some cases, cities. The construction of the water conveyance facilities would create incompatibilities with numerous land use designations, goals and policies set forth by these general plans. Construction of these facilities would also take place on areas governed by state and regional plans. The Delta Plan policies most closely associated with land use are ER P2 (Restore Habitats at Appropriate Elevations), ER P3 (Protect Opportunities to Restore Habitat), DP P1 (Locate New Urban Development Wisely), and DP P2 (Respect Local Land Use When Siting Water or Flood Facilities or Restoring Habitats). Because CM1 under Alternatives 1A through 9 would not involve habitat restoration nor residential, commercial, or industrial development, ER P2 and DP P1 would not be applicable. With regard to

Policy ER P3, construction of water conveyance facilities could occur on priority habitat restoration areas identified in Delta Plan Figure 4-4. Impacts to the opportunity for habitat restoration must be "avoided or mitigated" under this policy. Alternatives 1A, 1C, 2A, 2C, 2D 3, 4, 4A, 5, 5A, 6A, 6C, 7, and 8 would avoid constructing water conveyance features on these areas. However, under Alternatives 1B, 2B, 6B, and 9, several features could be incompatible with one or more of the priority habitat restoration areas. While the potential for restoration of these lands would be affected, activities associated with BDCP Conservation Measures 3 through 11 would reduce these effects by restoring or permanently protecting other areas that could have been restored at the site(s) affected. As noted under Alternative 1A, Impact LU-4, priority habitat restoration areas substantially coincide with the restoration opportunity areas identified for tidal natural communities under BDCP CM4. Therefore, implementation of the action alternatives would be considered compatible with this policy. Policy DP P2 requires that parties responsible for proposed actions avoid or reduce incompatibilities with existing or planned uses when feasible. In some cases, commitments and mitigation measures identified in this document (see, for example, Chapter 14, *Agricultural Resources,* Mitigation Measure AG-1: Develop an ALSP to preserve agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones) will help meet this requirement. However, avoidance of all incompatibilities is likely to be considered infeasible; thus, activities associated with CM1 under Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A would be considered compatible with Policy DP P2.

Alternatives 1A–9, including Alternatives 4A, 2D, and 5A, may also result in incompatibilities with LURMP policies related to land use. Many of these policies focus on local government activities; however, Land Use P-7 declares that new structures should be set back from levees. Intakes, fish screens, operable barriers, and their related structures require contact with water and cannot feasibly be set back from levees. Incompatibilities could also occur with other LURMP policies, including Agriculture P-2, which suggests that agricultural land conversion should occur first where productivity and values are lowest. As discussed in Chapter 14, *Agricultural Resources*, some higher-value agricultural land would be converted under construction and operation of CM1 for each action alternative. Other projects that would potentially create incompatibilities are listed in Table 13-17.

Other projects, including projects that could be implemented under the CWAP that could potentially permanently convert existing land uses are listed in Draft EIR/EIS Table 13-17 and Table 5.2.2.9-1 above. These cumulative projects include flood protection projects, habitat and ecosystem restoration projects, and water conveyance projects proposed in various areas within and adjacent to the Delta, such as the Sustainable Groundwater Management Act, the Delta Wetlands Project, and the Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh. Implementing these cumulative projects in combination with Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, would likely result in changes in existing land use in the study area by permanently converting land to new uses for purposes such as restoration projects, or water storage. These changes would be adverse because of the substantial amount of land likely to be converted to other uses that would create incompatibilities with numerous land use designations, goals and policies set forth by these general plans.

Implementing these projects in combination with Alternatives 1A–9, including Alternatives 4A, 2D, and 5A would result in the potential for additional incompatibilities with designations, goals, and policies intended to reduce environmental effects. For example, construction of projects related to water supply, infrastructure, and habitat restoration would require temporary staging areas, resulting in land use changes throughout the study area. Permanent footprints of these projects would, in some cases, require direct changes in land use. Some of these changes could be

incompatible with existing policies, particularly those regarding protection of agricultural resources. New plans or updates to existing plans could indirectly affect land use by creating new regulations by which land uses in the study area are governed. Incompatibilities suggest the potential for a physical effect on the environment. As discussed in Section 13.3.2, such effects are discussed in other chapters throughout the Draft EIR/EIS.

***CEQA Conclusion*:** These cumulative incompatibilities with land use regulations indicate the potential for a physical consequence to the environment. As discussed in Section 13.3.2, the cumulative physical effects they suggest are discussed in other chapters throughout this document. The relationship between plans, policies, and regulations and impacts on the physical environment is discussed in Section 13.3.1.

Impact LU-8: Cumulative Conflicts with Existing Land Uses as a Result of Constructing the Proposed Water Conveyance Facility (CM1)

NEPA Effects: Under Alternatives 1A–9, including Alternatives 4A, 2D, and 5, construction and operation of physical facilities for water conveyance would create temporary or permanent conflicts with existing land uses. These effects result from the removal or relocation of existing structures, as summarized in Table 13-4, and from the disruption of critical access routes.

Other projects, including projects that could be implemented under the CWAP that could create similar conflicts with existing land uses are listed in Draft EIR/EIS Table 13-17 and Table 5.2.2.9-1 above. These cumulative projects include flood protection projects, habitat and ecosystem restoration projects, and water conveyance projects proposed in various areas within and adjacent to the Delta, such as the Sustainable Groundwater Management Act, the Delta Wetlands Project, and the Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh. Implementing these cumulative projects in combination with Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, would likely result in changes in existing land use in the study area by permanently converting land to new uses for purposes such as restoration projects, or water storage. These changes would be adverse because they could create conflicts with existing land uses.

Implementing these projects in combination with all action alternatives could result in the removal of additional structures or disruption of access in more locations. For example, construction of projects related to water supply, infrastructure, and habitat restoration would require temporary staging areas, resulting in the potential for temporary disruption of access. The permanent footprints of these projects could require existing structures to be demolished and removed, creating substantial conflicts with existing land uses. New plans or updates to existing plans would not be anticipated to result in adverse effects with respect to existing land uses because these tend to focus on general goals, objectives, and policies designed to guide land use.

The removal of a cumulatively considerable number of existing permanent structures would be considered a direct, adverse socioeconomic effect under NEPA. To reduce these cumulative effects, when required, the BDCP proponents would provide compensation to property owners for losses due to BDCP implementation, which would reduce the severity of economic effects related to these cumulative impacts, but would not reduce the severity of the physical impacts themselves. Cumulative conflicts with existing public structures are addressed in Chapter 20, *Public Services and Utilities*; potential cumulative effects on the environment related to the potential release of hazardous materials contained in structures to be demolished are addressed in Chapter 24, *Hazards and Hazardous Materials;* and potential cumulative effects on traditional cultural properties are addressed in Chapter 18, *Cultural Resources*.

***CEQA Conclusion*:** Construction of cumulative projects within the study area could result in the removal of a substantial number of existing permanent structures based on the locations of new features such as water facilities or restored habitat. The removal of existing structures is not, in itself, considered a significant environmental impact, though removal might entail economic impacts. Significant cumulative environmental impacts would only result if the structures qualified as "historical resources" or the removal of structures led to physical effects on certain other resources. As discussed in Section 13.3.2, such effects are discussed in other chapters throughout this EIR/EIS. Cumulative conflicts with existing public structures are addressed in Chapter 20, *Public Services and Utilities*; potential cumulative impacts on the public and environment related to the potential release of hazardous materials contained in structures to be demolished are addressed in Chapter 24, *Hazards and Hazardous Materials;* and potential impacts on "historical resources" (including qualifying structures) and traditional cultural properties are addressed in Chapter 18, *Cultural Resources*. Where applicable, BDCP proponents will provide compensation to property owners for losses due to BDCP implementation. This compensation would reduce the severity of economic effects, but would not constitute mitigation for any related physical impact. In sum, there are no land use effects under CEQA due solely to the removal of physical structures that are not treated under other impact categories.

Impact LU-9: Cumulative Physical Structures Adjacent to and through a Portion of an Existing Community as a Result of Constructing the Proposed Water Conveyance Facility (CM1)

Alternatives 3, 5, 5A

NEPA Effects: The construction of structures related to water conveyance would not establish physical structures adjacent to and through a portion of any existing community under BDCP Alternatives 3 and 5. A tunnel carrying water south from Intake 2 to the intermediate forebay would be placed under the community. The tunnel would be constructed below the surface and would not interfere with the existing community; therefore, the alignment would not create a physical structure adjacent to or through the existing community. While construction activities for intakes and the intermediate forebay would occur in the relative proximity of the community of Hood, the community would not be crossed by these alternatives or by any other plan, policy, or program considered for cumulative analysis. Therefore, this effect is not considered adverse.

***CEQA Conclusion*:** No structure built for the purposes of water conveyance would be located adjacent to or through a portion of an existing community under Alternatives 3, 5, or 5A. Similarly, other plans, policies, and programs considered for cumulative analysis are not anticipated to create such an effect. Therefore, this impact is not significant.

Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 4, 4A, 6A, 6B, 6C, 7, 8, and 9

NEPA Effects: Under these alternatives, at least one feature would be located in and around a community, resulting in an adverse effect. For those alternatives constructing Intake 3 or 4 on the east bank of the Sacramento River, a conveyance pipeline or canal would create a linear construction zone between structures in the community of Hood, except for Alternatives 4, 4A, and 2D, which would instead convey water from Intake 3 to the intermediate forebay via a tunnel. However, these alternatives would include a permanent power line through the eastern section of the community, which would provide power to the intakes. Additionally, a temporary work area associated with construction of the conveyance facilities would be built adjacent to Hood on the southern side of the community, and would serve as a staging area during the construction phase. It would consist of

facilities such as parking areas, offices, and construction equipment storage. For alternatives constructing a conveyance pipeline between Intakes 1 and 2 on the west bank of the Sacramento River, the lands surrounding the community of Clarksburg would be altered during the construction period for this feature. Fish screens constructed under Alternative 9 would create physical structures adjacent to the communities of Walnut Grove and Locke. The construction of these facilities would create an adverse effect with respect to establishing structures adjacent to or through a portion of an existing community. Mitigation Measures TRANS-1a and TRANS-1b are available to help address these effects.

***CEQA Conclusion*:** Construction of facilities under Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 4, 4A, 6A, 6B, 6C, 7, 8, and 9 would create physical structures adjacent to and through a portion of one of several communities in the study area. Linear construction zones would also be associated with these features, which include intakes, pipelines, canals, bridges, and/or fish screens. These divisions would result in a cumulatively considerable incremental contribution to a significant and unavoidable cumulative impact. Implementation of Mitigation Measures TRANS-1a and TRANS-1b would help reduce the severity of this impact by supporting continued access to and from the community on transportation routes; however, permanent structures would remain, and the impact would be significant.

Mitigation Measure TRANS-1a: Implement Site-Specific Construction Traffic Management Plan

Please refer to Mitigation Measure TRANS-1a in Chapter 19, *Transportation*, under Alternative 1A, Impact TRANS-1, in the Draft EIR/EIS.

Mitigation Measure TRANS-1b: Limit Hours or Amount of Construction Activity on Congested Roadway Segments

Please refer to Mitigation Measure TRANS-1b in Chapter 19, *Transportation*, under Alternative 1A, Impact TRANS-1, in the Draft EIR/EIS.

Impact LU-10: Cumulative Incompatibility with Applicable Land Use Designations, Goals, and Policies as a Result of Implementing the Proposed Conservation Measures 2–21

NEPA Effects: Under Alternatives 1A–2C, 3–4, 5, and 6–9, implementation of CM2–CM21 and Environmental Commitments under Alternatives 4A, 2D, and 5A, could result in incompatibility with applicable land use designations, goals, and policies in the study area. For any conservation measure requiring construction activities (e.g., establishment of storage, staging and stockpiling areas; grading; levee removal/replacement), temporary incompatibilities with land use designations or policies intended to avoid or mitigate environmental impacts across the study area counties or cities could potentially occur for the duration of those activities. Because the locations for the implementation of these conservation measures are unknown at this point, a definitive conclusion about the compatibility of these measures with applicable land use regulations cannot be made. These issues would be addressed in detail in site-specific environmental documents for restoration proposals. Because most activities would be anticipated to take place on land designated for agriculture, open space, natural preserve and recreation, local designations, goals, and policies related to preservation of those attributes would be most implicated.

As discussed under Impact LU-7, above, implementation of projects listed in Table 13-17 and Table 5.2.2.9-1, including projects that could be implemented under the CWAP, could result in the

potential for additional incompatibilities with designations, goals, and policies intended to reduce environmental effects. These cumulative projects include flood protection projects, habitat and ecosystem restoration projects, and water conveyance projects proposed in various areas within and adjacent to the Delta, such as the Sustainable Groundwater Management Act, the Delta Wetlands Project, and the Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh. For example, construction of projects related to water supply, infrastructure, and habitat restoration would require temporary staging areas, resulting in land use changes throughout the study area. Permanent footprints of these projects would, in some cases, require direct changes in land use. Some of these changes could be incompatible with existing policies, particularly those regarding protection of agricultural resources. New plans or updates to existing plans could indirectly affect land use by creating new regulations by which land uses in the study area are governed. Incompatibilities suggest the potential for cumulative physical effects on the environment. As discussed in Section 13.3.2, such effects are discussed in other chapters throughout this EIR/EIS.

***CEQA Conclusion*:** Considered together, the construction of cumulative projects within the study area listed in Table 13-17 and Table 5.2.2.9-1, in addition to implementation of Conservation Measures 2–21 under Alternatives 1A–2C, 3–4, 5, and 6–9, Environmental Commitments under Alternatives 4A, 2D, and 5A, could result in the potential for substantial incompatibilities with land use designations, goals, and policies. However, because the locations for the implementation of these conservation measures are unknown at this point, a definitive conclusion about these measures' incremental contributions to cumulative incompatibilities with applicable land use guidelines cannot be made. These issues therefore will have to be addressed in detail in site-specific environmental documents proposals related to these measures. Although cumulative implementation of these conservation measures along with other projects would be anticipated to result in substantial incompatibilities with land use regulations due to the amount of land area affected, it is presently unknown whether any such incompatibilities would be indicative of related physical consequences, such as the loss of prime agricultural land or unique archaeological resources. The relationship between plans, policies, and regulations and impacts on the physical environment is discussed in Section 13.3.1. These issues will also be addressed in the site-specific environmental documents for proposed restoration activities. 2D, 4A, and 5A would not result in cumulative effects because the conservation measures would not be implemented under those alternatives.

Impact LU-11: Cumulative Conflicts with Existing Land Uses as a Result of Implementing the Proposed Conservation Measures 2–21

NEPA Effects: Implementation of CM2–CM21 under Alternatives 1A–2C, 3–4, 5, and 6–9 and Environmental Commitments under Alternatives 4A, 2D, and 5A, could create temporary or permanent conflicts with existing land uses where they would require the removal of structures or sever critical access routes.

As described under Impact LU-8, Table 13-17 and Table 5.2.2.9-1 includes other projects and programs in the study area, including the CWAP, that could create similar conflicts with existing land uses. Implementing these projects in combination with Alternatives 1A–4 and 5–9, including Alternatives 4A, 2D, and 5A, could result in the removal of additional structures or disruption of access in more locations. For example, construction of projects related to water supply, infrastructure, and habitat restoration would require temporary staging areas, resulting in the potential for temporary disruption of access. The permanent footprints of these projects could require existing structures to be demolished and removed, creating substantial conflicts with

existing land uses. New plans or updates to existing plans would not be anticipated to result in adverse effects with respect to existing land uses because these tend to focus on general goals, objectives, and policies designed to guide land use.

The removal of a cumulatively considerable number of existing permanent structures as a result of constructing the water conveyance facility would be considered a direct, adverse effect. Where applicable, the BDCP proponents will provide compensation to property owners for losses due to implementation of the BDCP measures, which would reduce the severity of economic effects related to these cumulative impacts, but would not reduce the severity of the physical impacts themselves. Cumulative conflicts with existing public structures are addressed in Chapter 20, *Public Services and Utilities*; potential cumulative effects on the environment related to the potential release of hazardous materials contained in structures to be demolished are addressed in Chapter 24, *Hazards and Hazardous Materials;* and potential cumulative effects on traditional cultural properties are addressed in Chapter 18, *Cultural Resources*.

***CEQA Conclusion*:** Construction of cumulative projects within the Plan Area could result in the removal of a substantial number of existing permanent structures based on the locations of new features such as water facilities or restored habitat. However, because the locations for the implementation of CM2–CM21 or Environmental Commitments are unknown at this point, a definitive conclusion about these measures' incremental contributions to cumulative conflicts with existing land uses cannot be made. These issues therefore will have to be addressed in detail in site-specific environmental documents for restoration proposals. In addition, the removal of existing structures is not, in itself, considered a significant environmental impact. Cumulative conflicts with existing public structures are addressed in Chapter 20, *Public Services and Utilities*; potential cumulative impacts on the public and environment related to the potential release of hazardous materials contained in structures to be demolished are addressed in Chapter 24, *Hazards and Hazardous Materials;* and potential impacts on traditional cultural properties are addressed in Chapter 18, *Cultural Resources*. When required, the project proponents would provide compensation to property owners for losses due to implementation of CM2–CM21 or Environmental Commitments, which would reduce the severity of economic effects related to this physical impact, but would not reduce the severity of the physical impact itself.

Impact LU-12: Cumulative Physical Structures Adjacent to and through a Portion of an Existing Community as a Result of Implementing the Proposed Conservation Measures 2–21

NEPA Effects: Because the locations for the implementation of CM2–CM21 under Alternatives 1A–2C, 3–4, 5, and 6–9 and Environmental Commitments under Alternatives 4A, 2D, and 5A, are unknown at this time, a definitive conclusion about their potential to divide an existing community cannot be made. These conservation measures are anticipated to take place largely on undeveloped lands that lie outside of existing communities. Those conservation measures that would take place inside existing communities (for instance, CM14, CM18, and CM19) would be anticipated to be limited in their physical scope and would not be linear in nature.

***CEQA Conclusion*:** Implementation of CM2–CM21 or Environmental Commitments would not be anticipated to physically divide an existing community under the action alternatives. However, without the locations where these components would be implemented, a definitive conclusion cannot be made.

5.2.4.9 Agricultural Resources

Table 5.2.2.10-1 lists projects considered for this cumulative effects section in addition to those listed in Table 14-12 in Chapter 14, *Agricultural Resources*, of the Draft EIR/EIS; for a complete list of such projects, consult Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, in Appendix A of the RDEIR/SDEIS. These projects would convert agricultural lands to nonagricultural uses and otherwise affect agricultural activities in the study area. This cumulative analysis also considers potential cumulative effects/impacts associated with Alternative 4A, 2D, and 5A.

Table 5.2.2.10-1. Effects on Agriculture from Additional Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Status	Description of Program/Project	Effects on Agriculture
Semitropic Water Storage District	Delta Wetlands Projects	Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	Project will result in conversion of existing agricultural land.
State and Federal Contractors Water Agency, California Department of Water Resources and MOA Partners	Lower Yolo Restoration Project		The goal of this project is to provide important new sources of food and shelter for a variety of native fish species at the appropriate scale in strategic locations in addition to ensuring continued or enhanced flood protection.	The project site would affect existing pasture land by restoring it to tidal habitat.
State Water Resources Control Board	Bay-Delta Water Quality Control Plan Update	Ongoing development.	The State Water Board is updating the 2006 Bay-Delta Water Quality Control Plan (WQCP) in four phases: Phase I: Modifying water quality objectives (i.e., establishing minimum flows) on the Lower San Joaquin River and Stanislaus, Tuolumne, and Merced Rivers to protect the beneficial use of fish and wildlife and (2) modifying the water quality objectives in the southern Delta to protect the beneficial use of agriculture; Phase II: Evaluating and potentially amending existing water quality objectives that protect beneficial uses and the	The WQCP plan update may change water quality objectives designed to protect agricultural beneficial uses (as opposed to influence water quality standards for irrigation water within the Plan Area and in other parts of the state).

Agency	Program/ Project	Status	Description of Program/Project	Effects on Agriculture
			program of implementation to achieve those objectives. Water quality objectives that could be amended include Delta outflow criteria; Phase III: Requires changes to water rights and other measures to implement changes to the WQCP from Phases I and II; Phase IV: Evaluating and potentially establishing water quality criteria and flow objectives that protect beneficial uses on tributaries to the Sacramento River.	
U.S. Army Corps of Engineers	CALFED Levee Stability Program		The California Bay-Delta Program's (CALFED) levee stability program provides for long-term protection of resources in the Delta by maintaining and improving the integrity of the area's extensive levee system.	This program would help to protect continued agricultural uses by improving levee stability in the Delta.
San Joaquin County	General Plan Update		The general plan provides guidance for future growth in a manner that preserves the county's natural and rural assets. Most of the urban growth is directed to existing urban communities.	This plan update could result in effects on agricultural lands through protection and/or conversion of agricultural land uses.
California State Administration	Sites Reservoir/ North of the Delta Offstream Storage		Determine the viability of a proposed off-stream storage project that could improve water supply, water reliability, support enhanced survival of anadromous fish and other aquatic species	This project could support improved water supplies and water quality in the Delta and in SWP/CVP service areas.
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential for loss of agricultural land from water supply infrastructure and restoration actions.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for loss of agricultural land from restoration actions.
Department of Water Resources	North Bay Aqueduct Alternative	Notice of Preparation issued on	Plan to construct and operate an alternative intake on the Sacramento River, generally	Minor effects on adjacent agricultural lands

Agency	Program/ Project	Status	Description of Program/Project	Effects on Agriculture
	Intake	December 2, 2009. CEQA documentation under preparation.	upstream of the Sacramento Regional Wastewater Treatment Plant, and connect it to the existing North Bay Aqueduct system by a new pipeline. The proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct intake at Barker Slough.	

Impact AG-1: Temporary Conversion, Short-Term Conversion, and Permanent Conversion of Important Farmland or of Land Subject to Williamson Act Contracts or in Farmland Security Zones as a Result of Constructing the Proposed Water Conveyance Facility

NEPA Effects: Construction associated with all of the action alternatives would convert Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones to nonagricultural uses. Temporary and short-term impacts on Important Farmland would range from 559 to 3,170 acres while permanent impacts would fall between 2,459 and 18,875 acres, depending on the alternative selected. Land subject to Williamson Act contracts or in Farmland Security Zones affected by temporary and short-term construction activities would range from 632 to 1,877 acres while those at risk of permanent conversion would be between 2,035 and 14,125 acres. Other projects, including projects that could be implemented under the CWAP that would potentially affect agricultural uses are listed in Table 5.2.2.10-1. These cumulative projects include water supply, flood protection, land use, water quality, and habitat restoration plans and projects that directly or indirectly contribute to effects on agricultural activities in the Delta and other more regional projects that would be implemented under CWAP, such as Sites Reservoir and the State Water Board's update to the Bay-Delta Water Quality Control Plan, that could result in substantial agricultural land conversion in areas north and south of the Delta. Implementing these projects in combination with any of the action alternatives would result in cumulative adverse effects because of the substantial amount of acreage that could be lost across the state and the importance of farmland in California. Mitigation Measure AG-1 would be available to reduce those effects created by project-related activities.

***CEQA Conclusion*:** Construction and ongoing operations associated with Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A would directly and indirectly affect agricultural resources in the Plan Area. Other projects that would potentially convert Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones are listed in Table 14-12 in Chapter 14, *Agricultural Resources*, of the Draft EIR/EIS and discussed above. Implementing these projects in combination with any of the action alternatives would result in a significant cumulative impact because of the substantial amount of acreage that could be lost across the state and the importance of farmland in California. The contribution of the alternatives to conversion of Important Farmland, land subject to Williamson Act contract, or land within a Farmland Security Zone to nonagricultural uses is cumulatively considerable and significant because of the substantial amounts of farmland that would be converted in the Delta and the relatively large proportion of effects that would result from implementing the alternatives compared to losses from other contributing projects.

Mitigation Measure AG-1 will reduce the severity of impacts created by project-related activities by implementing activities such as siting project footprints to encourage continued agricultural production; relocating or replacing agricultural infrastructure in support of continued agricultural activities; engaging counties, owners/operators, and other stakeholders in developing optional agricultural stewardship approaches; and/or preserving agricultural land through off-site easements or other agricultural land conservation interests. However, these impacts remain significant and unavoidable after implementation of this measure because (i) even after effects from the footprints of project facilities are minimized through design, they would continue to require the conversion of substantial amounts of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones, (ii) conservation or preservation by means of acquiring agricultural land conservation interests, even at one-to-one ratio, may not avoid a net loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones and (iii) the proposed optional agricultural stewardship approach does not focus principally on physical effects, but rather, focuses on providing, at a minimum, a neutral agricultural economic effect on affected lands in the Delta as a result of the project, taking into consideration the desire of individual Delta farmers to continue working on their land, the long-term viability of regional agricultural economies, the economic health of local governments and special districts, and the Delta as an evolving place.

Mitigation Measure AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to Maintain Agricultural Productivity and Mitigate for Loss of Important Farmland and Land Subject to Williamson Act Contracts or in Farmland Security Zones

Please see Mitigation Measure AG-1 under Impact AG-1 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

5.2.4.10 Recreation

Since the time of the Draft EIR/EIS notice of preparation (NOP) in 2009, additional projects that could combine with the action alternatives to contribute to cumulative impacts on recreation are known to be reasonably foreseeable or probable. The list of projects included in the Draft EIR/EIS Table 15-19 is amended to include the additional projects shown in Table 5.2.2.11-1 below. These additional cumulative projects are considered in combination with the projects included in Draft EIR/EIS Table 18-2. These projects were added because they would involve land disturbing activities that could damage cultural resources. For purposes of this assessment, the water conveyance facilities and conservation measures also combined.

Table 5.2.2.11-1. Effects on Recreation Resources from Additional Programs and Projects Considered for Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Recreation
DWR and Suisun Mash Preservation Agreement agencies	Miens Landing Restoration	Currently under study	Restoration of duck clubs to tidal marsh.	Restoration could adversely affect waterfowl hunting opportunities and potentially benefit non-consumptive recreation.
DWR	Cache Slough Area Restoration	Currently under study	Restoration of lands within the Cache Slough Complex located in the Delta	Conversion of lands from agriculture to wildlife habitat could benefit non-consumptive recreation. This project is examined under Alternatives 1A–4 and 5–9 of the BDCP.
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential for beneficial and adverse effects on recreation resources.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for enhanced recreation experience related to improved fish and wild life habitat conditions.

Impact REC-16: Cumulative Displacement of Recreational Facilities

Alternative 9

***NEPA Effects*:** Water conveyance facilities under Alternative 9 include fish screens and intakes. The location of these facilities would result in the direct permanent loss of well-established recreation facilities in the Delta including Boathouse Marina, Walnut Grove public guest dock, and Boon Dox guest dock. The other project alternatives, including Alternative 4A, would not displace recreation facilities. The other projects shown in Draft EIR/EIS Table 15-9 and Table 5.2.2.11-1 are not expected to contribute to the direct loss or restrict access to recreation facilities. While this project-level effect is adverse, it would not contribute to a cumulatively considerable loss of recreational resources in the Delta.

***CEQA Conclusion*:** The projects shown in Draft EIR/EIS Table 15-9 and Table 5.2.2.11-1 in combination with Alternative 9 are not expected to contribute to the direct loss of established recreation facilities. The loss in recreation opportunities provided by the Boathouse Marina, Walnut Grove public guest dock and Boon Dox guest dock would not be considered a cumulatively considerable impact on recreation because of the numerous alternative venues for boating and

mooring, the loss of recreational facilities under Alternative 9 would not contribute to a cumulatively significant loss of recreational resources.

Impact REC-17: Temporary Disruption of Recreation Opportunities and Experiences as a Result of Construction Projects in the Delta

Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A

***NEPA Effects*:** Construction of water conveyance facilities under Alternatives 1A through 9, including Alternatives 4A, 2D, and 5Awould result in temporary and adverse disruptions of recreational opportunities and experiences. These effects, when combined with the effects of the projects shown in Draft EIR/EIS Table 15-9 and Table 5.2.2.11-1 could temporarily disrupt or reduce the quality of recreation by generating construction-related noise, light and glare, and by the long-term loss of access to some recreation facilities. While the project-level effects of each alternative would be adverse, the temporary cumulative loss of recreational opportunities and experiences provided at affected sites is not deemed adverse because of the large supply of alternative recreation areas throughout the Delta. In addition, habitat restoration occurring under all alternatives and cumulative projects would also benefit non-consumptive recreation opportunities within the Delta.

***CEQA Conclusion*:** The projects shown in Draft EIR/EIS Table 15-9 and Table 5.2.2.11-1 in combination with each alternative could temporarily disrupt localized recreation opportunities within the Delta as they are constructed. Many of these projects along with restoration actions associated with the project alternatives could result in a benefit to non-consumptive recreation opportunities within the Delta. The cumulative recreation impact of the projects and alternatives is not considered significant because of the diversity of recreation opportunities throughout the Delta, the temporary nature of most cumulative impacts and the benefit that will result from cumulative projects implemented under the CWAP and California EcoRestore program.

Impact Rec-18: Temporary Alteration of Recreational Navigation

Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A

***NEPA Effects*:** Constructing the water conveyance facilities would result in a temporary adverse effect on recreational boating by restricting access to certain waterways. Restrictions on boating access would occur under all alternatives, including Alternatives 4A, 2D, and 5A. These restrictions would adversely affect water-dependent recreation including waterskiing and wakeboarding occurring at or in the vicinity of construction sites. The other cumulative projects included in Draft EIR/EIS Table 15-9 and Table 5.2.2.11-1 are primarily land based and would not necessarily contribute to a combined adverse effect on boating that would occur during construction of the water conveyance facilities. Although the effects on boating occurring during construction are temporary, they would be considered adverse because in the affected locations, the recreation activities would be entirely displaced. Mitigation Measure TRANS-1a is available to address this adverse effect.

***CEQA Conclusion*:** The impact on recreational navigation resulting from constructing the water conveyance facilities in combination with the projects included in Draft EIR/EIS Table 15-9 and Table 5.2.2.11-1 would be considered significant and unavoidable as boating would be restricted from these sites during construction. Because the other projects that could affect recreation are primarily land based and would not affect boating, a significant cumulative impact on boating would

not occur. Mitigation Measure TRANS-1a would help reduce the impacts on boating occurring during construction but not to a less-than-significant level.

Impact REC-19: Temporary Effects on Recreational Fishing

Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A

***NEPA Effects*:** Constructing the water conveyance facilities would result in a temporary long-term disruption to some recreational fishing occurring in the Delta by restricting access to fishing sites or introducing a change in an environmental condition (e.g., noise, light) that would distract from fishing. The loss of access to or change in character of recreational fishing sites would occur under all alternatives, including Alternatives 4A, 2D, and 5A, and would be considered adverse. The other projects included in Draft EIR/EIS Table 15-9 and Table 5.2.2.11-1 are primarily land based and would not necessarily contribute to a combined adverse effect on sport-fishing. This cumulative fishing access impact is considered not adverse because of the amount and diversity of recreational fishing opportunities throughout the Delta, the temporary nature of most cumulative impacts and the benefit that will result from cumulative projects implemented under the CWAP and California EcoRestore program.

Mitigation Measures REC-2, AQUA-1a, AQUA-1b, NOI-1a, NOI-1b, and AES-1a through AES-g are available to reduce the adverse effect on recreational fishing.

***CEQA Conclusion*:** The impact on recreational fishing resulting from constructing the water conveyance facilities would be considered significant as the public would be restricted from accessing recreational fishing sites would be restricted during construction. Cumulative fishing access impacts are considered less than significant because combined cumulative projects would mainly include temporary land-based construction effects, fishing access in the Delta is plentiful and other cumulative projects such as those implemented under the CWAP and California EcoRestore program could benefit fishing and other recreational opportunities in the Delta.

5.2.4.11 Socioeconomics

The following section provides an update to the socioeconomic cumulative impact analysis in the Draft EIR/EIS Chapter 16, *Socioeconomics*. This section considers additional projects (Table 5.2.2.12-1) not previously included in the Draft EIR/EIS cumulative analysis, as well as those previously considered, which are identified in Table 16-61. For a complete list of plans, policies, programs and projects considered, see Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*. These projects would have the potential to affect socioeconomics in the study area. This section also includes a discussion of the cumulative impacts associated with Alternatives 4A, 2D, and 5A.

Table 5.2.2.12-1. Effects on Socioeconomics from the Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Socioeconomics
California Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	EIR certified in 2010, project is ongoing.	The Dutch Slough Tidal Marsh Restoration Project, located near Oakley in Eastern Contra Costa County, would restore wetland and uplands, and provide public access to the 1,166-acre Dutch Slough property owned DWR. The property is composed of three parcels separated by narrow man-made sloughs.	Potential beneficial effects on recreational economics and potential adverse effects, although limited, on agricultural economics
California High Speed Rail Authority and Federal Railroad Administration	California High-Speed Rail System Fresno to Merced Section	Final EIR/EIS certified on May 3, 2012.	The project would construct a new rail corridor between Merced and Fresno.	Potential beneficial effects on regional economics and potential adverse agricultural economics
Semitropic Water Storage District	Delta Wetlands Project	Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	Potential beneficial effects on recreational economics and potential adverse agricultural economics
Natural Resources Agency, Salton Sea Authority, California Department of Fish and Wildlife, California Department of Water Resources	Salton Sea Species Conservation Habitat Project	Ongoing	The Natural Resources Agency, in partnership with the Salton Sea Authority, will coordinate state, local and federal restoration efforts and work with local stakeholders to develop a shared vision for the future of the Salton Sea. Restoration will include construction of 600 acres of near shore aquatic habitat to provide feeding, nesting and breeding habitat for birds. This project is permitted to increase to 3,600 acres and could be scaled even greater with additional resources. Additional restoration projects may follow.	Potential beneficial effects on recreational economics

Agency	Program/Project	Status	Description of Program/Project	Effects on Socioeconomics
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential for positive socio-economic effects from improved state-wide water resources management.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for positive socioeconomic effects from improved Delta habitat conditions.

Impact ECON-1: Temporary Effects on Regional Economics and Employment in the Delta Region during Construction of the Proposed Water Conveyance Facilities

NEPA Effects: Construction of water conveyance facilities would result in an increase in construction-related employment and labor income; this would be considered a beneficial effect. However, these activities would also be anticipated to result in a decrease in agricultural-related employment and labor income, which would be considered an adverse effect. Employment and income associated with the construction of many of the cumulative projects identified in Table 5.2.2.12-1, Table 16-61, and in Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, could increase employment and income in the Delta region. The projects would also potentially convert or disturb existing land use. The effects on the economy of the Delta region would be similar in kind, although not magnitude, to those estimated for construction of conveyance features and facilities for the Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A. In general, the changes in regional economic activity (employment and income) would include increases from the construction-related activity, declines resulting from agricultural or other land uses converted or impaired, declines resulting from abandonment of natural gas wells on lands converted or impaired, and changes in recreation spending that could be positive or negative depending on the specific project. A number of the cumulative projects included in this analysis are located within the Delta (e.g., Delta Wetlands Project), and if their construction were concurrent with that of the BDCP, the cumulative effects on employment and income would be larger than for the proposed water conveyance facilities alone.

Construction of water conveyance facilities, in addition to these other projects would result in an increase in construction-related employment and labor income; this would be considered a beneficial effect. However, these activities would also be anticipated to result in a decrease in agricultural-related or natural gas-related employment and labor income, which would be considered an adverse effect. The scale of action alternatives indicates that their effects are cumulatively considerable. Mitigation Measure AG-1 would be available to reduce effects by preserving agricultural productivity and compensating off-site. Mitigation Measure MIN-5 would be available to reduce BDCP-related effects on natural gas wells and associated employment and labor income by minimizing, to the extent feasible, the need for well abandonment or relocation.

***CEQA Conclusion*:** Construction of the BDCP water conveyance facilities and cumulative projects in Table 5.2.2.12-1, Table 16-61 and in Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, would affect total employment and income in the Delta region. The potential cumulative change in total employment and income in the Delta region is based on expenditures resulting from construction and resulting changes in agricultural production recreation, and natural gas well operations. The total cumulative change in employment and income is not considered an environmental impact. Significant environmental impacts would only result if the changes in regional economics cause reasonably foreseeable physical impacts. Such effects are discussed in other chapters throughout this EIR/EIS. Cumulative removal of agricultural land from production is addressed in Chapter 14, *Agricultural Resources*; cumulative changes in recreation related activities are addressed in Chapter 15, *Recreation;* and cumulative abandonment of natural gas wells is addressed in Chapter 26, *Mineral Resources*.

Impact ECON-2: Effects on Population and Housing in the Delta Region during Construction of the Proposed Water Conveyance Facilities

NEPA Effects: Construction of the water conveyance facilities under Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, could result in localized effects on housing within specific local communities. However, given the availability of housing within the five-county region, predicting where this impact might fall would be speculative. In addition, new residents would likely be dispersed across the region, thereby not creating a burden on any one community. Because these activities would not result in permanent concentrated, substantial increases in population or new housing, they would not be considered to have an adverse effect. Employment associated with implementing the cumulative projects in Table 5.2.2.12-1, Table 16-61 and Appendix 3D could require the temporary or permanent relocation of workers into the region. In turn, demand for housing could increase. A number of these projects are located within the Delta, and if their construction were concurrent with that of CM1 under the action alternatives, the cumulative effects on population and housing during the common construction period would be larger than for the proposed water conveyance facilities alone. While the combined population and housing effects from BDCP and other cumulative, could lead to a cumulative adverse effect, because the BDCP activities would not result in permanent concentrated, substantial increases in population or new housing, they would not be considered to be cumulatively considerable.

***CEQA Conclusion*:** Construction of the water conveyance facilities under the action alternatives in combination with the other cumulative projects would result in population increases in the Delta region. An increase in population, by itself, is not considered a physical impact under CEQA. Any physical impacts associated with the cumulative effects of the action alternatives regarding population are discussed in other chapters. Changes in demand for public services resulting from any increase in population are addressed in Chapter 20, *Public Services and Utilities*.

Impact ECON-3: Changes in Community Character as a Result of Constructing the Proposed Water Conveyance Facilities

NEPA Effects: Under the Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, community character could change as a result of constructing water conveyance facilities. While the location and magnitude of these effects would be anticipated to vary from alternative to alternative, the nature of these effects would be similar. Potential increases in population, along with reduced agricultural and recreational economic contributions, could create demographic changes in Delta communities, altering their character. Additionally, physical effects of construction could lead to

changes in rural qualities including predominant agricultural land uses, relatively low population densities, and low levels of associated noise and vehicular traffic. Construction-related effects could also result in changes to community cohesion if they were to restrict mobility, reduce opportunities for maintaining face-to-face relationships, or disrupt the functions of community organizations or community gathering places.

Employment, income, and land use changes associated with the cumulative projects described in Table 5.2.2.12-1, Table 16-61 and Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, could bring about changes in community character. The magnitude of the potential impacts would depend on the timing, location, and intensity of effects from these projects. Implementation of these projects concurrent with that of BDCP water conveyance construction would result in a cumulative adverse social effect on community character during the common construction period. The incremental contribution of BDCP-related activities to this effect would be cumulatively considerable. Implementation of mitigation measures and environmental commitments related to noise, visual effects, transportation, agriculture, and recreation would reduce cumulative adverse effects (see Appendix 3B, *Environmental Commitments*). These actions are summarized under Alternative 1A, Impact ECON-3 in Chapter 16, *Socioeconomics*.

***CEQA Conclusion*:** Construction of the water conveyance facilities and other cumulative projects could affect the character in Delta communities. To the extent that project construction schedules and locations overlap, the cumulative impacts on housing and population within specific communities could be substantial. However, because these cumulative impacts are social in nature, rather than physical, they are not considered impacts under CEQA. To the extent that changes to community character would lead to physical impacts involving population growth, such impacts are described under Impact ECON-2 and in Chapter 30, *Growth Inducement and Other Indirect Effects.* Furthermore, notable decreases in population or employment, even if limited to specific areas, sectors, or the vacancy of individual buildings, could result in alteration of community character stemming from a lack of maintenance, upkeep, and general investment. However, implementation of mitigation measures and environmental commitments related to noise, visual effects, transportation, agriculture, and recreation, would reduce the extent of these effects (see Appendix 3B, *Environmental Commitments*). Specifically, these commitments include Develop and Implement Erosion and Sediment Control Plans, Develop and Implement Hazardous Materials Management Plans, Notification of Maintenance Activities in Waterways, Noise Abatement Plan, Fire Prevention and Control Plan, and Prepare and Implement Mosquito Management Plans.

Impact ECON-4: Changes in Local Government Fiscal Conditions as a Result of Constructing the Proposed Water Conveyance Facilities

NEPA Effects: Under Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, parts of the water conveyance facilities would be constructed on land currently held by private owners. Over the construction period, local governments and special districts would not be able to collect property tax and assessment revenue on this land. As discussed under Alternative 4A, these losses would be offset by requirements specified in the California Water Code which require entities constructing and operating water conveyance facilities in the Delta to fully offset losses in tax revenues to local governments and special districts. The action alternatives would not contribute to an adverse cumulative effect on local government of special district tax revenues.

***CEQA Conclusion*:** Construction of the action alternatives would not result in a loss of local government and special tax revenues because of the provisions in the California Water Code which require entities constructing and operating water conveyance facilities in the Delta to offset any loss in property tax revenues. The action alternatives would not contribute to a cumulative impact on local government of special district tax revenues.

Impact ECON-5: Effects on Recreational Economics as a Result of Constructing the Proposed Water Conveyance Facilities

NEPA Effects: Under the action alternatives substantial disruption of recreational activities considered temporary and permanent would occur in the study area during the construction period. The quality of recreational activities in the Delta could be affected by noise, lighting, traffic, and visual degradation in proximity to water conveyance construction. A substantial decline in visits to the Delta region as a result of facility construction would be expected to reduce recreation-related spending, creating an adverse effect throughout the Delta. Additionally, if construction activities shift the relative popularity of different recreational sites, the project may carry localized beneficial or adverse effects. Changes to recreational opportunities or quality associated with construction of other cumulative projects (see Table 5.2.2.12-1, Table 16-61 and Appendix 3D) could bring about changes similar changes. Those projects involving in-water construction in recreational areas would be anticipated to add to the adverse effects associated with the BDCP; however, other projects involving the development or improvement of recreational opportunities could create beneficial effects with respect to recreational economic activity.

Under the Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, mitigation measures and environmental commitments would be implemented to reduce some of the effects of construction activities upon the recreational experience. These include protection of waterway navigation, recreational access, public views, and noise abatement.

Construction of water conveyance structures, in conjunction with construction activities for other projects, would be anticipated to result in a lower-quality recreational experience in a number of localized areas throughout the Delta, despite the implementation of environmental commitments. With a decrease in recreational quality, the number of visits would be anticipated to decline, at least in areas closest to construction activities. Fewer visits would lead to less spending, creating a cumulatively significant adverse effect. Recreation-dependent businesses including marinas and recreational supply retailers may not be able to economically weather the effects of multiyear construction activities and may be forced to close as a result, even while businesses in areas that become more popular could benefit. The multi-year schedule and geographic scale of construction activities anticipated under each action alternatives and the anticipated incremental decline in recreational spending would be cumulatively considerable. The environmental commitments cited above would contribute to the reduction of this effect and long-term benefits that may improve some recreation access and resources.

***CEQA Conclusion*:** Construction of the water conveyance facilities under each action could impact revenues generated by recreation expenditures made in the Delta region if construction activities result in fewer visits to the area. Fewer visits would be anticipated to result in decreased economic activity related to recreational activities. This section considers only the economic effects of recreational changes brought about by construction of the proposed water conveyance facilities. Potential physical changes to the environment relating to cumulative recreational resources are described and evaluated in Chapter 15, *Recreation*.

Impact ECON-6: Effects on Agricultural Economics in the Delta Region during Construction of the Proposed Water Conveyance Facilities

Because construction of the proposed water conveyance facilities under Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, in addition to the other cumulative projects, programs, and plans considered, would lead to reductions in crop acreage and in the value of agricultural production in the Delta region, this is considered an adverse effect and the incremental contribution of BDCP-related activities would be cumulatively considerable. Mitigation Measure AG-1 would be available to reduce BDCP-related effects by preserving agricultural productivity and compensating off-site.

***CEQA Conclusion*:** Construction of the water conveyance facilities and other cumulative projects could reduce the total value of agricultural production in the Delta region. The reduction in the value of agricultural production is not considered an environmental impact. Significant environmental impacts would only result if the changes in regional economics cause physical impacts. Such effects are discussed in other chapters throughout this EIR/EIS. The potential cumulative impacts from permanent removal of agricultural land from production are addressed in Chapter 14, *Agricultural Resources*.

Impact ECON-7: Permanent Regional Economic and Employment Effects in the Delta Region during Operation and Maintenance of the Proposed Water Conveyance Facilities

Increased expenditures related to operation and maintenance of water conveyance facilities would be expected to result in a permanent increase in regional employment and income, as presented in Chapter 16, *Socioeconomics* (Table 16-22). This would be considered a beneficial effect. However, the permanent removal of agricultural land following construction would have lasting negative effects on agricultural employment and income. Considered together, the cumulative effects of these projects on agricultural employment would be adverse and the effect of activities under each action alternative would be cumulatively considerable. Mitigation Measure AG-1, described in Chapter 14, *Agricultural Resources*, would be available to reduce regional economic and employments effects by preserving agricultural productivity and compensating off-site.

***CEQA Conclusion*:** Operation and maintenance of the proposed water conveyance facilities would increase total employment and income in the Delta region. The net change would result from expenditures on operation and maintenance and from changes in agricultural production, which could also be affected by other projects, programs, and plans in the Delta region. The total change in income and employment is not, in itself, considered an environmental impact. Significant environmental impacts would only result if the changes in regional economics cause physical impacts. Such effects are discussed in other chapters throughout this EIR/EIS. Costs are addressed in Chapter 8 of the BDCP, *Implementation Costs and Funding Sources*; removal of agricultural land from production is addressed in Chapter 14, *Agricultural Resources*; changes in recreation related activities are addressed in Chapter 15, *Recreation*.

Impact ECON-8: Permanent Effects on Population and Housing in the Delta Region during Operation and Maintenance of the Proposed Water Conveyance Facilities

NEPA Effects: Cumulative effects on population and housing during operation and maintenance of Alternatives 1A through 4A, including Alternatives 4A, 2D, and 5A and other projects described in see Table 5.2.2.12-1, Table 16-61 and Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, would be similar in kind,

although not magnitude, to those described under Impact ECON-2 in this cumulative analysis. It is anticipated that non-local workers would relocate to the five-county region, thus adding to the local population. However, this additional population and any population added by other projects in the Delta region would be anticipated to result in only a minor increase in the total 2020 projected regional population of 4.6 million and be distributed throughout the region. It is anticipated that most of the operational workforce would be drawn from within the five-county region. Consequently, operation of the conveyance facilities, in addition to the effects of other projects, would not result in cumulative adverse effects on housing.

***CEQA Conclusion*:** Operation and maintenance of the proposed water conveyance facilities, in addition to other programs, plans, policies, and projects in the Delta region, would result in minor population increases in the Delta region with adequate housing supply to accommodate the change in population and therefore adverse changes in the physical environment are not anticipated.

Impact ECON-9: Changes in Community Character during Operation and Maintenance of the Proposed Water Conveyance Facilities

NEPA Effects: Under the Alternatives 1A through 5A, including Alternatives 4A, 2D, and 5A, community character could change over the period the water conveyance facilities are operated and maintained. While the location and magnitude of these effects would be anticipated to vary from alternative to alternative, the nature of these effects would be similar. Changes in population, along with reduced agricultural and recreational economic contributions, could create demographic changes in Delta communities, altering their character. Additionally, continued physical effects of operations could lead to changes in rural qualities including predominant agricultural land uses, relatively low population densities, and low levels of associated noise and vehicular traffic. Such lasting effects could also result in changes to community cohesion if they were to restrict mobility, reduce opportunities for maintaining face-to-face relationships, or disrupt the functions of community organizations or community gathering places (such as schools, libraries, places of worship, and recreational facilities).

Employment, income, and land use changes associated with the cumulative projects described in see Table 5.2.2.12-1, Table 16-61 and Appendix 3D could bring about changes in community character similar to those described above. The magnitude of the potential impacts would depend on the location and intensity of effects from these projects. However, the resultant cumulative social effects on community character would be significant and adverse. The incremental contribution of BDCP-related activities to this effect would be cumulatively considerable. Implementation of mitigation measures and environmental commitments related to noise, visual effects, transportation, agriculture, and recreation would reduce cumulative adverse effects (see Appendix 3B, *Environmental Commitments*). These actions are summarized under Alternative 1A, Impact ECON-9.

***CEQA Conclusion*:** Continued operation and maintenance of the water conveyance features under Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, along with other cumulative projects could affect the character of Delta communities. To the extent that project locations overlap, the cumulative impacts on housing and population within specific communities could be substantial in intensity. However, because these cumulative impacts are social in nature, rather than physical, they are not considered impacts under CEQA. To the extent that changes to community character would lead to physical impacts involving population growth, such impacts are described under Impact ECON-8 and in Chapter 30, *Growth Inducement and Other Indirect Effects* Furthermore, notable decreases in population or employment, even if limited to specific areas, sectors, or the

vacancy of individual buildings, could result in alteration of community character stemming from a lack of maintenance, upkeep, and general investment.

Impact ECON-10: Changes in Local Government Fiscal Conditions during Operation and Maintenance of the Proposed Water Conveyance Facilities

NEPA Effects: Under Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, parts of the water conveyance facilities would be constructed on land currently held by private owners. Over the operation and maintenance period construction period, local governments and special districts would not be able to collect property tax and assessment revenue on this land. As discussed under Alternative 4A, these losses would be offset by requirements specified in the California Water Code which require entities constructing and operating water conveyance facilities in the Delta to fully offset losses in tax revenues to local governments and special districts. The action alternatives would not contribute to an adverse cumulative effect on local government of special district tax revenues.

***CEQA Conclusion*:** Operation of the action alternatives would not result in a loss of local government and special tax revenues because of the provisions in the California Water Code which require entities constructing and operating water conveyance facilities in the Delta to offset any loss in property tax revenues. The action alternatives would not contribute to a cumulative impact on local government of special district tax revenues.

Impact ECON-11: Effects on Recreational Economics during Operation and Maintenance of the Proposed Water Conveyance Facilities

Alternatives 1A–8, including Alternatives 4A, 2D, and 5A

Under Alternatives 1A through 8, including Alternatives 4A, 2D, and 5A, water conveyance structures are expected to permanently displace some recreational access along the alternative alignments. These impacts are discussed in Chapter 15, *Recreation.* Maintenance of conveyance facilities, including intakes, would result in periodic temporary but not substantial adverse effects on boat passage and water-based recreational activities. Similarly, recreational changes associated with operation and maintenance of the cumulative would not be anticipated to create adverse economic effects related to recreation. Because effects of facility maintenance would be short-term and intermittent, substantial cumulative economic effects are not anticipated to result.

Alternative 9

Recreational changes associated with operation and maintenance of the cumulative projects would not be anticipated to create adverse economic effects related to recreation. However, under BDCP Alternative 9, recreational activities including boat passage and navigation would be adversely affected by water conveyance operations. Operable gate and boat passage facilities would require boaters to wait for passage and would require speed limits in nearby areas. In some areas, boat navigation could be enhanced due to dredging activities and a new channel connection. However, use of operable gates would result in an adverse effect on recreational activities and would be anticipated to result in a cumulative adverse economic effect, at least in localized areas, by reducing the quality of the boating experience, along with other water-based recreation. The incremental effect of operating BDCP Alternative 9 would be cumulatively considerable. An environmental commitment to retain passage at some facilities, along with implementation of Mitigation Measures REC-13a and REC-13b would reduce the severity of this effect.

***CEQA Conclusion*:** Recreational changes associated with operation and maintenance of the cumulative projects would not be anticipated to create adverse economic effects related to recreation. Similarly, operation and maintenance activities associated with the proposed water conveyance facilities under Alternatives 1A through 8, including Alternatives 4A, 2D, and 5A, would only be anticipated to create minor effects on recreational spending. However, operation of Alternative 9 would be anticipated to result in substantial effects on recreational resources and therefore, to reduce related economic activity such as lodging, food, fuel, and accessories. This section considers only the economic effects of recreational changes. Potential physical changes to the environment relating to recreational resources are described and evaluated in Chapter 15, *Recreation*.

Impact ECON-12: Permanent Effects on Agricultural Economics in the Delta Region during Operation and Maintenance of the Proposed Water Conveyance Facilities

Cumulative effects on agricultural economics during operation and maintenance of the water conveyance facilities under the action alternatives and cumulative projects (see Table 5.2.2.12-1, Table 16-61 and Appendix 3D) would be similar in kind, although not magnitude, to those described under Impact ECON-6 in this cumulative analysis. Together, the footprint of water conveyance facilities proposed under BDCP, along with other cumulative projects, programs, and plans, would result in lasting reductions in crop acreage and in the value of agricultural production in the Delta region; therefore, this is considered an adverse cumulative effect and the incremental BDCP contribution to this effect would be cumulatively considerable. Mitigation Measure AG-1, described in Chapter 14, *Agricultural Resources,* would be available to reduce BDCP-related effects by preserving agricultural productivity and compensating off-site.

***CEQA Conclusion*:** Operation and maintenance of the BDCP water conveyance facility under the action alternatives and under cumulative projects could reduce the total value of agricultural production in the Delta region. The reduction in the value of agricultural production is not considered an environmental impact. Significant environmental impacts would only result if the changes in regional economics cause physical impacts. Such effects are discussed in other chapters throughout this EIR/EIS. The potential cumulative impacts from permanent removal of agricultural land from production are addressed in Chapter 14, *Agricultural Resources.*

Impact ECON-13: Effects on the Delta Region's Economy and Employment Due to the Implementation of CM2–CM21 under Alternatives 1A–2C, 3–5, and 6A–9, or Environmental Commitments under Alternatives 4A, 2D, and 5A

NEPA Effects: Cumulative effects on regional economics as a result of implementing CM2–CM21 under all action alternatives except Alternatives 4A, 2D, and 5A and as a result of implementing Environmental Commitments under Alternatives 4A, 2D, and 5A would be similar in kind, although not magnitude, to those described under Impact ECON-1 in this cumulative analysis. In the Delta region, spending on CM2–CM21, or Environmental Commitments under Alternatives 4A, 2D, and 5A, and other similar projects would include construction, operation and maintenance activities that would convert or disturb existing land use. Because implementation of CM2–CM21, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, along with effects of similar projects, would be anticipated to result in an increase in construction and operation and maintenance-related employment and labor income, this would be considered a beneficial effect. However, implementation of these project components and other non-BDCP projects would also be anticipated to result in a decrease in agricultural-related and natural gas production-related

employment and labor income, which would be considered an adverse cumulative effect and the incremental contribution made by the action alternatives to this effect would be cumulatively considerable. The magnitude of this adverse cumulative effect and contribution to the cumulative impact would be smaller under Alternative 4A because the magnitude of habitat restoration and enhancement would be considerably less that the other action alternatives. Mitigation Measure AG-1, described in Chapter 14, *Agricultural Resources*, would be available to reduce project related effects by preserving agricultural productivity and compensating off-site. Mitigation Measure MIN-5, described in Chapter 26, *Mineral Resources*, would be available to reduce project related effects on natural gas well-related employment and labor income by minimizing, to the extent feasible, the need for well abandonment or relocation.

***CEQA Conclusion*:** Implementation of the proposed CM2–CM21or Environmental Commitments under Alternatives 4A, 2D, and 5A would affect total employment and income in the Delta region. The change in total employment and income in the Delta region is based on expenditures resulting from implementation of the proposed CM2–CM21, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, and any resulting changes in agricultural production, recreation, and natural gas production activities. The total change in employment and income is not, in itself, considered an environmental impact. Significant environmental impacts would only result if the changes in regional economics cause physical impacts. Such effects are discussed in other chapters throughout this EIR/EIS. Removal of agricultural land from production is addressed in Chapter 14, *Agricultural Resources*; changes in recreation-related activities are addressed in Chapter 15, *Recreation*; abandonment of natural gas wells is addressed in Chapter 26, *Mineral Resources*.

Impact ECON-14: Effects on Population and Housing in the Delta Region as a Result of Implementing CM2–CM21 under Alternatives 1A–2C, 3–5, and 6A–9, or Environmental Commitments under Alternatives 4A, 2D, and 5A

Cumulative effects on population and housing as a result of implementing CM2–CM21, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, and other cumulative would be similar in kind, although not magnitude, to those described under Impact ECON-2 of this cumulative analysis. In general, the changes in population and housing associated with CM2–CM21, or Environmental Commitments under Alternatives 4A, 2D, and 5A, as well as similar conservation efforts in the Delta region, would include increases in population from the construction and operation and maintenance-related activity and declines in residential housing and business establishments as a result of lands converted or impaired. Because these activities would not be anticipated to result in concentrated, substantial increases in population or new housing, they would not be considered to have an adverse cumulative effect.

***CEQA Conclusion*:** Implementation of the proposed CM2–CM21, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, would impact total population and housing in the Delta region. The change in total population and housing in the Delta region is based on employment resulting from implementation of the proposed CM2–CM21 or the Environmental Commitments under Alternatives 4A, 2D, and 5A. The change in population and housing is expected to be minor relative to the five-county Delta region, and dispersed throughout the region. Therefore, significant changes to the physical environment are not anticipated to result.

Impact ECON-15: Changes in Community Character as a Result of Implementing CM2–CM21 under Alternatives 1A–2C, 3–5, and 6A–9, or Environmental Commitments under Alternatives 4A, 2D, and 5A

NEPA Effects: Cumulative effects on community character as a result of implementing CM2–CM21, or Environmental Commitments under Alternatives 4A, 2D, and 5A, and other cumulative (see Table 5.2.2.12-1, Table 16-61 and Appendix 3D) would be similar in kind, although not magnitude, to those described above under Impacts ECON-3 and ECON-9. Changes in population and in agricultural and recreational economic contributions could create demographic changes in Delta communities, altering their character and resulting in potential effects on community cohesion. Additionally, physical effects of conservation measure implementation could improve or detract from the rural qualities of Delta communities.

Employment, income, and land use changes associated with the cumulative projects could bring about changes in community character similar to those described above. The magnitude of the potential impacts would depend on the location and intensity of effects from these projects. However, the resulting cumulative social effects on community character would be anticipated to be significant and adverse. The incremental contribution of project-related activities to this effect would be cumulatively considerable. The magnitude of this adverse cumulative effect and contribution to the cumulative impact would be smaller under Alternatives 4A, 2D, and 5A because the magnitude of habitat restoration and enhancement would be considerably less that the other action alternatives. Implementation of mitigation measures and environmental commitments related to noise, visual effects, transportation, agriculture, and recreation would reduce cumulative adverse effects (see Appendix 3B, *Environmental Commitments*). These actions are summarized under Alternative 1A, Impact ECON-15.

***CEQA Conclusion*:** Implementation of BDCP CM2–CM2, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, along with other cumulative projects, could affect the character in Delta communities. To the extent that project locations overlap, the cumulative impacts on housing and population within specific communities could be substantial in intensity. However, because these cumulative impacts are social in nature, rather than physical, they are not considered impacts under CEQA. To the extent that changes to community character would lead to physical impacts involving population growth, such impacts are described in Chapter 30, *Growth Inducement and Other Indirect Effects.* Furthermore, notable decreases in population or employment, even if limited to specific areas, sectors, or the vacancy of individual buildings, could result in alteration of community character stemming from a lack of maintenance, upkeep, and general investment.

Impact ECON-16: Changes in Local Government Fiscal Conditions as a Result of Implementing CM2–CM21 under Alternatives 1A–2C, 3–5, and 6A–9, or Environmental Commitments under Alternatives 4A, 2D, and 5A

NEPA Effects: Construction of the action alternatives would not result in a loss of local government and special tax revenues because of the provisions in the California Water Code which require entities constructing and operating water conveyance facilities in the Delta to offset any loss in property tax revenues. The action alternatives would not contribute to a cumulative impact on local government of special district tax revenues.

***CEQA Conclusion*:** Implementation of BDCP CM2–CM2, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, along with other cumulative projects, would restrict potential property tax and assessment revenue for various local government entities in the Delta region. However,

construction of the action alternatives would not result in a loss of local government and special tax revenues because of the provisions in the California Water Code which require entities constructing and operating water conveyance facilities in the Delta to offset any loss in property tax revenues. The action alternatives would not contribute to a cumulative impact on local government of special district tax revenues. CEQA does not require a discussion of socioeconomic effects except where they would result in physical changes. If an alternative is not anticipated to result in a physical change to the environment, it would not be considered to have a significant impact under CEQA.

Impact ECON-17: Effects on Recreational Economics as a Result of Implementing CM2–CM21 under Alternatives 1A–2C, 3–5, and 6A–9, or Environmental Commitments under Alternatives 4A, 2D, and 5A

NEPA Effects: Implementation of CM2–CM21, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, would be anticipated to create an adverse effect on recreational resources by limiting access to facilities, restricting boat navigation and disturbing fish habitat while restoration activities are taking place. These measures may also permanently reduce the extent of upland recreation sites. However, over the 50-year permit period (or the shorter permit period for Alternatives 4A, 2D, and 5A), these components could also create beneficial effects by enhancing aquatic habitat and fish abundance, expanding the extent of navigable waterways available to boaters, and improving the quality of existing upland recreation opportunities. Similar adverse or beneficial effects could also result from the projects described in Table 5.2.2.12-1, Table 16-61, and Appendix 3D. Therefore, the potential exists for the creation of significant cumulative adverse and beneficial effects related to recreational economics. The magnitude of these effects would be smaller under Alternatives 4A, 2D, and 5A because the magnitude of habitat restoration and enhancement actions would be considerably smaller than the other action alternatives. In the case that significant adverse economic effects arise, the project's incremental contribution could be cumulatively considerable.

***CEQA Conclusion*:** Site preparation and earthwork activities associated with the BDCP and non-BDCP conservation and habitat restoration projects would limit opportunities for recreational activities where they are conducted in or near existing recreational areas. Noise, odors, and visual effects of construction activities would also temporarily compromise the quality of recreation in and around these areas, leading to potential economic impacts. However, over time, implementation of these projects could collectively improve the quality of existing recreational opportunities, leading to increased economic activity. This section considers only the economic effects of recreational changes brought about by conservation measure implementation. Potential physical changes to the environment relating to recreational resources are described and evaluated in Chapter 15, *Recreation.*

Impact ECON-18: Effects on Agricultural Economics in the Delta Region as a Result of Implementing CM2–CM21 under 1A–2C, 3–5, and 6A–9, or Environmental Commitments under Alternatives 4A, 2D, and 5A

Cumulative effects on agricultural economics as a result of implementing CM2–CM21, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, and cumulative projects described in Table 5.2.2.12-1, Table 16-61 and Appendix 3D, would be similar in kind, although not magnitude, to those described under Impact ECON-6 in this cumulative analysis. CM2–CM21, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, along with other conservation efforts in the Delta region, would convert land from existing agricultural uses. Effects on agricultural

economics would include effects on crop production and agricultural investments resulting from restoration actions on agricultural lands. The effects would be similar in kind to those described for lands converted due to construction and operation of the conveyance features and facilities. The total acreage and crop mix of agricultural land potentially affected is not specified at this time, but when required, the project proponents would provide compensation to property owners for economic losses due to implementation of an action alternative. The magnitude of these effects would be smaller under Alternatives 4A, 2D, and 5A because the magnitude of habitat restoration and enhancement actions would be considerably smaller than the other action alternatives.

Because implementation of CM2–CM21, or of Environmental Commitments under Alternatives 4A, 2D, and 5A, along with similar activities not associated with BDCP, would be anticipated to lead to reductions in crop acreage and in the value of agricultural production in the Delta region, this is considered an adverse cumulative effect. Mitigation Measure AG-1, described in Chapter 14, *Agricultural Resources*, would be available to reduce BDCP-related effects by preserving agricultural productivity and compensating off-site.

***CEQA Conclusion*:** Implementation of CM2–CM21, or the Environmental Commitments under Alternatives 4A, 2D, and 5A, would reduce the total value of agricultural production in the Delta region. The reduction in the value of agricultural production is not considered an environmental impact. Significant environmental impacts would only result if the changes in regional economics cause reasonably foreseeable physical impacts. Such effects are discussed in other chapters throughout this EIR/EIS. When required, the project proponents would provide compensation to property owners for economic losses due to implementation of an action alternative. While the compensation to property owners would reduce the severity of economic effects related to the loss of agricultural land, it would not constitute mitigation for any related physical impact. Measures to reduce these impacts are discussed in Chapter 14, *Agricultural Resources*.

Impact ECON-19: Socioeconomic Effects in the South-of-Delta Hydrologic Regions

Alternatives 1A through 5A

NEPA Effects: The cumulative socioeconomic effects associated with the implementation of the projects, programs, and policies summarized in Table 16-61, along with operation of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 4, 4A, 5, and 5A could result in adverse and beneficial effects on socioeconomics in the hydrologic regions. Programs and policies that would present barriers to continued growth could limit the potential for economic and employment growth while those that would reduce water deliveries or increase regulatory burdens for agricultural operations could result in decreased production and a decline in related employment. Generally, changes in deliveries to hydrologic regions, whether created by project-related activities or other projects, programs, or polices could result in beneficial and adverse socioeconomic effects in communities throughout the hydrologic regions. Alternatives 1A through 5A would be anticipated to generally contribute to an increase in total SWP and CVP deliveries. In hydrologic regions where water deliveries are predicted to increase when compared with the No Action Alternative, more stable agricultural activities could support employment and economic production associated with agriculture. Such changes to agricultural production and population growth with its associated economic activity could also lead to shifts in the character of communities in the hydrologic regions with resultant beneficial or adverse effects. Likewise, growth associated with deliveries could require additional expenditures for local governments while also supporting increases in revenue.

CEQA Conclusion: Operation of water conveyance facilities under Alternatives 1A through 5A (including Alternatives 4A and 2D), along with socioeconomic effects from other cumulative projects, programs, and policies, could affect socioeconomic conditions in the hydrologic regions receiving water from the SWP and CVP. However, because these cumulative impacts are social and economic in nature, rather than physical, they are not considered environmental impacts under CEQA. To the extent that changes in socioeconomic conditions in the hydrologic regions would lead to physical impacts, such impacts are described in Chapter 30, *Growth Inducement and Other Indirect Effects*.

Alternatives 6A through 9

NEPA Effects: The cumulative socioeconomic effects associated with the implementation of the projects, programs, and policies summarized in Table 16-61 and Table 5.2.2.12-1, along with operation of Alternatives 6A, 6B, 6C, 7, 8, and 9 could result in adverse and beneficial effects on socioeconomics in the hydrologic regions. Programs and policies that would present barriers to continued growth could limit the potential for economic and employment growth while those that would reduce water deliveries or increase regulatory burdens for agricultural operations could result in decreased production and a decline in related employment. Generally, changes in deliveries to hydrologic regions, whether created by project-related activities or other projects, programs, or polices could result in beneficial or adverse socioeconomic effects in communities throughout the hydrologic regions. Alternatives 6A through 9 would generally be anticipated to contribute to a decrease in total SWP and CVP deliveries. Reduced or less reliable water deliveries would result in decreased agricultural production and, in turn, a reduction in both direct and indirect agricultural employment. Economic and social patterns tied to predominant agricultural industrial activities and land uses could erode, changing the character of agricultural communities in hydrologic regions. If M&I deliveries were reduced to the extent that it would, in the long run, constrain population growth in certain hydrologic regions, implementation of these alternatives, along with other projects, programs, and policies, could reinforce a socioeconomic status quo or limit potential economic and employment growth in hydrologic regions. Changes to agricultural production and population growth with its associated economic activity could also lead to shifts in the character of communities in the hydrologic regions with resultant beneficial or adverse effects. Likewise, limited growth associated with reduced deliveries could require lower expenditures for local governments while also leading to reduced revenue.

CEQA Conclusion: Operation of water conveyance facilities under Alternatives 6A through 9, along with socioeconomic effects from other projects, programs, and policies, could affect socioeconomic conditions in the hydrologic regions receiving water from the SWP and CVP. However, because these cumulative impacts are social and economic in nature, rather than physical, they are not considered environmental impacts under CEQA. To the extent that changes in socioeconomic conditions in the hydrologic regions would lead to physical impacts, such impacts are described in Chapter 30, *Growth Inducement and Other Indirect Effects,* Section 30.3.2.

5.2.4.12 Aesthetics and Visual Resources

Since the time of the Draft EIR/EIS notice of preparation (NOP) in 2009, additional projects that could combine with the action alternatives to contribute to cumulative aesthetic and visual resources impacts are known to be reasonably foreseeable or probable. The complete list of cumulative projects is detailed in Appendix 3D, Attachment 3D-A (BDCP Draft EIR/EIS). Table 5.2.2.13-1 below includes the additional cumulative projects that would affect aesthetic and visual

resources because they would result in visible changes to the landscape, in addition to the list of projects included in Table 17-2 of the Draft EIR/EIS. These additional cumulative projects are considered in combination with the projects included in Draft EIR/EIS Table 17-2 and the action alternatives to provide a thorough analysis of the potential cumulative impacts on aesthetic and visual resources. Some of the cumulative effects described include localized effects that would occur in direct combination with the action alternative in the vicinity of alternative conveyance facilities and restoration actions. Other cumulative effects described consider more indirect additive effects on aesthetics and visual resources in the region, including outside of the Delta study area.

Table 5.2.2.13-1. Effects on Aesthetics and Visual Resources from Additional Programs and Projects Considered for Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Aesthetic and Visual Resources
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Projects occurring under the program could result in visual impacts from the construction of water facilities and associated infrastructure.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for positive aesthetic and visual resource effects from improved Delta habitat conditions.
California Department of Fish and Wildlife	Private Lands Incentive Programs	Ongoing	DFG administers the Landowner Incentive Program funded by USFWS to annual incentive payments to landowners to enhance and manage their lands to protect wetlands, native grasslands, and riparian habitat.	Small scale, site-specific management enhancements may occur on private properties that could be seen by nearby viewers.
California Department of Water Resources, Suisun Marsh	Meins Landing Restoration	Ongoing	Meins Landing is a mosaic of managed wetlands and upland habitats, of which a portion will be restored to tidal marsh to meet wetlands restoration goals of other projects.	Small scale, site-specific management enhancements may occur on private properties that could be seen by nearby viewers.
Department of Parks and Recreation	Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh	Proposal released in 2011	The proposal recommends the expansion of the State Park system in the Delta, agency collaboration to expand wildlife viewing, angling, and hunting opportunities in the Delta and Suisun Marsh, and that communities on the edge of the Delta or Suisun Marsh near major transportation routes be developed as “gateways” to provide supplies and recreational information to visitors.	Small scale, site-specific visual changes may occur on properties that could be seen by nearby viewers to accommodate expanded recreation enhancements. Could provide greater visual access to Delta and Suisun Marsh scenic resources.

Agency	Program/Project	Status	Description of Program/Project	Effects on Aesthetic and Visual Resources
National Marine Fisheries Service	Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring- run Chinook Salmon and Central Valley Steelhead	Released July 2014.	The Draft Recovery Plan provides a roadmap that describes the steps, strategy, and actions that should be taken to return winter-run Chinook salmon, spring-run Chinook salmon, and steelhead to viable status in the Central Valley, California thereby ensuring their long-term persistence and evolutionary potential.	Recovery plan actions would give rise to actual projects that would affect the visual landscape. Beneficial visual effects could result where restoration and enhancement activities improve existing visual conditions and increase visual diversity. Adverse visual effects could result where restoration, enhancement, and management measures require built elements that detract from, instead of compliment or improve, the visual landscape.
State Water Resources Control Board	Bay-Delta Water Quality Control Plan Update (initiated through the California Water Boards' Strategic Plan Update 2008–2012)	Ongoing development.	The State Water Board is updating the 2006 Bay-Delta Water Quality Control Plan (WQCP) in four phases: Phase I: Modifying water quality objectives (i.e., establishing minimum flows) on the Lower San Joaquin River and Stanislaus, Tuolumne, and Merced Rivers to protect the beneficial use of fish and wildlife and (2) modifying the water quality objectives in the southern Delta to protect the beneficial use of agriculture; Phase II: Evaluating and potentially amending existing water quality objectives that protect beneficial uses and the program of implementation to achieve those objectives. Water quality objectives that could be amended include Delta outflow criteria; Phase III: Requires changes to water rights and other measures to implement changes to the WQCP from Phases I and II; Phase IV: Evaluating and potentially establishing water quality criteria and flow objectives that protect beneficial uses on tributaries to the Sacramento River.	Plan actions would give rise to actual projects that would affect the visual landscape. Beneficial visual effects could result where restoration and enhancement activities improve existing visual conditions and increase visual diversity. Adverse visual effects could result where restoration, enhancement, and management measures require built elements that detract from, instead of compliment or improve, the visual landscape or affect visual access.

Agency	Program/Project	Status	Description of Program/Project	Effects on Aesthetic and Visual Resources
State Water Resources Control Board and Department of Public Health	Financial Assistance Programs for Wastewater and Water Facilities for Small Communities	Ongoing	SWRCB Resolution No. 200800048 includes the Small Community Wastewater Strategy to provide grants, low-interest loans and bonds for construction of wastewater facilities.	Program would fund projects that would introduce wastewater facilities where none presently exist. This would alter the existing visual character at the project locations and could result in adverse effects on nearby viewer groups.
U.S. Fish and Wildlife Service	Recovery Plan for the Sacramento-San Joaquin Delta Native Fishes	Ongoing	The recovery plan addresses the recovery needs for several fishes that occupy the Sacramento-San Joaquin Delta. Recovery actions include tasks such as increasing freshwater flows; reducing entrainment losses to water diversions; reducing the effects of dredging, contaminants, and harvest; developing additional shallow-water habitat, riparian vegetation zones, and tidal marsh; reducing effects of toxic substances from urban non-point sources; reducing the effects of introduced species; and conducting research and monitoring.	Recovery plan actions would give rise to actual projects that would affect the visual landscape. Beneficial visual effects could result where restoration and enhancement activities improve existing visual conditions and increase visual diversity. Adverse visual effects could result where restoration, enhancement, and management measures require built elements that detract from, instead of compliment or improve, the visual landscape.
U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, California Department of Water Resources, and California Department of Fish and Wildlife	Upgrade of Facilities to Restore Delta Smelt and Other Native Aquatic Species	Rio Vista facility plans being developed	The Interim Federal Action Plan for the California Bay- Delta includes the development of a permanent fish restoration facility (the Bay Delta Center for Collaborative Science and Restoration Propagation of Native Imperiled Aquatic Species) to be located at Rio Vista. In addition, upgrades to the existing facility Delta Smelt Research and Culture Facility at Banks Pumping Plant would be made so this can serve as an interim restoration propagation facility until the Rio Vista facility is operational.	Project would repurpose the Rio Vista Army base and improve the existing visual character at the project location, which is currently blighted. Changes at Banks Pumping Plant would not likely be visible.
California Local Agencies	Various Programs	Ongoing	Local agencies are increasingly conserving water by prohibiting certain types of wasteful water use, such as converting lawns to drought tolerant landscapes.	Small-scale localized visual shifts from lawn to draught tolerant landscaping.

Agency	Program/Project	Status	Description of Program/Project	Effects on Aesthetic and Visual Resources
California State Administration	Sites Reservoir/North of the Delta Offstream Storage	Ongoing	The administration will work with the Legislature to make funding available to share in the cost of storage projects if funding partners step forward. The state will facilitate among willing local partners and stakeholders the development of financeable, multi-benefit storage projects, including working with local partners to complete feasibility studies.	Program would fund projects that would introduce offstream storage facilities where none presently exist. This would alter the existing visual character at the project locations and could result in adverse effects on nearby viewer groups.
San Joaquin River Restoration Program	San Joaquin River Restoration Program	Final Environmental Impact Statement published in July 2012. Implementation ongoing.	A comprehensive long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply impacts from restoration flows. The project was authorized and funded with the passage of San Joaquin River Restoration Settlement Act, part of the Omnibus Public Land Management Act of 2009 (Public Law 111-11). Interim flows began in October, 2009. There will be many physical improvements within and near the San Joaquin River to fully achieve the river restoration goal. The improvements will occur in two separate phases that will focus on a combination of water releases from Friant Dam, as well as structural and channel improvements.	Recovery plan actions would give rise to actual projects that would affect the visual landscape. Beneficial visual effects could result where restoration and enhancement activities improve existing visual conditions and increase visual diversity. Adverse visual effects could result where restoration, enhancement, and management measures require built elements that detract from, instead of compliment or improve, the visual landscape.
Natural Resources Agency, Salton Sea Authority, California Department of Fish and Wildlife, California Department of Water Resources	Salton Sea Species Conservation Habitat Project	Ongoing	The Natural Resources Agency, in partnership with the Salton Sea Authority, will coordinate state, local and federal restoration efforts and work with local stakeholders to develop a shared vision for the future of the Salton Sea. Restoration will include construction of 600 acres of near shore aquatic habitat to provide feeding, nesting and breeding habitat for birds. This project is permitted to increase to 3,600 acres and could be scaled even greater with additional resources. Additional restoration projects may follow.	Project would give rise to projects that would affect the visual landscape. Beneficial visual effects could result where restoration and enhancement activities improve existing visual conditions and increase visual diversity. Adverse visual effects could result where restoration, enhancement, and management measures require built elements that detract from, instead of compliment or improve, the visual landscape.

Agency	Program/Project	Status	Description of Program/Project	Effects on Aesthetic and Visual Resources
California Department of Fish and Wildlife, California Natural Resources Agency	Klamath Basin Restoration	Ongoing	The Department of Fish and Wildlife and the Natural Resources Agency will continue to work with diverse stakeholders to implement the Klamath Basin restoration and settlement agreements. The administration will work with Congress to secure the necessary federal authorizations for the agreements and secure the necessary funding for removal of four hydroelectric dams on the Klamath River and funding for the necessary basin restoration.	Project would affect the visual landscape. Beneficial visual effects could result where dams are removed and restoration and enhancement activities improve existing visual conditions and increase visual diversity. Adverse visual effects could result where restoration, enhancement, and management measures require built elements that detract from, instead of compliment or improve, the visual landscape.
U.S. Bureau of Reclamation	San Luis Reservoir Expansion	Draft Appraisal Report published in December 2013	The plan is to increase the storage capacity of San Luis Reservoir (behind B.F. Sisk Dam) to improve the reliability of CVP and SWP water supplies dependent upon San Luis Reservoir. Seismic risks under the dam and in the Delta, regulatory constraints to operating Delta export facilities, algae blooms at low water levels, and future climate change have and will reduce the reliability of CVP/SWP deliveries dependent upon the San Luis Reservoir.	Implemented actions from the Program could result in visual impacts, depending on if the dam is raised or additional structural modifications are made at the existing dam facility.
Metropolitan Water District of Orange County	Seawater Desalination Project at Huntington Beach	Final CEQA documents published in 2010. Awaiting permits	Water treatment plant would provide up to 50 mgd of desalinated water.	Project is introducing built features into an industrial landscape. This would not substantially alter the existing visual character because the location of the plant is already industrial.
San Diego County Water Authority and other water suppliers	Carlsbad Seawater Desalination Plant	Under construction.	Water treatment plant would provide up to 50 mgd of desalinated water.	Project is introducing built features into an industrial landscape and temporary features to construct underground pipeline. This would not substantially alter the existing visual character because the location of the plant is industrial and pipeline is underground.

Agency	Program/Project	Status	Description of Program/Project	Effects on Aesthetic and Visual Resources
San Diego County Water Authority	Emergency Storage Project	Under construction	The project will increase the amount of water stored locally. New water storage and pipeline connections will distribute water throughout the region if imported water supplies are reduced. The Emergency Storage Project is expected to meet the county's emergency water needs through 2030.	Project introduced a dam and project facilities where none previously existed. This altered the existing visual character at this location, and these changes are seen by affected viewer groups during construction and operation.
Western Municipal Water District and Reclamation	Riverside-Corona Feeder Conjunctive Use Project	Final Supplemental Environmental Impact Statement and Environmental Impact Report published in 2011	The project would allow WMWD to purchase water from SWP and store up to 40,000 acre-feet of water in the San Bernardino Basin Area and Chino Basin and to extract the water from the basins. The facilities would convey local water supplies and deliver treated imported water.	Program could require built features to increase water supply reliability for SWP water users. This could introduce project facilities where none presently exist and could create or expand existing water conveyance facilities. This would alter the existing visual character at this location and could result in adverse effects on nearby viewer groups through construction and operation.

Impact AES-1: Substantial Alteration in Existing Visual Quality or Character During Construction of Conveyance Facilities and Other CMs

***NEPA Effects*:** Construction of conveyance facilities and restoration actions under action alternatives 1-8 would alter the existing visual quality and character of the area surrounding construction sites extending from intake sites in the north portion of the study area to Clifton Court Forebay in the south. Restoration action changes would occur throughout study area. Changes in visual resources would also occur at shaft sites, and other features associated with construction of conveyance tunnels (e.g., Alternatives 1A, 2A, 2D, 3, 4, 4A, 5, 5A, 6A, 7, and 8) and related to canals (e.g., Alternatives 2B, 2C, 6B, and 6C). Changes in visual quality and character associated with Alternative 9 would be more isolated at site-specific locations throughout the Delta, such as the large-scale fish screens near Locke and Walnut Grove on the Delta Cross Channel and Georgiana Slough; operable barriers near Walnut Grove, Fisherman's Cut, the head of Old River, Old River connection to Middle River, and Victoria Canal, Three Mile Slough at Brannan Island State Recreation Area; pumping plants on the San Joaquin and Middle Rivers; dredge disposal areas on Bacon Island, Woodward Island, Upper Jones Tract, and Victoria Island; and canals and levees near Clifton Court Forebay. Visual resource changes associated with these conveyance facility features would include interruption or modification of views from public areas, roads of other sensitive receptors in the vicinity of proposed facilities. Other projects, including projects that could be implemented under the CWAP that could potentially affect existing visual quality and character are listed in Draft EIR/EIS Table 17-2 and Table 5.2.2.13-1 above. These cumulative projects include development and transportation projects, transmission line extensions, projects considered under existing planning and habitat restoration management plans, habitat restoration projects in the Delta, water supply infrastructure and reservoir storage projects, levee improvements and other channel and spawning habitat improvement projects proposed in various area within and adjacent to the Delta. Implementing these cumulative projects in combination with Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, would likely result in positive and negative effects on visual quality and character depending on the type of project proposed and its location with respect to an action alternative facility. Cumulative projects located in the near vicinity of proposed conveyance facilities include habitat restoration actions on McCormack – Williamson Tract, levee improvements on Staten Island and habitat improvements on Bouldin Island. These projects could potentially contribute to changes in existing visual quality and character when combined with the effects of proposed action alternatives because of their proximity to conveyance facility construction. Other cumulative projects listed in Draft EIR/EIS Table 17-2 and 5.2.2.13-1 listed above could also contribute to changes in the regional visual quality and character of the study area by introducing new visual elements with both beneficial and adverse effects depending on the project type and proximity to sensitive visual receptors.

Cumulative changes to the study area's visual environment would involve temporary and permanent conversion of agricultural land and open space land uses to nonagricultural uses. Agricultural and open space land conversions could occur through, urban development expansion, restoration and enhancement projects, aqueduct expansion, new parks and recreational access, levee improvements, water supply, water quality, and flood control projects and linear transportation, utility, and transmission projects to support this development. Large-scale utility, intake, development, and water conveyance projects and their associated infrastructure such as roads and bridges could segment the visual landscape of the study area, reduce the amount of open space lands available to viewers, and effect valued visual resources. Proposed levee improvements

have the potential to denude miles of levees for compliance with non-vegetative levee prism policies, which could substantially alter water based recreational viewing experiences in the Delta. These types of cumulative projects would incrementally change the visual quality and character of portions of the study area from a natural and agricultural visual quality to a more built environment quality. In addition, new water storage projects could alter free-flowing waterways and transform them into impounded waterbodies, hiding previously seen creek valleys under water, or could further expand existing reservoirs to further cover adjacent lands. Quarrying for water could also remove visual features from view by mining down to the subsurface to retrieve water, leaving behind large, excavated pits and landscape scars.

However, a substantial number of the cumulative projects proposed in the study area could have beneficial visual quality and character effects, such as repurposing of blighted facilities and proposed habitat improvement projects proposed under the CWAP. Other projects, in combination with the action alternatives, could result in a cumulative reduction in the visual quality and character of the study area environment. This cumulative impact is considered adverse because of the potential for a large number of cumulative projects to be implemented that could contribute to localized and regional changes in visual quality and character when viewed from sensitive public locations in and adjacent to the study area. Mitigation Measures AES-1a through AES-1g and Mitigation Measure AES-6a are available to address these adverse effects.

***CEQA Conclusion*:** Cumulative projects shown in Table 17-2 and Table 5.2.2.13-1 in combination with construction of conveyance facilities and restoration actions proposed under the action alternatives would result in cumulative changes to the visual environment that would involve temporary and permanent conversion of agricultural land to nonagricultural uses. Agricultural and open space land conversions could occur through urban development expansion, restoration and enhancement projects, aqueduct expansion, new parks and recreational access, levee improvements, water supply, water quality, and flood control projects and linear transportation, utility, and transmission projects to support this development. The actual amount of agricultural and open space lands that may be converted by all cumulative projects is not known, but this cumulative conversion of the existing visual landscape is considered a significant impact because of the landscape sensitivity and visual dominance of project features that would result in reduced scenic quality in portions of the region.

The action alternatives' incremental contributions to cumulative effects are cumulatively considerable and significant because all of the alternatives would introduce a substantial number and type of changes to the visual quality and character of the study area that could result in reduced visual quality, introduce dominant visual elements that would result in noticeable changes, are incompatible with the existing visual environment, and could be viewed by sensitive receptors and from public viewing areas.

Mitigation Measures AES-1a through AES-1g and AES-6a would partially reduce impacts by locating new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed where feasible, installing visual barriers between construction work areas and sensitive receptors, developing and implementing a spoil/borrow and RTM area management plan, restoring barge unloading facility sites once decommissioned, applying aesthetic design treatments to all structures to the extent feasible, locating concrete batch plants and fuel stations away from sensitive visual resources and receptors and restoring the sites upon removal of facilities, using best management practices to implement a project landscaping plan, and placing new or relocated utility lines underground where feasible. However, cumulative impacts are not expected to be reduced to a

less-than significant level because some aspects of the cumulative projects could permanently change the visual quality and character of the landscape in relatively large portions of the study area in ways that could not be fully reduced with the recommended mitigation measures because of the size of some of the proposed facilities and their potential effect on sensitive viewers. Therefore, this cumulative impact is considered significant and unavoidable.

Mitigation Measure AES-1a: Locate New Transmission Lines and Access Routes to Minimize the Removal of Trees and Shrubs and Pruning Needed to Accommodate New Transmission Lines and Underground Transmission Lines Where Feasible

Please refer to Mitigation Measure AES-1a under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1b: Install Visual Barriers between Construction Work Areas and Sensitive Receptors

Please refer to Mitigation Measure AES-1b under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1c: Develop and Implement a Spoil/Borrow and Reusable Tunnel Material Area Management Plan

Please refer to Mitigation Measure AES-1c under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1d: Restore Barge Unloading Facility Sites Once Decommissioned

Please refer to Mitigation Measure AES-1d under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1e: Apply Aesthetic Design Treatments to All Structures to the Extent Feasible

Please refer to Mitigation Measure AES-1e under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1f: Locate Concrete Batch Plants and Fuel Stations Away from Sensitive Visual Resources and Receptors and Restore Sites upon Removal of Facilities

Please refer to Mitigation Measure AES-1f under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1g: Implement Best Management Practices to Implement Project Landscaping Plan

Please refer to Mitigation Measure AES-1g under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-6a: Underground New or Relocated Utility Lines Where Feasible

Please refer to Mitigation Measure AES-6a under Impact AES-6 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Impact AES-2: Permanent Effects on a Scenic Vista from Presence of Conveyance Facilities and Other CMs

***NEPA Effects*:** Conveyance facilities (e.g., intakes, tunnel shafts, forebays, canals, permanent transmission lines and RTM sites) and restoration sites under Alternatives 1A through9, including Alternatives 4A, 2D, and 5A would permanently change scenic vistas at facility locations by introducing new and discordant facilities that would interrupt and modify vistas currently viewed from public roads and waterways. Other projects, including projects that could be implemented under the CWAP that could potentially affect existing scenic vistas are listed in Draft EIR/EIS Table 17-2 and Table 5.2.2.13-1 above. Cumulative changes to the scenic vistas under the action alternatives would involve temporary and permanent conversion of agricultural and open space lands to nonagricultural uses. Agricultural and open space land conversions could occur through linear urban development expansion, restoration and enhancement projects, aqueduct expansion, new parks and recreational access, levee improvements, water supply, water quality, and flood control projects and transmission projects to support this development. Implementing these projects in combination with action alternatives 1A through9, including Alternatives 4A, 2D, and 5A could have effects on established scenic vistas in the study area at multiple locations by introducing built features into the landscape, visually converting the landscape, and degrading the quality of views. Some of the cumulative projects may combine with the action alternatives to create adverse effects on the same scenic vistas and most of the cumulative projects could create additional interruptions or modification of scenic views because of their effects on agricultural areas and Delta waterways. Although some of the cumulative projects could create beneficial changes in vistas in the study area, overall cumulative impacts on scenic vistas are considered adverse because cumulative projects could result in a permanent reduction in the Scenic Quality Rating for multiple scenic vistas and would introduce dominant visual elements that would result in noticeable changes in the visual character of a vista viewshed. Mitigation Measures AES-1a through AES-1g and Mitigation Measure AES-6a are available to address these adverse effects.

***CEQA Conclusion*:** Cumulative projects shown in Draft EIR/EIS Table 17-2 and Table 5.2.2.13-1 in combination with construction of conveyance facilities and restoration actions proposed under the action alternatives would result in cumulative changes to the scenic vistas that would involve temporary and permanent conversion of agricultural land to nonagricultural uses. Agricultural and open space land conversions could occur through urban development expansion, restoration and enhancement projects, aqueduct expansion, new parks and recreational access, levee improvements, water supply, water quality, and flood control projects and transmission projects to support this development. Overall, cumulative visual effects on scenic vistas associated with past, present, and reasonably foreseeable future projects within the study area are anticipated. The actual amount of agricultural and open space lands that may be converted by all cumulative projects is not known, but this cumulative conversion of the existing visual landscape of scenic vistas is considered a significant impact because implementation of these projects could substantially reduce the Scenic Quality Rating for multiple scenic vistas and would introduce dominant visual elements that would result in noticeable changes in the visual character of a vista viewshed.

The action alternatives' incremental contribution to cumulative impacts would be cumulatively considerable and significant because of the number and type of effects on scenic vistas that could result from the construction of conveyance facilities and the amount of farmland that would be converted in the Delta by these actions.

Mitigation Measures AES-1a, AES-1c, AES-1d, AES-1e, AES-1g, and Mitigation Measure AES-6a would partially reduce these impacts by locating new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed where feasible, developing and implementing a spoil/borrow and RTM area management plan, and applying aesthetic design treatments to all structures to the extent feasible as well as undergrounding new or relocated utility lines where feasible. Mitigation Measure AES-1e requires the use of aesthetic design treatments to all structures; however, the impacts on scenic vistas associated with cumulative projects would not be reduced to a less-than-significant level because of the permanent nature of changes to scenic vistas and the dominant nature of some of the cumulative project features. Therefore, this cumulative impact is considered significant and unavoidable.

Mitigation Measure AES-1a: Locate New Transmission Lines and Access Routes to Minimize the Removal of Trees and Shrubs and Pruning Needed to Accommodate New Transmission Lines and Underground Transmission Lines Where Feasible

Please refer to Mitigation Measure AES-1a under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1c: Develop and Implement a Spoil/Borrow and Reusable Tunnel Material Area Management Plan

Please refer to Mitigation Measure AES-1c under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1d: Restore Barge Unloading Facility Sites Once Decommissioned

Please refer to Mitigation Measure AES-1d under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1e: Apply Aesthetic Design Treatments to All Structures to the Extent Feasible

Please refer to Mitigation Measure AES-1e under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1f: Locate Concrete Batch Plants and Fuel Stations Away from Sensitive Visual Resources and Receptors and Restore Sites upon Removal of Facilities

Please refer to Mitigation Measure AES-1f under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1g: Implement Best Management Practices to Implement Project Landscaping Plan

Please refer to Mitigation Measure AES-1g under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-6a: Underground New or Relocated Utility Lines Where Feasible

Please refer to Mitigation Measure AES-6a under Impact AES-6 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Impact AES-3: Permanent Damage to Scenic Resources along a State Scenic Highway from Construction, Operation and Maintenance of Conveyance Facilities and Other CMs

***NEPA Effects*:** Conveyance facilities (e.g., intakes, permanent transmission lines and RTM sites) and potentially restoration sites under action Alternatives 1A through9, including Alternatives 4A, 2D, and 5A, would change views to and from SR 160 and River Road in the vicinity of facilities. Other projects, including projects that could be implemented under the CWAP have the potential to contribute to cumulative visual impacts in the vicinity of SR 160 and River Road. Cumulative changes to scenic highways would involve temporary and permanent conversion of agricultural land to nonagricultural uses. Agricultural and open space land conversions could occur through urban development expansion, restoration and enhancement projects, aqueduct expansion, new parks and recreational access, levee improvements, water supply, water quality, and flood control projects and flood control projects and transmission projects to support this development. The actual amount of agricultural and open space lands that may be converted by all cumulative projects is not known, but this cumulative conversion of the existing visual landscape seen from scenic highways is considered an adverse effect because cumulative projects could result in a reduction in the Scenic Quality Rating or introduce dominant visual elements that, based on the landscape sensitivity level, could result in noticeable changes in the visual character of a state scenic highway's viewshed. Mitigation Measures AES-1a through AES-1g and Mitigation Measures AES-6a are available to address these adverse effects.

***CEQA Conclusion*:** Cumulative projects shown in Draft EIR/EIS Table 17-2 and Table 5.2.2.13-1 in combination with construction of conveyance facilities and restoration actions proposed under the action alternatives would result in cumulative changes to scenic highways related to temporary and permanent conversion of agricultural land to nonagricultural uses and introduction of new facilities to the visual landscape. Agricultural and open space land conversions could occur through urban development expansion, restoration and enhancement projects, aqueduct expansion, new parks and recreational access, levee improvements, water supply, water quality, and flood control projects and transmission projects to support this development. This cumulative conversion of the existing visual landscape seen from scenic highways is considered a significant impact because cumulative projects could result in a reduction in the Scenic Quality Rating or introduce dominant visual elements that, based on the landscape sensitivity level, could result in noticeable changes in the visual character of a state scenic highway's viewshed.

The action alternatives' incremental contribution to cumulative impacts on scenic highways would be cumulatively considerable and significant because of the location of new intake facilities along SR 160 that would substantially change views from this scenic highway.

Mitigation Measures AES-1a, AES-1c, AES-1d, AES-1e, AES-1g, and Mitigation Measure AES-6a would partially reduce these impacts by locating new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed where feasible, developing and implementing a spoil/borrow and RTM area management plan, and applying aesthetic design treatments to all structures to the extent feasible as well as undergrounding new or relocated utility lines where feasible. Mitigation Measure AES-1e requires the use of aesthetic design treatments to all structures. However, the impacts on scenic resources along SR 160 associated with conveyance facility structures would not be reduced to a less-than-significant level because of the permanent nature of changes to SR 160 views and the dominant nature of some of the cumulative project features. Therefore, this cumulative impact is considered significant and unavoidable.

Mitigation Measure AES-1a: Locate New Transmission Lines and Access Routes to Minimize the Removal of Trees and Shrubs and Pruning Needed to Accommodate New Transmission Lines and Underground Transmission Lines Where Feasible

Please refer to Mitigation Measure AES-1a under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1b: Install Visual Barriers between Construction Work Areas and Sensitive Receptors

Please refer to Mitigation Measure AES-1b under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1c: Develop and Implement a Spoil/Borrow and Reusable Tunnel Material Area Management Plan

Please refer to Mitigation Measure AES-1c under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1d: Restore Barge Unloading Facility Sites Once Decommissioned

Please refer to Mitigation Measure AES-1d under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1e: Apply Aesthetic Design Treatments to All Structures to the Extent Feasible

Please refer to Mitigation Measure AES-1e under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1f: Locate Concrete Batch Plants and Fuel Stations Away from Sensitive Visual Resources and Receptors and Restore Sites upon Removal of Facilities

Please refer to Mitigation Measure AES-1f under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-1g: Implement Best Management Practices to Implement Project Landscaping Plan

Please refer to Mitigation Measure AES-1g under Impact AES-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-6a: Underground New or Relocated Utility Lines Where Feasible

Please refer to Mitigation Measure AES-6a under Impact AES-6 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Impact AES-4: Creation of a New Source of Light or Glare That Would Adversely Affect Views in the Area as a Result of Construction and Operation of Conveyance Facilities and Other CMs

***NEPA Effects*:** Conveyance facilities (e.g., intakes, permanent transmission lines and RTM sites) and potentially restoration sites under action Alternatives 1A through 9, including Alternatives 4A, 2D,

and 5A, would potentially create new sources of light and glare associated with facility lighting, building surfaces and new reservoir water surface areas. Other projects, including projects that could be implemented under the CWAP have the potential to contribute to light and glare effects in the study area due to increased rural and suburban development, lighting of facilities and buildings, removal of vegetation, and increased water surfaces. Restoration and enhancement projects have the potential to reduce glare by introducing trees and shrubs into a landscape that was in agricultural production, lacking mature vegetative cover that would absorb light and reduce the potential for glare. Although beneficial effects could occur, overall the introduction of new artificial sources of light and glare through development and anthropogenic features is considered adverse because of the substantial number and type of cumulative projects that could introduce new sources of light and glare to the study area and the potential for effects on sensitive receptors. Mitigation Measures AES-4a through AES-4c and Mitigation Measure AES-6b are available to address these adverse effects.

***CEQA Conclusion*:** Cumulative projects shown in Draft EIR/EIS Table 17-2 and Table 5.2.2.13-1 in combination with construction of conveyance facilities and restoration actions proposed under the action alternatives would result in cumulative changes to light and glare conditions in the study area due to increased rural and suburban development, lighting of facilities and buildings, removal of vegetation, and increased water surfaces. Restoration and enhancement projects have the potential to reduce glare by introducing trees and shrubs into a landscape that was in agricultural production, lacking mature vegetative cover that would absorb light and reduce the potential for glare. While this would be beneficial, the amount of new artificial sources of light and glare through development and introduction of anthropogenic features is considered significant because of the substantial number and type of cumulative projects that could introduce new sources of light and glare to the study area and the potential for effects on sensitive receptors. The action alternatives' incremental contribution to cumulative impacts on light and glare conditions in the study area would be cumulatively considerable and significant because of the considerable new facility and water surface elements that could increase light and glare effects on sensitive receptors.

Mitigation Measures AES-4a through 4c and Mitigation Measure 6b would partially reduce impacts by limiting construction daylight hours within 0.25 mile of residents, minimizing fugitive light from portable sources used for construction, installing visual barriers to prevent light spill from truck headlights toward residences, and evaluating implementation of an after- hours low-intensity and lights off policy. However, these mitigation measures would not reduce this impact to a less-than-significant level because of the substantial amount of new artificial sources of light and glare introduced in the study area from development and anthropogenic features. Therefore this cumulative impact is significant and unavoidable.

Mitigation Measure AES-4a: Limit Construction to Daylight Hours within 0.25 Mile of Residents

Please refer to Mitigation Measure AES-4a under Impact AES-4 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

Please refer to Mitigation Measure AES-4b under Impact AES-4 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

Please refer to Mitigation Measure AES-4c under Impact AES-4 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AES-6b: Develop and Implement an Afterhours Low-Intensity and Lights Off Policy

Please refer to Mitigation Measure AES-6b under Impact AES-6 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

5.2.4.13 Cultural Resources

Since the time of the Draft EIR/EIS notice of preparation (NOP) in 2009, additional projects that could combine with the action alternatives to contribute to cumulative impacts on archeological and historic resources are known to be reasonably foreseeable or probable. The list of projects included in the Draft EIR/EIS Table 18-2 is amended to include the additional projects shown in Table 5.2.2.14-1 below. These additional cumulative projects are considered in combination with the projects included in Draft EIR/EIS Table 18-2. These projects were added because they would involve land disturbing activities that could damage cultural resources. For purposes of this assessment, the water conveyance facilities and conservation measures are also combined.

Table 5.2.2.14-1. Effects on Cultural Resources from Additional Programs and Projects Considered for Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Cultural Resources
DWR	Dutch Slough Tidal Marsh Restoration Project	Currently under study	Restoration 1,178 acre site located in the South Delta to tidal marsh habitat.	Land disturbing activities could disturb or destroy sensitive cultural resources.
DWR and Suisun Mash Preservation Agreement agencies	Miens Landing Restoration	Currently under study	Restoration of duck clubs to tidal marsh.	Land disturbing activities could disturb or destroy sensitive cultural resources.
DWR	Cache Slough Area Restoration	Currently under study	Restoration of lands within the Cache Slough Complex located in the Delta	Land disturbing activities could disturb or destroy sensitive cultural resources. This project is examined under Alternatives 1A–4 and 5–9 of the BDCP.
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential for effects on archaeological and historic resources from water infrastructure projects implemented under this plan
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for effects on archaeological and historic resources from construction of restoration actions.

Impact CUL-9: Potential for the Action Alternatives to Contribute to the Cumulative Loss of Cultural Resources in the Plan Area

NEPA Effects: Construction of water conveyance facilities and implementing other conservation measures would result in an adverse effect on cultural resources through earth moving and other ground disturbing activities required to complete each project within the Delta Region. In addition to the projects listed in Table 27-16, other projects proposed within the Delta Region would also contribute to the damage or destruction of cultural resources by increasing the amount of ground disturbance. The combined effect of Alternative 1A through Alternative 9, including Alternatives 4A, 2D, and 5A, with the projects listed in Tables 26-9 and 5.2.2.14-1 would result in an adverse cumulative effect on cultural resources even with implementation of feasible mitigation measures. These effects include destruction of identified and identifiable archaeological and built-environment resources that qualify as historical resources, unique archaeological sites, or historic properties; destruction of archeological sites that qualify as historical resources, unique archaeological resources, traditional cultural properties and destruction of buried human remains that occur

cannot be feasibly be identified in advance of construction. Although Alternatives 4A, 2D, and 5A would result in fewer acres converted to meet environmental commitments, each includes extensive surface and subsurface disturbances that would result in adverse effects on cultural resources. Adverse effects on archeological and historic resources could be reduced by implementing Mitigation Measures CUL-1 through CUL-7.

***CEQA Conclusion*:** Constructing the water conveyance facilities and implementing restoration measures under the action alternatives would result in significant impacts on cultural resources within the Delta Region. Construction activities, including surface and subsurface disturbance, could result in damage or destruction of cultural resources. This impact would be exacerbated when combined with other ground disturbing projects in the Delta Region as summarized in Tables 26-9 and 5.2.2.14-1 and are considered a significant cumulative impact on Delta cultural resources because of the potential to affect sensitive archaeological and historic resources. The impact Alternatives 1A through 8, including Alternatives 4A, 2D, and 5A, would have on cultural resources would be cumulatively considerable because of the extensive surface and subsurface disturbance these alternatives would involve when compared to the other projects listed. Mitigation Measures CUL-1 through CUL-2 would reduce these impacts of the action alternatives but not to a less-than-significant level. Therefore, this cumulative impact on cultural resources is considered significant and unavoidable.

Mitigation Measure CUL-1: Prepare a Data Recovery Plan and Perform Data Recovery Excavations on the Affected Portion of the Deposits of Identified and Significant Archaeological Sites

Please see Mitigation Measure CUL-1 under Impact CUL-1 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure CUL-2: Conduct Inventory**, Evaluation, and Treatment of Archaeological Resources**

Please see Mitigation Measure CUL-2 under Impact CUL-2 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure CUL-3: Implement an Archaeological Resources Discovery Plan, Perform Training of Construction Workers, and Conduct Construction Monitoring

Please see Mitigation Measure CUL-3 under Impact CUL-3 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure CUL-4: Follow State and Federal Law Governing Human Remains if Such Resources Are Discovered during Construction

Please see Mitigation Measure CUL-4 under Impact CUL-4 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure CUL-5: Consult with Relevant Parties, Prepare and implement a Built Environment Treatment Plan

Please see Mitigation Measure CUL-5 under Impact CUL-5 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure CUL-6: Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Impacted by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts

Please see Mitigation Measure CUL-6 under Impact CUL-6 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure CUL-7: Conduct Cultural Resource Studies and Adopt Cultural Resource Mitigation Measures for Cultural Resource Impacts Associated with Implementation of CM2–21

Please see Mitigation Measure CUL-7 under Impact CUL-7 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

5.2.4.14 Transportation

Transportation systems in the Delta region are expected to change as a result of past, present, and reasonably foreseeable future projects, related to population growth and changes in economic activity (Chapter 30, *Growth Inducement and Other Indirect Effects*). The effects of the alternatives on transportation were considered in connection with the potential effects of projects listed in Attachment 3D-A to Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions.* Projects with the greatest potential to affect the transportation network are identified in Table 5.2.2.15-1. Please note that infrastructure projects included in the Sacramento County General Plan Update and the metropolitan and regional transportation plans prepared by SACOG, SJCOG, and MTC may also affect traffic operations throughout the Plan Area. Projects on the interstate and highway system that add additional vehicle trips or significantly change the location of existing trips are likely to have the largest potential effect.

Table 5.2.1.15-1. Effects on Transportation from a Selection of Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Description of Program/Project	Effects on Transportation
U.S. Army Corps of Engineers, Port of Stockton, and Contra Costa County Water Agency	San Francisco Bay to Stockton Deep Water Ship Channel Project	The San Francisco Bay to Stockton Deep Water Ship Channel Project is a congressionally authorized project being implemented by the U.S. Army Corps of Engineers (USACE), the Port of Stockton, and Contra Costa County Water Agency. A joint EIS/EIR will evaluate the action of navigational improvements to the Stockton Deep Water Ship Channel. A General Reevaluation Report is being prepared to determine the feasibility of modifying the current dimensions of the West Richmond, Pinole Shoal, Suisun Bay, and Stockton Ship Channels, which are currently maintained to 35 feet and provide access to oil terminals, industry in Pittsburg, and the Port of Stockton. The proposed action consists of altering the depth of the deep draft navigation route.	This marine highway corridor could be affected, particularly for commercial barges, during construction work on the ship channel.
U.S. Army of Corps of Engineers and Port of Sacramento	Sacramento Deep Water Ship Channel Project	The Sacramento River Deep Water Ship Channel Project is a Congressionally authorized project being implemented by USACE and the Port of Sacramento. The proposed project would complete the deepening and widening of the navigation channel to its authorized depth of 35 feet. Deepening of the existing ship channel is anticipated to allow for movement of cargo via larger, deeper draft vessels. Widening portions of the channel would increase navigational safety by increasing maneuverability. The 46.5-mile-long ship channel lies within Contra Costa, Solano, Sacramento, and Yolo counties and serves the marine terminal facilities at the Port of Sacramento. The Sacramento Deep Water Ship Channel joins the existing 35-feet-deep channel at New York Slough, thereby affording the Port of Sacramento access to San Francisco Bay Area harbors and the Pacific Ocean.	This marine highway corridor could be affected, particularly for commercial barges, during construction work on the ship channel.
Department of Water Resources	North Bay Aqueduct Alternative Intake	Plan to construct and operate an alternative intake on the Sacramento River, generally upstream of the Sacramento Regional Wastewater Treatment Plant, and connect it to the existing North Bay Aqueduct system by a new pipeline. The proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct intake at Barker Slough.	Minor affects on local transportation system during construction of facilities.

The above list of related projects evaluated for cumulative impacts includes projects that would affect transportation conditions, including land use and network changes. The proposed BDCP, in conjunction with other projects identified in Table 19-31, Table 5.2.2.15-1 and regional transportation plans, would cumulatively affect transportation operations during project construction, as discussed further below.

Impact TRANS-12: Cumulative impacts on transportation systems from construction

NEPA Effects: Construction of planned projects throughout the study area would result in temporary, discrete effects such as traffic disruption resulting in delays to travelers and users of the transportation system, although these effects would not be necessarily be substantial from a regional perspective.

Construction of these projects could result in temporary impacts on levels of service due to increases in vehicle trips associated with movement of personnel, goods, and materials. Heavy construction equipment on local roadways could contribute to existing pavement deterioration. Conflicts with other users of the transportation roadway network, such as cyclists, transit services, or emergency service providers could occur. Marine highway corridors along between the ports of Oakland, Stockton, and Sacramento could be affected while commercial barges are used to transport materials to construction sites during work on the ship channel.

Although it is difficult to determine when major infrastructure projects would be constructed, the cumulative impact may be substantial if these projects occur during the same time frame and location as the proposed project because the magnitude of effects would be greater. If these projects occurred sequentially, the construction-related effects could be drawn out for an extended period, again. If one local area experiences several large construction projects simultaneously, there could be substantial localized impacts.

The effects are relatively similar between the alternatives and vary in location according to the type of conveyance. Decreases in level of service from construction of water conveyance facilities associated with BDCP alternatives using the pipeline/tunnel conveyance (Alternatives 1A, 2A, 3, 5, 6A, 7, and 8) affect fewer roadway segments (25), compared to alternatives using the modified pipeline/tunnel (Alternatives 4, 4A, 2D, and 5A) (38), east canal conveyance (Alternatives 1B, 2B, and 6B) (48), west canal conveyance (Alternatives 1C, 2C, and 6C) (56), or Alternative 9 (56). Pavement deterioration under Alternative 9 affects the fewest road segments (42), compared to all the other alternatives (42–48). Effects would also be lessened with alternatives constructing fewer intakes.

Construction of cumulative projects within the Delta, such as those listed in Table 5.2.2.15-1, could contribute to cumulative impacts on transportation systems due to substantial increases in construction road traffic volumes affecting level of service and contributing to pavement deterioration. This cumulative impact is considered adverse and the contribution from Alternatives 1A–9 would be cumulatively considerable.

Mitigation Measures TRANS-1 through TRANS-7 are available to reduce this effect, but would not reduce the severity to a level that would not be considered adverse. The project proponents are not solely responsible for the timing, nature, or complete funding of required improvements. Moreover, coordinating with the construction schedules of other large projects in the region is heavily dependent on availability. If an improvement identified in the mitigation agreement(s) is not fully funded and constructed before the project's contribution to the effect is made, construction of water

conveyance facilities combined with other projects in the study area would make a cumulatively considerable contribution to the effects on transportation systems in the Delta. Accordingly, this effect would be adverse.

CEQA Conclusion: Construction of cumulative projects within the Delta would result in cumulative impacts on transportation systems because of substantial increases in construction traffic volumes affecting level of service and contributing to pavement deterioration. This cumulative impact would be significant and the contribution from Alternatives 1A–9 would be cumulatively considerable. Although TRANS-1 through TRANS-7 would reduce the severity of this impact, the project proponents cannot ensure that the improvements will be fully funded or constructed prior to the project's contribution to the impact. If an improvement identified in the mitigation agreement(s) is not fully funded and constructed before the project's contribution to the effect is made, construction of project facilities combined with other projects in the study area would make a cumulatively considerable contribution to the effects on transportation systems in the Delta. Accordingly, this effect would be significant and unavoidable because it would affect level of service and contribute to pavement deterioration.

Impact TRANS-13: Cumulative impacts on transportation systems from operation and maintenance (post-construction)

NEPA Effects: Traffic and transportation impacts for Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, include increased congestion and exceedances of roadway levels of service, which most jurisdictions consider significant and unavoidable. Other impacts identified by some jurisdictions include impacts on parking capacity, emergency access, conflicts with or increased demand for alternative transportation, and altered air traffic patterns: these are considered by some jurisdictions to be significant but mitigable and by at least one jurisdiction to be significant and unavoidable (refer to Chapter 30, *Growth Inducement and Other Indirect Effects*). Other projects, as identified in Table 5.2.2.15-1 above, would also have the potential to affect transportation systems when combined with the operation and maintenance of the proposed project. Identified mitigation measures include TRANS-1a (site-specific construction traffic management plans), TRANS-1b and TRANS-2b (traffic limits on congested or deficient roadways), TRANS-1c and 2-c (mitigation agreements to enhance roadway capacity and condition), and TRANS-2a (prohibition of construction traffic on deficient roadways). Therefore, although mitigation may reduce effects, this impact would be adverse because the proposed project would cumulatively contribute to adverse effects because when combined, they would cause impacts to transportation systems.

None of the alternatives would construct new public transportation facilities, demolish existing public transportation facilities, or add substantial traffic to transportation facilities during routine operation and maintenance (refer to Tables 19-14, 19-15, 19-16). Operation and maintenance of the project would not result in the construction of new transportation systems or increases in capacity in existing transportation systems and therefore would not make a cumulatively considerable contribution to effects on transportation systems. This cumulative impact is not distinguishable between the alternatives.

The effect related to operation and maintenance of restored habitats associated with CM2–CM21 for Alternatives 1A–2C, 3–4, 5, and 6A through 9 and Environmental Commitments 3, 4, 6–11 for Alternatives 4A, 2D, and 5A could also result in similar minor contributions to traffic on

transportation facilities, depending on the location and duration of the O&M activities. These effects are not distinguishable between the alternatives at the current program level of design.

CEQA Conclusion: Operation and maintenance associated with each BDCP alternative would include increased congestion and exceedances of roadway levels of service, which most jurisdictions consider significant and unavoidable. When combined with other cumulative projects within the Delta, these projects could contribute to significant cumulative impacts on transportation systems for Alternatives 1A through 9 resulting from increases in traffic volumes affecting level of service and contributing to pavement deterioration. Accordingly, this impact would be significant and unavoidable.

5.2.4.15 Public Services and Utilities

This cumulative effects analysis considers the incremental effects on public services or utilities as a result of the no action and action alternatives in the Plan Area, when taking into consideration past, present, and reasonably foreseeable future projects. For this analysis, the projects considered are listed in Table 20-6 of the Draft BDCP EIR/EIS as well as Table 5.2.2.16-1. This list has been drawn from a more substantial compilation of past, present, and reasonably foreseeable programs and projects included in Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions*.

Table 5.2.2.16-1. Public Services and Utilities Effects of Additional Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Status	Description of Program/Project	Public Services and Utilities Effects
Semitropic Water Storage District	Delta Wetlands Projects	Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	Would require relocation and extension of various electrical distribution lines and result in increased demand for police and fire protection in the Delta.
State Water Resources Control Board and Department of Public Health	Financial Assistance Programs for Wastewater and Water Facilities for Small Communities	Ongoing	SWRCB Resolution No. 200800048 includes the Small Community Wastewater Strategy to provide grants, low-interest loans and bonds for construction of wastewater facilities.	Beneficial impact on public services and utilities by providing funding for construction of publicly-owned wastewater treatment and collection facilities.

Agency	Program/ Project	Status	Description of Program/Project	Public Services and Utilities Effects
DWR	Dutch Slough Tidal Marsh Restoration Project	Currently under study	Restoration 1,178 acre site located in the South Delta to tidal marsh habitat.	The Project's potential impact to police protection, fire protection, water supply, wastewater, storm drainage, and electrical and gas transmission would be less than significant or mitigated to less-than-significant levels
DWR	Cache Slough Area Restoration	Currently under study	Restoration of lands within the Cache Slough Complex located in the Delta. Could include roughly 45,000 acres of existing and potential open water, marsh, floodplain and riparian habitat.	This project is examined under Alternatives 1A–4 and 5–9 of the BDCP.
California High Speed Rail Authority and Federal Railroad Administration	California High-Speed Rail System Fresno to Merced Section	Final EIR/EIS certified on May 3, 2012.	The project would construct a new rail corridor between Merced and Fresno.	Construction could result in planned temporary interruption of utility service, accidental disruption of services, increased water use, and an increase in waste generation
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential for effects on public services and utilities from construction of water supply infrastructure under this program.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for effects on public services and utilities from construction of restoration actions.

Demand for public services, such as law enforcement, fire protection, and medical services are expected to change as a result of past, present, and reasonably foreseeable future projects, and typically increase in correlation with population growth and changes in economic activity in the region. Cumulative effects related to public services and utilities may also result from past, present, and reasonably foreseeable future projects that cause disruption to utility services and/or conflict with a public facility (i.e., physically traverse such a facility).

The following list of ongoing and reasonably foreseeable future projects were reviewed for their potential for effects on public services and utilities, that when considered with the alternatives, may result in cumulative effects.

In addition to the ongoing and reasonably foreseeable future projects listed in Table 20-6 and Table 5.2.2.16-1, development projects and other projects implemented under city and county general plans within the Plan Area may result in effects to public services and utilities.

Impact UT-9: Cumulative Effects on Public Services and Utilities from Construction Activities Occurring Within the Delta

NEPA Effects: Implementation of the BDCP and other local and regional projects as presented in Table 20-6 and Table 5.2.2.16-1, could contribute to regional impacts on public services and utilities.

Public Services

As detailed in Chapter 16, *Socioeconomics*, growth rates from 2000 to 2008 were generally higher in the smaller communities of the Plan Area than in larger cities such as Antioch and Sacramento. Further, growth projections through 2060 indicate that all counties overlapping the Delta, except for Sacramento County, are projected to grow at a faster rate than the state as a whole. Total population in the Delta counties is projected to grow at an average annual rate of 0.9% through 2030 (California Department of Finance 2007). The historic trend of limited development allowed in the Delta primary zone would likely continue, and the limited future growth would minimize the potential effects related to disruption to existing public services and conflicts with public facilities and utilities.

Although Alternatives 1A through9, including Alternatives 4A, 2D, and 5A, are not expected to result in adverse effects on public services and utilities as a result of increased demands for services and utilities from population growth, when combined with projects listed above that may generate additional demand on public services and utilities, there could be a cumulative effect on public services and utilities. However, the projects and types of projects listed in Table 20-6, Table 5.2.2.16-1 and Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions* would be required to be consistent with specific goals, objectives, policies, and implementation measures of the respective county's general plan where the project or development is proposed. The county general plans, as described under the Regulatory Setting of this chapter provide guidance and regulation for the provision of public services and utilities within the respective jurisdiction. Though past, current, and future projects may result in additional demands on public services and utilities, the regulatory framework that governs each county within the Plan Area is expected to mitigate any potential adverse effects on service levels and disruption to such services. There would be no cumulative effect on public services as a result of increased demand.

As discussed previously under the discussion of the BDCP alternatives, any alternative that includes construction of the conveyance pipeline between Intake 3 and the Intermediate Forebay (Alternatives 1A, 2A, 6A, 7, and 8) (Figure 20-5) or construction of the canal segment and bridge (Alternatives 1B, 2B, and 6B) (Figure 20-6), would conflict with and potentially require removal of the Hood Fire Station. Because none of the projects listed in Table 20-6 or Table 5.2.2.16-1 are known to require relocation or construction of a public facility, BDCP's incremental contribution to the adverse cumulative effect on public services is significant.

Implementation of Mitigation Measure UT-2 would lessen this effect by requiring coordination with the Courtland Fire Protection District through final project design regarding potential relocation of the Hood Fire Station, and the provision of a suitable permanent facility prior to any activities that would disrupt fire protection in its service area within the Courtland Fire Protection District.

However, because the effects of constructing a new fire station are unknown, this effect would remain adverse.

Consequently, Alternatives 1A, 1B, 2A, 2B, 6A, 6B, 7, and 8 would contribute to a cumulatively considerable adverse effect on public services. Alternatives 1C, 2C, 2D, 3, 4, 4A, 5, 5A, 6C, and 9 would not have a cumulatively adverse effect on public services.

Utilities

Construction of BDCP Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, is not expected to have any adverse effect on water, wastewater and solid waste facilities. None of the projects listed in Table 20-6 or Table 5.2.2.16-1 are known to have any adverse effect on water, wastewater and solid waste facilities. Therefore, there would be no cumulative effect on these utilities.

However, construction of Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, would require the relocation and disruption of utility infrastructure, including existing water, sewer, storm drain, natural gas, oil, electric, and/or communication lines, and would have the potential to create adverse effects through the relocation of facilities. Because the relocation and potential disruption of utility infrastructure would be required and could create environmental impacts, this effect would be significant and unavoidable due to the size of the Plan Area. Other past, present, and probable future projects and programs in the region that are identified in Table 20-6, Table 5.2.2.16-1 and Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions* also have the potential to result in relocation and disruption of utility infrastructure.

The Suisun Marsh Habitat Management, Preservation, and Restoration Plan would damage utility facilities during construction and restoration activities. However, mitigation was able to reduce it to less than significant. Delta Wetlands would also require relocation of electrical distribution lines due to construction and project footprint, but would be able to mitigate the impact to less than significant. Because no other projects are known to result in relocation and disruption of utility infrastructure and the Suisun Marsh Habitat Management, Preservation, and Restoration Plan and Delta Wetlands were able to reduce this effect to not adverse through mitigation measures, BDCP's incremental contribution to the adverse cumulative effect on utilities is significant.

Implementation of Mitigation Measures UT-6a, UT-6b, and UT-6c are available to reduce the severity of this effect, but the effect would remain adverse. Consequently, Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A would contribute to a cumulatively considerable adverse effect on utilities.

***CEQA Conclusion*:** All action alternatives would require the relocation and disruption of utility infrastructure, including existing water, sewer, storm drain, natural gas, oil, electric, and/or communication lines, and would have the potential to create significant impacts through the relocation of facilities. As such, the contribution of cumulative impacts under Alternatives 1A through 9 is considerable. Mitigation Measures UT-6a, UT-6b, and UT-6c are available to reduce the severity of this impact, but would remain cumulatively considerable.

The potential conflict with the Hood Fire Station as a result of implementation of Alternative 1A, 1B, 2A, 2B, 6A, 6B, 7, or 8 is considered a significant and unavoidable impact because the effects of constructing a new fire station are unknown at this time. Mitigation Measure UT-2 would be available to lessen the severity of the potential impact by ensuring continuation of fire protection

services in the Courtland Fire Protection District service area, which is shared with the Courtland Fire Station. However, this impact would remain cumulatively considerable.

Mitigation Measure UT-2: Ensure the Continuation of Fire Protection Services by the Courtland Fire Protection District

Please see Mitigation Measure UT-2 under Impact UT-2 in the discussion of Alternative 4 in Chapter 18, *Cultural Resources*, of the Draft EIR/EIS.

Mitigation Measure UT-6a: Verify Locations of Utility Infrastructure

Please see Mitigation Measure UT-6a under Impact UT-6 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure UT-6b: Relocate Utility Infrastructure in a Way That Avoids or Minimizes Any Effect on Operational Reliability

Please see Mitigation Measure UT-6b under Impact UT-6 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure UT-6c: Relocate Utility Infrastructure in a Way That Avoids or Minimizes Any Effect on Worker and Public Health and Safety

Please see Mitigation Measure UT-6c under Impact UT-6 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

5.2.4.16 Energy

Since the time of the Draft EIR/EIS notice of preparation (NOP) in 2009, additional projects that could combine with the action alternatives to contribute to cumulative energy resource impacts are known to be reasonably foreseeable or probable. The list of projects included in the Draft EIR/EIS Table 21-13 is amended to include the additional projects included in Table 5.2.2.17-1 below. These additional cumulative projects are considered in combination with the projects included in Draft EIR/EIS Table 21-13. The potential for cumulative impacts on energy generation and use are described for BDCP operational effects on energy use within the Delta and energy use in the South of Delta region of CVP and SWP water deliveries related to CM1. Effects are analyzed on a statewide level since the BDCP would obtain electricity and fuel from the statewide electrical grid and energy resources from across Northern California.

Table 5.2.2.17-1 Effects on Energy Resources from Additional Programs and Projects Considered for Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Energy Resources
Department of Water Resources	North Bay Aqueduct Alternative Intake	Notice of Preparation issued on December 2, 2009. CEQA documentation under preparation.	Plan to construct and operate an alternative intake on the Sacramento River, generally upstream of the Sacramento Regional Wastewater Treatment Plant, and connect it to the existing North Bay Aqueduct system by a new pipeline.	May increase energy demand
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential effects on energy resources during construction of water supply infrastructure under this program
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for minor effects on energy resources during construction of restoration actions.
California High Speed Rail Authority and Federal Railroad Administration	Altamont Corridor Rail Project	Preliminary Alternatives Analysis issued on February 2011.	The project would incrementally upgrade the Altamont Commuter Express System.	Increased energy demand
California High Speed Rail Authority and Federal Railroad Administration	California High-Speed Rail System Fresno to Merced Section	Final EIR/EIS certified on May 3, 2012.	The project would construct a new rail corridor between Merced and Fresno.	Increased energy demand
East Bay Municipal Utility District	Water Supply Management Program 2040	Final plan published in April 2012	The plan serves as the basis for water conservation and recycling programs and for development of supplemental supply initiatives through 2040, especially dry-year water needs and future needs with climate change.	May change CVP operations and energy use

Agency	Program/Project	Status	Description of Program/Project	Effects on Energy Resources
Placer County Water Agency	Sacramento River Water Reliability Study	Notice of Preparation in 2003. Project is on hold during recent recession. Reclamation was preparing a joint NEPA document; however, the NEPA process was halted in 2013.	PCWA, Sacramento Suburban Water District, and the cities of Roseville and Sacramento, are investigating the viability of a joint water supply diversion from the Sacramento River.	May change to pumping and energy demand
Semitropic Water Storage District	Delta Wetlands Projects	Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	May increase energy demand
U.S. Bureau of Reclamation	Upper San Joaquin River Basin Storage Investigation	Draft Environmental Impact Statement published in August 2014	The Upper San Joaquin Storage would contribute to restoration of the San Joaquin River, improve water quality of the San Joaquin River, and facilitate additional conjunctive management and water exchanges that improve the quality of water deliveries to urban communities. To the extent possible, the Upper San Joaquin River Basin Storage Investigation will explore opportunities to provide other benefits that could include hydropower, flood control, and recreation.	May increase system resiliency and availability of energy resources
Western Municipal Water District and Reclamation	Riverside-Corona Feeder Conjunctive Use Project	Final Supplemental EIS/EIR published in 2011	The project would allow WMWD to purchase water from SWP and store up to 40,000 acre-feet of water in the San Bernardino Basin Area and Chino Basin and to extract the water from the groundwater basins.	May increase system resiliency and availability of energy resources; water conveyed throughout the region may increase energy demand

Agency	Program/Project	Status	Description of Program/Project	Effects on Energy Resources
Metropolitan Water District of Orange County	Seawater Desalination Project at Huntington Beach	Final CEQA documents published in 2010. Awaiting permits	Water treatment plant would provide up to 50 mgd of desalinated water.	May increase energy demand
San Diego County Water Authority and other water suppliers	Carlsbad Seawater Desalination Plant	Under construction.	Water treatment plant would provide up to 50 mgd of desalinated water.	May increase energy demand
San Diego County Water Authority	Emergency Storage Project	Under construction	The project will increase the amount of water stored locally through new water storage and pipeline connections.	May increase system resiliency and availability of energy resources; water distributed throughout the region may increase energy demand
Contra Costa Water District and Bureau of Reclamation	Los Vaqueros Reservoir Expansion Project	Program under development. Draft EIS/EIR in 2009. Final EIS/EIR in 2010. Completed in 2012.	Project increases the storage capacity of Los Vaqueros Reservoir.	May increase system resiliency and availability of energy resources
U.S. Bureau of Reclamation	Shasta Lake Water Resources Investigation	Draft Environmental Impact Statement published in June 2013	The project is a multiple purpose plan to modify Shasta Dam and Reservoir for fisheries and water supply benefits.	May change to pumping and energy demand
Department of Water Resources and U.S. Bureau of Reclamation	North-of-the-Delta Offstream Storage Investigation	Preliminary Administrative Draft Environmental Impact Statement published in December 2013	The plan will provide offstream storage in the northern Sacramento Valley for improved water supply and water supply reliability, improved water quality, and enhanced survival of anadromous fish and other aquatic species.	May increase system resiliency and availability of energy resources
U.S. Bureau of Reclamation	San Luis Reservoir Expansion	Draft Appraisal Report published in December 2013	The plan is to increase the storage capacity of San Luis Reservoir (behind B.F. Sisk Dam) to improve the reliability of CVP and SWP water supplies dependent upon San Luis Reservoir.	May increase system resiliency and availability of energy resources
Department of Water Resources	South Delta Temporary Barriers Project	Ongoing Program	The program was initiated in 1991, and includes four rock barriers across South Delta channels.	May change to pumping and energy demand

Impact ENG-1: Cumulative Impact on Energy Use for Operation of the BDCP's Water Pumping and Conveyance Facilities in the Delta

Alternatives 1A through 8

NEPA Effects: The amount of energy for operation of north Delta intakes and a new Delta conveyance facility will depend on the hydrological conditions, as well as the specific features of the alternative (i.e., pumping capacity and energy factor). Alternatives 1A through 8 would require an average annual increased energy use of between 18 GWh and 421 GWh, relative to the No Action Alternative (2060), for pumping and conveyance through the Delta. Because this electrical energy would be transmitted from existing or new generation facilities to the new pumping plants on the existing transmission grid, other projects that use more energy would contribute cumulatively to this effect on regional energy use (see Table 21-17 in the Draft EIR/EIS and Table 5.2.2.17-1 above). However, the increase attributable to any alternative compared to statewide use (300,000 GWh) is not cumulatively considerable.

CEQA Conclusion: Each of these BDCP alternatives would require an annual increase energy use, relative to existing conditions. When combined with ongoing and reasonably foreseeable future projects, cumulative energy demand may affect regional resources. However, the increase attributable to any alternative compared to statewide use (300,000 GWh) is not cumulatively considerable. Accordingly, there is no cumulative effect on energy use from Alternatives 1A through 8. This impact would be less than significant. No mitigation is required.

Alternative 9

NEPA Effects: Alternative 9 would rely on the existing Delta channels (with some dredging) and tidal energy to transport water from the Sacramento River to the existing south Delta channels. Dredging for Alternative 9 would require considerable amounts of diesel fuel during the dredging period (2–3 years), but not much electrical energy would be used. Although some new circulation pumps would be needed as part of the separation of the San Joaquin River corridor from the south Delta pumping plants to reduce fish entrainment, no substantial new energy use would be required. There would be no cumulative effect on energy use from Alternative 9.

CEQA Conclusion: Alternative 9 would rely on the existing Delta channels (with some dredging) and tidal energy to transport water from the Sacramento River to the existing south Delta channels. Although some new circulation pumps would be needed as part of the separation of the San Joaquin River corridor from the south Delta pumping plants to reduce fish entrainment, no substantial new energy use would be required. Accordingly, there is no cumulative effect on energy use within the Delta from Alternative 9. This impact would be less than significant. No mitigation is required.

Impact ENG-2: Cumulative Impact on Energy Use at Existing CVP and SWP Pumping Plants to Deliver Additional Water Supplies

Alternatives 1A through 5A

NEPA Effects: For Alternatives 1A through 5A, the operations under CM1 would allow increased Delta exports and water supply delivery compared to the No Action Alternative (2060). This increased pumping is less than the maximum monthly energy requirement planned and previously operated for CVP and SWP water supply deliveries. This increased energy use contributes to the

cumulative effects on increased energy use in the South of Delta water supply region. Although this increased energy use at the existing CVP and SWP pumping plants was not considered a project impact on energy resources (the energy sources were planned and constructed as part of the CVP and SWP and therefore do not represent a *new* energy demand), this increased energy use would contribute to the cumulative energy use in this large portion of California. The high energy requirements of the SWP are well described and understood (California Energy Commission 2005; Natural Resources Defense Council 2004) and are a significant factor in the cumulative energy use of the south of Delta water supply region. However, the increase attributable to any alternative compared to statewide use (300,000 GWh) would not be cumulatively considerable.

***CEQA Conclusion*:** Increased energy use for pumping of increased water deliveries to the South of Delta CVP and SWP water supply region could result in cumulative impacts on energy use within the water supply region. This cumulative impact is considered significant but the contribution from Alternatives 1A through 2C, and Alternatives 4 and 5A would not be cumulatively considerable because this energy use is within the planned maximum capacity for the CVP and SWP. Because this energy use is part of the energy uses for existing facilities, the incremental impact from the BDCP alternatives on cumulative energy use in the South of Delta region would be less than significant. No mitigation is required.

Alternatives 6A through 9

Alternatives 6A through 9 each would reduce somewhat the energy used to pump water from the Delta to CVP and SWP contractors because these alternatives would reduce the annual average CVP and SWP south of Delta water deliveries and reduce the average annual energy use, relative to the No Action Alternative (2060). These alternatives would reduce the cumulative effect on energy use in the CVP and SWP South of Delta water supply region and the increase attributable to any alternative compared to statewide use (300,000 GWh) would not be cumulatively considerable.

CEQA Conclusion: Alternatives 6A through 9 would provide somewhat less CVP and SWP water supply deliveries and would reduce the cumulative energy use for pumping from the No Action Alternative. There would be no cumulative energy impact in the South of Delta water supply region. Accordingly, this impact would be less than significant. No mitigation is required.

Impact ENG-3: Cumulative Impact on Energy Use from Diesel and Gasoline Consumption during Construction

Alternatives 1A through 9

NEPA Effects: Project construction would consume gasoline and diesel through operation of heavy-duty construction equipment and vehicles. Alternatives 1A through 9, Alternatives 4A, 2D, and 5A and the cumulative projects listed in Table 5.2.2.17-1 would all incorporate energy-saving measures required by a myriad of state and local energy policies to improve energy efficiency and reduce waste. Measures pursued by the project are summarized in Appendix 3B, *Environmental Commitments*. With all projects, including the proposed project, implementing similar measures, a cumulative effect related to the inefficient use of energy would not occur.

***CEQA Conclusion*:** Project construction would consume gasoline and diesel through operation of heavy-duty construction equipment and vehicles. Alternatives 1A through 9 and the cumulative projects listed in Table 5.2.2.17-1 would all incorporate energy-saving measures required by a myriad of state and local energy policies to improve energy efficiency and reduce waste. Measures

pursued by the project are summarized in Appendix 3B, *Environmental Commitments*. With all projects, including the proposed project, implementing similar measures, a cumulative impact related to the inefficient use of energy would not occur. No mitigation is required.

5.2.4.17 Air Quality and Greenhouse Gases

Projects within the Plan Area that require construction or heavy-equipment and vehicles during operation could generate criteria pollutant emissions. As described in Section 22.3.4 of the Draft EIR/EIS, the project-level thresholds adopted by local air quality management agencies to evaluate criteria pollutant effects consider relevant past, present, and reasonably foreseeable future projects within the Plan area and are considered project-level and cumulative thresholds of significance. Therefore, exceedances of the air district thresholds would be cumulatively considerable.

Impact AQ-28: Cumulative Generation of Regional Criteria Pollutants in Excess of Air District Threshold during Construction of the Water Conveyance Facility

Alternatives 1A, 1B, 2A, 2B, 3–6B, 7–9

NEPA Effects: All alternatives would exceed one or more air district threshold and would therefore result in adverse cumulative effects on regional air quality in the region. Mitigation Measures AQ-1 through AQ-4 would reduce ROG, NO_X, PM10, and PM2.5 emissions, as needed, below air district thresholds. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Emissions generated by Alternatives 1A, 1B, 2A, 2B, 3–6B, 7–9 would exceed one or more air district threshold for ROG, NO_X, PM10, or PM2.5. The impact of generating emissions in excess of local air district thresholds would violate applicable air quality standards in the study area and could contribute to or worsen cumulative air quality conditions. This would be a significant impact. Mitigation Measures AQ-1 through AQ-4 would be available to reduce emissions to a less-than-significant level by offsetting emissions to quantities below air district CEQA thresholds.

Alternatives 1C, 2C, and 6C

NEPA Effects: Alternatives 1C, 2C, and 6C would generate ROG, NO_X, and PM10 in excess of more or more air district threshold and would therefore result in adverse cumulative effects on regional air quality in the region. Mitigation Measures AQ-1, AQ-2, and AQ-4 would reduce emissions below SMAQMD and YSAQMD thresholds. Mitigation Measures AQ-3a and AQ-3b would be available to reduce ROG and NO_X in the BAAQMD, given the magnitude of estimated emissions, neither measure would reduce emissions below district thresholds.[4] Accordingly, construction of Alternatives 1C, 2C, and 6C would result in an adverse and cumulative air quality effect in the BAAQMD.

CEQA Conclusion: ROG, NO_X, and PM10 generated by Alternatives 1C, 2C, and 6C would exceed one or more air district threshold. The impact of generating emissions in excess of local air district thresholds would violate applicable air quality standards in the study area and could contribute to or worsen an cumulative air quality conditions. This would be a significant impact. Mitigation

[4] The amount of moneys required to achieve sufficient contracts to reduce project emissions below air district thresholds would require immediate and substantial outreach, staffing, and other resources. There are also a number of hurdles related to accelerating equipment turnover and identifying available projects. While the mitigation measure will reduce project emissions, it is unlikely sufficient resources can be identified to reduce emissions by the amount required to achieve a less-than-significant finding.

Measures AQ-1, AQ-2, and AQ-4 would be available to reduce emissions to a less-than-significant level by offsetting emissions to quantities below air district SMAQMD and YSAQMD thresholds. Although Mitigation Measures AQ-3a and AQ-3b would be available to reduce ROG and NO_X in the BAAQMD, given the magnitude of estimated emissions, neither measure would reduce emissions below district thresholds. Accordingly, construction of Alternatives 1C, 2C, and 6C in the BAAQMD would result in a cumulative air quality effect (i.e., significant and unavoidable).

Mitigation Measure AQ-1a: Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within the SFNA to Net Zero (0) for Emissions in Excess of General Conformity *De Minimis* Thresholds (Where Applicable) and to Quantities below Applicable CEQA Thresholds for Other Pollutants

Please see Mitigation Measure AQ-1a under Impact AQ-1 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AQ-1b: Develop an Alternative or Complementary Offsite Mitigation Program to Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within the SFNA to Net Zero (0) for Emissions in Excess of General Conformity *De Minimis* Thresholds (Where Applicable) and to Quantities below Applicable CEQA Thresholds for Other Pollutants

Please see Mitigation Measure AQ-1b under Impact AQ-1 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AQ-4a: Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within SJVAPCD/SJVAB to Net Zero (0) for Emissions in Excess of General Conformity *De Minimis* Thresholds (Where Applicable) and to Quantities below Applicable SJVAPCD CEQA Thresholds for Other Pollutants

Please see Mitigation Measure AQ-4a under Impact AQ-4 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AQ-4b: Develop an Alternative or Complementary Offsite Mitigation Program to Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within the SJVAPCD/SJVAB to Net Zero (0) for Emissions in Excess of General Conformity *De Minimis* Thresholds (Where Applicable) and to Quantities below Applicable SJVAPCD CEQA Thresholds for Other Pollutants

Please see Mitigation Measure AQ-4b under Impact AQ-4 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AQ-3a: Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within BAAQMD/SFBAAB to Net Zero (0) for Emissions in Excess of General Conformity *De Minimis* Thresholds (Where Applicable) and to Quantities below Applicable BAAQMD CEQA Thresholds for Other Pollutants

Please see Mitigation Measure AQ-3a under Impact AQ-3 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure AQ-3b: Develop an Alternative or Complementary Offsite Mitigation Program to Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within the BAAQMD/SFBAAB to Net Zero (0) for Emissions in Excess of General Conformity *De Minimis* Thresholds (Where Applicable) and to Quantities below Applicable BAAQMD CEQA Thresholds for Other Pollutants

Please see Mitigation Measure AQ-3b under Impact AQ-3 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Impact AQ-29: Cumulative Generation of Criteria Pollutants in Excess of Air District Regional Threshold during Operation of the Water Conveyance Facility

Alternatives 1A through 9

NEPA Effects: Operation and maintenance activities under all alternatives would not exceed the regional air district thresholds of significance. Consequently, there would be no cumulative adverse effect to regional air quality.

CEQA Conclusion: Operation and maintenance activities under all alternatives would not exceed the regional air district thresholds of significance. Consequently, the impact would be less than cumulatively considerable (i.e., less than significant).

Impact AQ-30: Expose Sensitive Receptors to Cumulative Localized Pollutant Concentrations (PM, CO, and DPM) from Construction of CM1

Alternatives 1A through 9

NEPA Effects: There are several proposed projects (listed in Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*) that could contribute construction-related DPM, PM10, and PM2.5 emissions adjacent to the project area. When combined with emissions generated during construction of the water conveyance facility, combined DPM, PM10, and PM2.5 emissions may contribute to significant cumulative health threats. Accordingly, this effect would be cumulatively considerable.

CEQA Conclusion: Construction of the BDCP water conveyance features would contribute to significant cumulative health risks at sensitive receptors. While Mitigation Measures AQ-9 and AQ-16 would reduce project specific health risks, emissions generated from the development of each alternative would still be cumulatively significant based on the contribution from other existing operational emission sources. This impact would be significant and unavoidable.

Impact AQ-31: Generation of Cumulative Regional Criteria Pollutants from Implementation of CM2–CM11

Alternatives 1A through 9

NEPA Effects: Implementation of the CM2–CM11 (Environmental Commitments 3, 4, 6–11 under Alternatives 2D, 4A, and 5A) would generate construction emissions through earthmoving activities and heavy-duty diesel-powered equipment. The intensity and frequency of vehicle trips and construction activities associated with the CM2–CM11/Environmental Commitments 3, 4, 6–11 are assumed to be relatively minor, but could exceed local air district thresholds in the Study area.

Accordingly, this effect would be cumulatively considerable. Mitigation Measure AQ-24 would be available to reduce this effect, but emissions would still be adverse.

CEQA Conclusion: Cumulative construction and operational emissions associated with the restoration and enhancement actions could exceed applicable air district thresholds. Exceedances of air district regional thresholds could lead to violations of applicable air quality standards in the Study area and could contribute to or worsen an existing air quality conditions. Mitigation Measure AQ-24 would be available to reduce this effect, but may not be sufficient to reduce emissions below applicable air quality management district thresholds. Consequently, this impact would be cumulatively considerable and significant and unavoidable.

Mitigation Measure AQ-24: Develop an Air Quality Mitigation Plan (AQMP) to Ensure Air District Regulations and Recommended Mitigation are Incorporated into Future Conservation Measures and Associated Project Activities

Please see Mitigation Measure AQ-24 under Impact AQ-24 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Impact AQ-32: Expose Sensitive Receptors to Cumulative Localized Pollutant Concentrations (PM, CO, and DPM) from Implementation of CM2 through CM11

Alternatives 1A through 9

NEPA Effects: Additional traffic and heavy-duty equipment required to implement CM2–11 (Environmental Commitments 3, 4, 6–11 under Alternatives 2D, 4A, and 5A) would generate emissions that could expose nearby receptors to local concentrations of PM, CO, and DPM. Proposed projects (listed in Appendix 3D) adjacent to restoration sites could increase pollutant concentrations at exposed receptors. Increases in PM, CO, or DPM (cancer and non-cancer-risk) at receptors sites could result in adverse health impacts. Mitigation Measure AQ-25 is available to address the effect and requires preparation of a site-specific HRA for all restoration sites adjacent to sensitive receptors. This effect would not be adverse.

CEQA Conclusion: Additional traffic and heavy-duty equipment required to implement CM2–11/Environmental Commitments 3, 4, 6–11 would generate emissions that could expose nearby receptors to local concentrations of PM, CO, and DPM. Proposed projects (listed in Appendix 3D) adjacent to restoration sites could increase pollutant concentrations at exposed receptors. Increases in PM, CO, or DPM (cancer and non-cancer-risk) at receptors sites could result in adverse health impacts. Mitigation Measure AQ-25 is available to address the effect and requires preparation of a site-specific HRA for all restoration sites adjacent to sensitive receptors. The HRA would not only consider project-level emissions, but also cumulative contributions from other reasonably foreseeable projects, as required by local air district CEQA guidelines. Consequently, this impact would be less than significant with mitigation.

Mitigation Measure AQ-25: Prepare a Project-Level Health Risk Assessment to Reduce Potential Health Risks from Exposure to Localized DPM and PM Concentrations

Please see Mitigation Measure AQ-25 under Impact AQ-25 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

5.2.4.18 Noise

Implementation of the BDCP will result in noise and vibration effects associated with construction and operation of new intake and conveyance facilities and conservation measures. To assess the contribution of the BDCP project alternatives to cumulative noise and vibration conditions, noise and vibration from construction and operation of the BDCP is evaluated in conjunction with noise and vibration potentially generated by past, present, and reasonably foreseeable future projects within the Plan Area (Table 23-86) as well as Table 5.2.2.19-1 below. The following list includes projects considered for this cumulative effects section; for a complete list of such projects, consult Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions.*

Table 5.2.2.19-1. Noise Effects from Additional Plans, Policies, and Programs Considered for Cumulative Analysis

Project/Program	Agency	Project Elements Related to Noise	Potential Noise Effect
Suisun Marsh Habitat Management, Preservation, and Restoration Plan	California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, and Suisun Marsh Charter Group	The proposed plan would be consistent with the goals and objectives of the Bay-Delta Program, and would balance those goals and objectives with the Suisun Marsh Preservation Agreement and federal and state endangered species programs within the Suisun Marsh. The Suisun Marsh Plan also would provide for simultaneous protections and enhancement of: 1) existing wildlife values in managed wetlands, 2) endangered species, 3) tidal marshes and other ecosystems, and 4) water quality, including, but not limited to, the maintenance and improvement of levees.	Increases in short term noise levels during levee repair and habitat construction. Increases in long-term ambient noise levels as a result of wildlife habitat.
Department of Water Resources	California Water Action Plan	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential for noise impacts associated with construction and operation of water supply infrastructure.
Delta Conservancy	California EcoRestore	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for noise impacts associated with construction of restoration actions.

Project/Program	Agency	Project Elements Related to Noise	Potential Noise Effect
Yolo Bypass Wildlife Area Land Management Plan	California Department of Fish and Wildlife	The stated purposes of the Yolo Bypass Wildlife Area Land Management Plan are to: (1) guide the management of habitats, species, appropriate public use, and programs to achieve California Department of Fish and Wildlife's mission; (2) direct an ecosystem approach to managing the Yolo Bypass Wildlife Area in coordination with the objectives of the CALFED ERP; (3) identify and guide appropriate, compatible public-use opportunities within the Yolo Bypass Wildlife Area; (4) direct the management of the Yolo Bypass Wildlife Area in a manner that promotes cooperative relationships with adjoining private-property owners; (5) establish a descriptive inventory of the sites and the wildlife and plant resources that occur in the Yolo Bypass Wildlife Area; (6) provide an overview of the Yolo Bypass Wildlife Area's operation, maintenance, and personnel requirements to implement management goals, and serve as a planning aid for preparation of the annual budget for the Bay-Delta Region (Region 3); and (7) present the environmental documentation necessary for compliance with state and federal statutes and regulations, provide a description of potential and actual environmental impacts that may occur during plan management, and identify mitigation measures to avoid or lessen these impacts.	Increases in long-term ambient noise levels as a result of wildlife habitat. This project is examined under Alternatives 1A–4 and 5–9 of the BDCP.
Delta Levees Flood Protection Program	California Department of Water Resources	The program presently focuses on flood control projects and related habitat projects for eight western Delta Islands (Bethel, Bradford, Holland, Hotchkiss, Jersey, Sherman, Twitchell and Webb Islands) and for the towns of Thornton and Walnut Grove.	Increases in short term noise levels during construction.
Dutch Slough Tidal Marsh Restoration Project	California Department of Water Resources and California State Coastal Conservancy	The Dutch Slough Tidal Marsh Restoration Project, located near Oakley in Eastern Contra Costa County, would restore wetland and uplands, and provide public access to the 1,166-acre Dutch Slough property owned by the Department of Water Resources (DWR).	Increases in short term noise levels during construction. Increases in long-term ambient noise levels as a result of wildlife habitat.

Project/Program	Agency	Project Elements Related to Noise	Potential Noise Effect
Franks Tract Project	California Department of Water Resources and U.S. Bureau of Reclamation	DWR and Reclamation propose to implement the Franks Tract Project to improve water quality and fisheries conditions in the Delta. DWR and Reclamation are evaluating installing operable gates to control the flow of water at key locations (Threemile Slough and/or West False River) to reduce sea water intrusion, and to positively influence movement of fish species of concern to areas that provide favorable habitat conditions. The project gates would be operated seasonally and during certain hours of the day, depending on fisheries and tidal conditions. Boat passage facilities would be included to allow for passing of watercraft when the gates are in operation.	Increases in short term noise levels during construction
Contra Costa Canal Replacement Project	Contra Costa Water District	Contra Costa Water District's Canal Replacement Project will replace the canal with a pipeline along a portion of the 48-mile Contra Costa Canal near Oakley.	Increases in short term noise levels during construction
South Sacramento Habitat Conservation Plan	Sacramento County and U.S. Fish and Wildlife Service	The geographic location of the proposed HCP includes a combined 341,000 acres within south Sacramento County (unincorporated area) and the cities of Rancho Cordova, Elk Grove, and Galt.	Increases in short term noise levels during construction. Increases in long-term ambient noise levels as a result of wildlife habitat.
SRWTP Facility Upgrade Project (EchoWater)	Sacramento Regional County Sanitation District	Upgrade existing secondary treatment facilities to advanced unit processes including improved nitrification/denitrification and filtration.	Increases in short term noise levels during construction. Potential increase in short term groundborne vibration.
Delta Wetlands Project	Semitropic Water Storage District	Would divert and storage of winter flows on Bacon Island and Webb Tract for beneficial uses in summer, and developing seasonal wetlands and riparian habitats on Bouldin Island and most of Holland Tract	Increases in short term noise levels during construction. Increases in long-term ambient noise levels as a result of wildlife habitat.

Project/Program	Agency	Project Elements Related to Noise	Potential Noise Effect
Sacramento County General Plan Update	Sacramento County	In 2002, the County initiated a comprehensive general plan update to guide the growth and development of the County through the year 2030. In June 2007, the county issued a draft updated general plan and began environmental review. The plan was adopted on November 9, 2011. The general plan update covers the entire unincorporated portion of Sacramento County, including portions of the Delta within Sacramento County. The update also includes a Delta Protection Element that identifies goals and objectives within the primary zone of the Delta.	Increases in short term noise levels during construction; increases in long-term ambient noise levels associated with new development; increases in short and long-term groundborne vibration

The above list of related projects evaluated for cumulative impacts includes a number of projects that would affect existing and/or future noise levels in the Plan Area. The proposed BDCP, in conjunction with other projects that affect noise levels, would expose sensitive land uses in the Plan Area to increased noise levels that could exceed applicable thresholds. Increases in ambient noise levels could occur during project construction, or through the long-term operation of new noise-generating facilities (e.g., pumping plants, rail lines, etc.). The actual increase in ambient noise expected as result of the projects shown in Table 23-86 and Table 5.2.2.19-1 is not known.

Impact NOI-5: Cumulative Effects of Increased Noise and Vibration from Construction Activities and Operation of Conveyance Facilities Occurring Within the Delta

Alternatives 1A through 9, Including Alternatives 4A, 2D, and 5A

NEPA Effects: Implementation of the BDCP action alternatives would involve construction and operation of new facilities related to water extraction and transport including intake facilities, pipelines, tunnels, and canals. The project also includes implementation of conservation measures. Some of these conservation measures include construction activities related to grading, levee modifications, modifications of existing infrastructure, and construction of new infrastructure. As stated in the impact discussion above, construction activities will generate noise and vibration. Operation of facilities related to the extraction and transport of water will also generate noise.

Other past, present, and probable future projects and programs in the region that are identified in Table 23-86, Table 5.2.2.19-1 and Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions* have the potential to adversely affect noise and vibration effects. However, construction noise and vibration are temporary and highly localized effects. This reduces the potential for construction noise and vibration to contribute meaningfully to cumulative noise and vibration effects associated with other projects. Operational noise on the other hand is permanent and thus has more potential to contribute to cumulative noise effects on an on-going basis. However, BMPs for reducing noise related to operation and maintenance would reduce the potential for conveyance facility operations to contribute to cumulative noise effects.

BDCP project components are located primarily in rural agricultural areas including the primary zone of the Delta where there is little potential for project-related construction and operational noise and vibration to occur concurrently with or in proximity to noise and vibration from other development projects. There may, however, be situations in which noise and vibration from one or more projects identified in Table 23-86 and Table 5.2.2.19-1 could occur concurrently or in proximity to project components. Therefore, there could be a cumulative effect. Implementation of BMPs and other design measures incorporated into the project and Mitigation Measures NOI-1a, NOI-1b, NOI-2, and NOI-3 identified for project-specific effects would reduce noise and vibration impacts from construction. However, there may be situations where construction noise and vibration effects would remain adverse. If these situations occur concurrently or in proximity to other noise- and vibration-generating projects, the BDCP's incremental contribution to adverse noise and vibration effects would be cumulatively considerable.

CEQA Conclusion: Because implementation of BMPs and other design measures incorporated into the project, and mitigation measures identified for project-specific effects may not reduce significant construction noise and vibration impacts and operational noise impacts to less-than-significant levels in all cases, the project's incremental contribution to significant cumulative noise impacts is cumulatively considerable. This impact would be considered significant and unavoidable. Mitigation

Measures NOI-1a, NOI-1b, NOI-2, and NOI-3 are designed to address project-level effects and would reduce the impact, but not to a less-than-significant level.

Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during Construction

Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1C in Appendix A of this RDEIR/SDEIS.

Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response Tracking Program

Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during Construction of Water Conveyance Facilities

Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 4 in in Appendix A of this RDEIR/SDEIS.

Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is Less) at Nearby Noise Sensitive Land Uses

Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

5.2.4.19 Hazards and Hazardous Materials

The following section provides an update to the Hazards and Hazardous materials cumulative impact analysis in the Draft EIR/EIS Chapter 24. This section considers additional projects (Table 5.2.2.20-1) not previously included in the Draft EIR/EIS cumulative analysis, as well as those previously considered, which are identified in Table 24-7. For a complete list of plans, policies, programs and projects considered, see Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*. These projects would have the potential to affect public health in the study area. This cumulative analysis also considers potential cumulative effects/impacts associated with Alternative 4A, 2D, and 5A.

Table 5.2.2.20-1. Effects Related to Hazards and Hazardous Materials from the Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
Department of Water Resources	North Bay Aqueduct Alternative Intake	Notice of Preparation issued on December 2, 2009. CEQA documentation under preparation.	Plan to construct and operate an alternative intake on the Sacramento River, generally upstream of the Sacramento Regional Wastewater Treatment Plant, and connect it to the existing North Bay Aqueduct system by a new pipeline. The proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct intake at Barker Slough.	Hazardous materials associated with land and in-river construction equipment on land as well as in the Sacramento River could expose the public and the environment to hazardous materials (e.g., fuel, oil, solvents) if materials are improperly handled. Additionally, the project area (rural portions of Solano and Yolo Counties) has a history of agricultural use and may have areas of previously unknown contamination related to the use or storage of agricultural compounds. Project construction activities thus could encounter unknown contamination. Other potential hazards resulting from construction activities could include disturbance of electrical transmission lines and the inadvertent release of existing contaminants in river sediment.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for short-term hazards associated with constructing water supply infrastructure.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for short-term hazards associated with constructing restoration actions.
U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Services, Department of Water Resources, and Department of Fish and Wildlife	San Joaquin River Restoration Program	Final EIS/EIR and Record of Decision completed in 2011.	Program that aims at restoring flows to the San Joaquin River from Friant Dam to the confluence of Merced River (Bureau of Reclamation 2011).	In addition to typical construction-related hazards such as accidental spills of hazardous materials, the EIS/EIS indicated that there would be a potentially significant hazard associated with disrupting active, idle, or abandoned wells in the restoration area.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
California High Speed Rail Authority and Federal Railroad Administration	Altamont Corridor Rail Project	Preliminary Alternatives Analysis issued on February 2011.	The project would incrementally upgrade the Altamont Commuter Express System.	The construction of this project would involve the use, transport, and disposal of construction-related hazardous materials and potentially hazardous waste. Accordingly, accidental release of hazardous materials could occur. The project could occur in areas of known or unknown contamination, the disturbance of which could result in hazards to the public and the environment.
California High Speed Rail Authority and Federal Railroad Administration	California High-Speed Rail System Fresno to Merced Section	Final EIR/EIS certified on May 3, 2012.	The project would construct a new rail corridor between Merced and Fresno.	The construction of this project would involve the use, transport, and disposal of construction-related hazardous materials and potentially hazardous waste. Accordingly, accidental release of hazardous materials could occur. The project could occur in areas of known or unknown contamination, the disturbance of which could result in hazards to the public and the environment.

Impact HAZ-9: Create Cumulative Hazards to the Public or the Environment through the Release of Hazardous Materials or by Other Means as a Result of Constructing the Water Conveyance Facilities

NEPA Effects: Construction of the water conveyance facilities under Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A in combination with other related past, present, and reasonably foreseeable probable future construction projects in the study area (as presented in Table 5.2.2.20-1, Table 24-7 and Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions*), could contribute to potential public and environmental hazards. The potential construction-related effects pertain to the creation of hazards through the release of hazardous materials (e.g., inadvertent spills and disrupting existing contaminants in soils and existing structures) or by other means (e.g., natural gas accumulation in tunnels, disturbance of energized transmission lines, interference with air traffic safety). It is reasonable to assume that other projects would involve the risk of similar hazards, given that the majority of these types of hazards (e.g., spills, potential for interference with air traffic for construction near an airport) are not uncommon for construction projects. Due to the large geographic scale and extended time required to construct the water conveyance facilities, the action alternatives would make a cumulatively considerable contribution to adverse effects. As such, the combined effects of the action alternatives with other projects related to the potential for creation of cumulative hazards would be cumulatively adverse. Each project would require an evaluation of potential hazards associated with its implementation. Additionally, it is the responsibility of the projects' proponents to comply with applicable laws regarding hazardous materials and other hazards. Similarly, implementation of environmental commitments (e.g., SWPPPs, HMMPs, SPCCPs, SAPs, and others as described above and in Appendix 3B, *Environmental Commitments*) and Mitigation Measures HAZ-1a, HAZ-1b, HAZ-6, HAZ-8, UT-6a, UT-6c, and TRANS-1a would render the contribution of the action alternatives to less than cumulatively considerable. Accordingly, compliance with applicable laws pertaining to hazards and hazardous materials, combined with the

implementation of project-specific environmental commitments and mitigation measures, would minimize cumulative impacts of the action alternatives and other projects related to hazards. Therefore, there would be no cumulative adverse effect.

***CEQA Conclusion*:** The potential construction-related effects of Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, pertain to the creation of hazards through the release of hazardous materials (e.g., inadvertent spills, disrupting existing contaminants in soils) or by other means (e.g., natural gas accumulation in tunnels, disturbance of energized transmission lines, and interference with air traffic safety). Construction of the water conveyance facilities in combination with related past, present, and reasonably foreseeable probable future construction projects considered in this cumulative analysis (as presented in Table 5.2.2.20-1, Table 24-7 and Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions*) could result in a cumulatively significant impact related to hazards and hazardous materials. The incremental hazards and hazardous material impact contribution from any of the action alternatives would be cumulatively considerable, but with the implementation of Mitigation Measures HAZ-1a, HAZ-1b, HAZ-6 UT-6a, UT-6c, TRANS-1a, and the applicable environmental commitments discussed previously and in Appendix 3B, *Environmental Commitments*, there impacts would be reduced such that they would be less than cumulatively considerable.

Impact HAZ-10: Create Cumulative Hazards to the Public or the Environment through the Release of Hazardous Materials or by Other Means as a Result of Operating and Maintaining the Water Conveyance Facilities

NEPA Effects: Operation and maintenance of the water conveyance facilities under all Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, in combination with other related past, present, and reasonably foreseeable probable future projects in the study area (as presented in Table 5.2.2.20-1, Table 24-7 and Appendix 3D*, Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions)*, could contribute to potential public and environmental hazards. Under all of the action alternatives, the transport, storage, and use of chemicals or hazardous materials may be required during long-term operation and maintenance of the water conveyance facilities. Additionally, facility equipment maintenance would be required for all action alternatives, although the facilities differ according to alternative. For example, under alternatives with five intakes, maintenance of solids lagoons would create an anticipated 18,000 cubic yards of dry sediment/solids annually, a potential source of contaminants. Alternative 9 would require periodic dredging activities associated with maintenance of pumping plants and operable barriers, and Alternatives 4, 4A, 2D, and 5A would require periodic dredging of an expanded Clifton Court Forebay. Some of the materials used in routine maintenance for all action alternatives may include hydraulic oil for lubricating machinery, fuel, batteries for vehicles and equipment, nitrogen, carbon dioxide or clear agent fire suppression, paints, cleaning solvents and chemicals, pesticides and herbicides for grounds maintenance. Some of these materials, bulk fuel and lubricants for example, would likely be stored in the maintenance facilities. Accidental release of hazardous materials during routine operation and maintenance of the water conveyance facilities could contaminate soils, groundwater, or surface water and result in adverse effects on the environment and public.

It is reasonable to assume that many other past, present, and reasonably foreseeable projects in the study area (e.g., California Aquatic Invasive Species Draft Rapid Response Plan; the Davis-Woodland Water Supply Project) would involve the risk of similar hazards, given that the majority of these types of hazards (e.g., spills, periodic dredging) are not uncommon for operating and maintaining

water conveyance facilities. Due to the large geographic scale of the water conveyance facilities, the BDCP would represent a cumulatively considerable contribution to adverse effects. However, implementation of Mitigation Measure HAZ-6 and applicable environmental commitments (as described in Impact HAZ-6 under Alternative 1A, and in Appendix 3B, *Environmental Commitments*), and adherence to all applicable laws, would reduce the contribution of the action alternatives to less than cumulatively considerable. Accordingly, compliance with applicable laws pertaining to hazards and hazardous materials, combined with the implementation of project-specific environmental commitments and mitigation measures, would minimize the cumulative impacts of the BDCP and other projects related to hazards. Therefore, there would be no cumulative adverse effect.

***CEQA Conclusion*:** The accidental release of hazardous materials to the environment during operation and maintenance of the water conveyance facilities under all action alternatives could result in cumulative significant impacts on the public and the environment. The incremental contribution to hazards and hazardous material impact from any of the action alternatives would be cumulatively considerable, and therefore significant. However, the severity of these impacts would be reduced with the implementation of Mitigation Measure HAZ-6 and applicable environmental commitments (as described for Impact HAZ-6 under Alternative 1A, and in Appendix 3B, *Environmental Commitments*, respectively) and adherence to all applicable laws. Accordingly, the cumulative impact would not be cumulatively considerable, and would therefore be less than significant.

Mitigation Measure HAZ-6: Test Dewatered Solids from Solids Lagoons Prior to Reuse and/or Disposal

Please see Mitigation Measure HAZ-6 under Impact HAZ-6 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Impact HAZ-11: Create a Cumulative Hazard to the Public or the Environment through the Release of Hazardous Materials or by Other Means as a Result of Implementing the Conservation Measures

NEPA Effects: Construction, operation and maintenance of the proposed conservation measures CM2–CM11, CM13, CM14, CM16, and CM18 or Environmental Commitments as part of the action alternatives except Alternative 4A could have effects related to hazardous materials (e.g., accidental release of fuels) and potential hazards similar to those discussed for construction, operation, and maintenance of proposed water conveyance facilities. Restoration and enhancement environmental commitments under Alternatives 4A, 2D, and 5A could have similar effects, but because the scale of such activities under these alternatives would be considerably smaller than under the other action alternatives, the potential for those hazardous effects, as well as the magnitude, would be smaller. As previously described, implementation of the conservation measures would involve extensive use of heavy equipment during construction, and/or the use of chemicals during operations and maintenance (e.g., herbicides for nonnative vegetation control), which could result in the unintentional release of hazardous substances and could expose construction workers or the public to hazards. There is also potential for implementation of conservation measures that create or improve wildlife habitat (CM2–CM11) to create hazards to air and public safety through increased bird-aircraft strikes. The following airports, because they are in relatively close proximity (within 2 miles) to the ROAs and/or conservation zones could potentially be affected: Travis Air Force Base; Rio Vista Municipal Airport; Funny Farm Airport; Sacramento International Airport, and Byron Airport. Mitigation Measure HAZ-8 is available to reduce this impact, although it would remain

significant and unavoidable. However, relative to the construction of the water conveyance facility, the potential effects of BDCP conservation measures would be dispersed over a larger geographic area and would generally involve substantially fewer construction and operation effects than those associated with built facilities.

It is reasonable to assume that other past, present and reasonably foreseeable future projects, including habitat restoration and enhancement projects (e.g., the Dutch Slough Tidal Marsh Restoration Project, and the San Joaquin River Restoration Project), as identified in Table 5.2.2.20-1, Table 24-7 and Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions*, would have similar, potentially hazardous effects. Combined effects of the BDCP and other projects would be cumulatively adverse. Due to the large geographic scale and range of hazard risks involved in conservation measures or environmental commitments, the incremental contribution of implementing these actions to the cumulative adverse effects of other projects would be cumulatively considerable and, as such, this would be an adverse cumulative effect.

However, the proposed action alternatives incorporate environmental commitments and Mitigation Measures HAZ-1a, HAZ-1b, HAZ-8, UT-6a, UT-6c, and TRANS-1a, as described under Impact HAZ-7 for Alternative 1A and in Appendix 3B, *Environmental Commitments* that would reduce BDCP's incremental contribution to adverse cumulative effects in the study area. Similarly, it is reasonable to assume that BMPs like the ones described previously (e.g., SWPPPs, SPCCPs, SAPs, and HMMPs) to minimize, avoid, and reduce effects related to hazards and hazardous materials would be incorporated into other projects within the study area, thereby further reducing the potential for cumulative effects related to hazards and hazardous materials in the study area. Therefore, there would be no cumulative adverse effect.

***CEQA Conclusion*:** The potential for cumulative impacts related to the release and exposure of workers and the public to hazardous substances or conditions during construction, operation, and maintenance of BDCP conservation measures, and restoration and enhancement environmental commitments under Alternatives 4A, 2D, and 5A, is considered cumulatively considerable, and therefore significant. Implementation of the conservation measures under all action alternatives except Alternatives 4A, 2D, and 5A,as well as implementation of the restoration/enhancement environmental commitments under Alternatives 4A, 2D, and 5A, would involve extensive use of heavy equipment and/or the use of chemicals during operations and maintenance (e.g., herbicides for nonnative vegetation control) that could unintentionally result in the release of hazardous substances or that could expose construction workers or members of the public to hazards. Expanded or improved wildlife habitat could increase the risk of bird-aircraft strikes, a hazard to air and public safety. However, the project proponents have incorporated environmental commitments and would implement Mitigation Measures HAZ-1a, HAZ-1b, HAZ-8, UT-6a, UT-6c, and TRANS-1a, which would reduce the incremental contribution of the BDCP to cumulative hazard-related impacts in the study area such that it would be less than cumulatively considerable (i.e., less than significant).

5.2.4.20 Public Health

The following section provides an update to the public health cumulative impact analysis in the Draft EIR/EIS Chapter 25, *Public Health*. This section considers additional projects (Table 5.2.2.21-1) not previously included in the Draft EIR/EIS cumulative analysis, as well as those previously considered, which are identified in Table 25-11. For a complete list of plans, policies, programs and

projects considered, see Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*. These projects would have the potential to affect public health in the study area. This cumulative analysis also considers potential cumulative effects/impacts associated with Alternative 4A, 2D, and 5A.

Table 5.2.2.21-1. Effects on Public Health from the Plans, Policies, and Programs Considered for Cumulative Analysis

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
California Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	EIR certified in 2010, project is ongoing.	The Dutch Slough Tidal Marsh Restoration Project, located near Oakley in Eastern Contra Costa County, would restore wetland and uplands, and provide public access to the 1,166-acre Dutch Slough property owned DWR. The property is composed of three parcels separated by narrow man-made sloughs.	Reduce levels of mosquito production relative to Existing Conditions in areas where seasonal wetland areas and unmanaged nontidal freshwater marsh are reduced. Increase mosquito production as a result of non-tidal open water management options, which would increase exposure of humans to mosquitoes and potentially vector-borne diseases. Potential incremental increase in methylmercury formation and contribution to Delta load.
California Natural Resources Agency, Cal/EPA, and California Department of Food and Agriculture	California Water Action Plan	Ongoing and future	Identifies key actions for the next one to five years that address urgent needs and provide the foundation for the sustainable management of California's water resources.	Actions implemented may affect seasonal and long-term water quality conditions in the Delta.
State Water Resources Control Board	Bay-Delta Water Quality Control Plan Update	Ongoing and future	The State Water Board is updating the Bay-Delta Water Quality Control Plan in four phases: Phase I: Modifying water quality objectives (i.e., establishing minimum flows) on the Lower San Joaquin River and Stanislaus, Tuolumne, and Merced Rivers to protect the beneficial use of fish and wildlife and (2) modifying the water quality objectives in the southern Delta to protect the beneficial use of agriculture; Phase II: Evaluating and potentially amending existing water quality objectives that protect beneficial uses and the	To the extent that modifications in surface water flow patterns, increase minimum instream flows, and increase minimum Delta outflows, this would benefit water quality in the Delta.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
			program of implementation to achieve those objectives. Water quality objectives that could be amended include Delta outflow criteria; Phase III: Requires a water rights proceeding to determine changes to existing water rights to achieve the objectives identified in Phase I and Phase II. Phase III will likely not occur until after Phase IV is complete or close to complete; Phase IV: Evaluating and potentially establishing water quality criteria and flow objectives that protect beneficial uses on tributaries to the Sacramento River.	
U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Services, Department of Water Resources, and Department of Fish and Wildlife	San Joaquin River Restoration Program	Final EIS/EIR and Record of Decision completed in 2011.	Program that aims at restoring flows to the San Joaquin River from Friant Dam to the confluence of Merced River (Bureau of Reclamation 2011).	The impact analysis in the EIS/EIR indicated that the program would entail construction and other restoration activities in the area located along the San Joaquin River between Friant Dam and the Merced River, which includes areas with an increased risk of exposure to West Nile virus in wetted portions of the San Joaquin River that provide mosquito habitat. In addition, The reoperation of Friant Dam would increase water volume and change the timing of water flows in the San Joaquin River. These changes could affect public health by increasing the amount of freestanding water, which could increase the amount of mosquito habitat and exposure to diseases.

Agency	Program/ Project	Status	Description of Program/Project	Effects on Public Health
U.S. Bureau of Reclamation, Department of Water Resources, and State Water Resources Control Board	Drought Contingency Plan (includes Emergency Drought Barriers project)	Completed for 2015; reasonably forseeable to occur in future years with drought.	Modification of Bay-Delta Water Quality Objectives (e.g., Delta outflow and electrical conductivity requirements) and requirements from 2008/2009 SWP/CVP BiOps to balance supplying human needs, repelling saltwater in the Delta, and providing for cold water needs of Chinook salmon.	Reduced Delta outflow may increase the potential for negative effects from flow-related stressors (e.g., *Microcystis*).
Semitropic Water Storage District	Delta Wetlands Project	Semitropic Water Storage District issued a Draft EIR in 2010 and a Final EIR in 2012.	Under the current proposal, the project would: 1) provide water to Semitropic Water Storage District to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company.	Increased levels of mosquito production on reservoir and habitat islands during certain times of the year.

Impact PH-10: Cumulative Impact on Public Health from Constituents of Concern (DBPs and Pesticides)

NEPA Effects:

Alternatives 1A–1C, 2A–2C, 2D, 3, 4, 4A 5, 5A, 6A–6C, 7, 8, and 9 (Pesticides)

Currently, other projects that could affect drinking water include the projects listed in Table 5.2.2.21-1 and Table 25-11. These projects may result in changes to flow in the Plan Area and thus could alter surface water pesticide concentrations in the study area. While factors such as TMDLs and future development of more target-specific and less-toxic pesticides would ultimately influence the future cumulative condition for pesticides, forecasting whether these various efforts would ultimately be successful at resolving current pesticide-related impairments requires considerable speculation. Accordingly, it is conservatively assumed that the cumulative condition would be adverse with respect to pesticides. Construction and operation of the water conveyance facilities for Alternatives 1A–1C, 4A, 2D, and 5A are not expected to contribute considerably to the adverse cumulative condition associated with increases in pesticide concentrations in surface water and, consequently, in drinking water. Further, although there would be forecasted increases in pesticide concentrations in surface water at various Delta locations in the study area, according to modeling results for water supply operations for some proposed BDCP action alternatives (as previously indicated under Impact PH-2 for Alternatives 2A–2C, 3–5, 6A–6C, and 7–9), the prediction of adverse effects (the long-term risk of pesticide-related toxicity to aquatic life) fundamentally assumes that the present pattern of pesticide incidence in surface water would continue at similar levels into the future. In reality the makeup and character of the pesticide use market during the late long-term

would not be exactly as it is today. Use of chlorpyrifos and diazinon is on the decline with their replacement by pyrethroids on the rise. Yet, in this assessment it is the apparent greater incidence of diazinon and chlorpyrifos in the San Joaquin River that serves as the basis for concluding that substantially increased San Joaquin River source water fraction would correspond to an increased risk of pesticide-related toxicity to aquatic life. However, drinking water from the study area would continue to be treated prior to distribution into the drinking water system, and water treatment plants are required to meet drinking water requirements set forth in the California Safe Drinking Water Act and the regulations adopted by CDPH. Therefore, it is not anticipated that there would be a cumulatively considerable contribution to cumulative adverse effects on public health from pesticides in drinking water due to implementation of BDCP action alternatives; nor would implementation of the BDCP action alternatives in combination with any of the projects listed in Table 25-11 be expected to result in a cumulative adverse effect on public health with regards to pesticides in drinking water in the study area.

Alternatives 1A–1C, 2A–2C, 3, 4, 5, 6A–6C, 7, 8, and 9 (DBPs [from increases in bromide concentrations])

Currently, other projects that could affect concentrations of constituents of concern in drinking water include the projects listed in Table 25-11. These projects may result in changes to flow in the study area and thus could alter DBP concentrations (from increases in bromide concentrations in surface water drinking sources). The BDCP action alternatives are anticipated to result in the potential for public health concerns because the changes in flow associated with the water conveyance facilities operations would increase the concentrations of bromide at various modeled Delta locations, with the greatest increase projected to occur at the North Bay Aqueduct at Barker Slough. This increase could necessitate drinking water treatment plant upgrades or operational changes in order to maintain DBP compliance. While treatment technologies sufficient to achieve the necessary bromide removal exist, implementation of such technologies would likely require substantial investment in new or modified infrastructure. Should treatment plant upgrades not be undertaken, a change of such magnitude in long-term average bromide concentrations in drinking water sources would represent an increased risk for adverse effects on public health from DBP in drinking water sources. Implementation of Mitigation Measure WQ-5 would reduce the severity of this impact. The proposed mitigation requires a series of phased actions to identify and evaluate existing and possible feasible actions to avoid, minimize, or offset increased bromide concentrations, followed by development and implementation of the actions, if determined to be necessary. Further, as described for Impact PH-2 under Alternative 1A, the adverse water quality effects on the North Bay Aqueduct at Barker Slough may be further minimized by implementation of the AIP. However, when these potential effects of the BDCP on public health are considered in combination with the potential effects of projects listed in Table 25-11 and in Appendix 3D, *Defining Existing Conditions, the No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, the effects of these action alternatives would be cumulatively considerable and therefore there would be a cumulative adverse effect on public health due to DBPs.

Alternatives 4A, 2D, and 5A (DBPs [from increases in DOC and bromide concentrations])

Currently, other past, present, and probably future projects that could affect concentrations of constituents of concern in drinking water include the projects listed in Table 5.2.2.21-1 and Table 25-11. These projects may result in changes to flow in the study area and thus could alter DBP concentrations (from increases in bromide and DOC concentrations in surface water drinking sources). In addition, the Delta is currently known to have elevated DOC levels exceeding standards,

the cumulative condition generated from past and present projects is already considered adverse. However, neither habitat restoration and enhancement activities or construction, operation, and maintenance of the water conveyance facilities under Alternatives 4A, 2D, and 5A is expected to make a considerable adverse contribution to existing and future DOC levels in the Delta. The areal extent and magnitude of habitat restoration under these alternatives is considerably less than under the other action alternatives and therefore the contribution to existing DOC would be relatively low. In addition, as indicated in the water quality analysis (Sections 4.3.4, 4.4.4, and 4.5.4 of this RDEIR/SDEIS), bromide would not increase substantially in drinking water sources in the study area. Therefore, Alternatives 4A, 2D, and 5A are not expected to make a cumulatively considerable contribution to bromide concentrations in drinking water sources in the study area. Accordingly, there would not be cumulative adverse effect on public health from increases in DBPs in drinking water sources in the study area.

***CEQA Conclusion*:** Operation of the water conveyance facilities and implementation of restoration and enhancement activities in the study area under Alternatives 4A, 2D, and 5A would not substantially increase DOC and bromide levels, and therefore DBPs, in drinking water sources in the study area. There would be considerably fewer acres of habitat restoration under this alternative relative to the other action alternatives. Further, hydrodynamic changes under Alternative 4A would not substantially increase bromide concentrations in drinking water sources in the study area. Therefore, Alternative 4A is not expected to make a significant incremental contribution to bromide concentrations in drinking water sources in the study area. Accordingly, impacts on public health from increases in DBPs in drinking water sources in the study area would be less than cumulatively considerable (i.e., less than significant).

Alternatives 6A–C, 7, 8, and 9 (DBPs [from increases in DOC concentrations])

Currently, other projects that could affect drinking water include the projects listed in Table 25-11. These projects may result in changes to flow in the study area and thus could alter DOC/DBP concentrations in the study area. Furthermore, since the Bay-Delta is currently known to have elevated DOC levels exceeding standards, the cumulative condition generated from past and present projects is already considered adverse.

Alternatives 6A–6C and 7–9 could have substantially adverse effects on public health associated with DBPs in drinking water as a result of increases in DOC concentrations at certain Delta locations. Operation of the water conveyance facilities under these alternatives would result in increased DOC levels at Franks Tract, Rock Slough and Contra Costa Pumping Plant No. 1. Under these alternatives, long-term average DOC concentration could increase by up to 41%, relative to the No Action Alternative. This increase could necessitate drinking water treatment plant upgrades or operational changes in order to maintain DBP compliance. Thus, the DOC contributions at Franks Tract, Rock Slough, and Contra Costa Pumping Plant No. 1 from these proposed BDCP action alternatives are determined to contribute considerably to the adverse cumulative condition for DOC in the Delta and potentially DBPs in drinking water, which could result in an adverse effect on public health. While Mitigation Measure WQ-17 is available to reduce impacts associated with DOC, it is unknown whether it would reduce potential adverse effects entirely. Therefore, the contribution of Alternatives 6A–C and 7–9 to the cumulative DOC-related public health effects would be cumulatively considerable, and there would be a cumulative adverse effect.

***CEQA Conclusion*:** Operation of cumulative projects within the Delta could result in cumulative impacts on public health related to increases in DBPs in drinking water. DOC concentrations could

increase by up to 46% at Franks Tract, Rock Slough and Contra Costa Pumping Plant No. 1 relative to Existing Conditions under Alternatives 6A–6C and 7–9. This cumulative impact is considered significant and the incremental contribution from the BDCP action alternatives discussed would be cumulatively considerable. Mitigation Measure WQ-5 is available to reduce these effects (implementation of this measure along with a separate, non-environmental commitment as set forth in EIR/EIS Appendix 3B, *Environmental Commitments*, relating to the potential increased treatment costs associated with bromide-related changes would reduce these effects). While Mitigation Measures WQ-5 and implementation of the AIP may reduce impacts associated with increase bromide concentrations at Barker Slough, and Mitigation Measure WQ-17 may reduce impacts associated with DOC, it is unknown to what level of reduction (i.e., below significance).

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

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

Please see Mitigation Measure WQ-5 under Impact PH-2 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

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

Please see Mitigation Measure WQ-17 under Impact PH-2 in the discussion of Alternative 6A in Chapter 8, *Water Quality*, of the Draft EIR/EIS.

Impact PH-11: Cumulative Impact from Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate as a Result of Construction, Operation or Maintenance

of the Water Conveyance Facilities or as a Result of Implementing the Restoration Conservation Measures or Environmental Commitments

NEPA Effects:

Alternatives 1A–4, 5, 4A, 2D, and 5A

Numerous regulatory efforts have been implemented to control and reduce mercury loading to the Delta, which include a Delta mercury TMDL and its implementation strategies, increased restrictions on point-source discharges such as publically owned treatment works (POTWs), greater restrictions on suction dredging in Delta tributary watersheds, and continued clean-up actions on mine drainage in the upper watersheds. A key challenge surrounds the pool of mercury deposited in the sediments of the Delta, which cannot be readily or rapidly reduced despite efforts to reduce loads in Delta tributaries, and which serves as a source for continued methylation and bioaccumulation of methylmercury by Delta biota. Consequently, mercury levels in Delta waters are considered to be an adverse cumulative condition.

Projects shown in Table 25-11 could affect constituents known to bioaccumulate, such as methylmercury. These projects are not anticipated to substantially increase methylmercury concentrations in the study area because they are not anticipated to have actions that would mobilize such a constituent. Once operational, the habitat restoration projects could result in an increase of methylmercury in the study area as a result of biogeochemical processes and sediment conditions established in tidal wetlands. However, it is expected these projects either have evaluated or would evaluate the potential for methylmercury production and would implement measures to monitor and adaptively manage methylmercury production. For example, the Suisun Marsh Plan EIR/EIS evaluated the potential for methylmercury production due to tidal restoration and determined it would result in less-than-significant impacts and that monitoring and other measures would be incorporated into the adaptive management plan to manage methylmercury concerns. Therefore, the habitat restoration projects that would occur under the No Action Alternative are not likely to adversely affect public health. However, because the existing condition is already considered cumulatively adverse, the cumulative effect of these tidal restoration projects would be considered adverse.

Based on water quality modeling results, water conveyance facilities operation and maintenance (CM1) for Alternatives 1A–5, and Alternatives 4A, 2D, and 5A would not be expected to substantially alter the existing adverse cumulative condition for mercury and the mercury impairment in the Delta. However, implementation of the following conservation measures and Environmental Commitments for the identified alternatives could create conditions resulting in increased methylation of mercury within the Delta per unit time, increased biotic exposure to and uptake of methylmercury, and result in increased mercury bioaccumulation in fish tissues.

- Tidal wetland restoration: CM4 (Alternatives 1A–5) and Environmental Commitment 4 (Alternatives 4A, 2D, and 5A)
- Nontidal marsh restoration: CM10 (Alternatives 1A–5) and Environmental Commitment 10 (Alternatives 4A, 2D, and 5A)
- Floodplain restoration: CM5 (Alternatives 1A–5)
- Yolo Bypass fisheries enhancement: CM2 (Alternatives 1A–5)

Although the amount of habitat restoration to be implemented for the Environmental Commitments of Alternatives 4A, 2D, and 5A would be relatively small compared to the areal extent of the Delta and compared to Alternatives 1A–5. However, implementation of tidal habitat restoration under all of these action alternatives would be expected to contribute considerably to methylation of mercury at certain localized areas within the Delta (i.e., where the aquatic restoration areas are planned).

As detailed below, design of habitat restoration sites for Alternatives 4A, 2D, and 5A would be guided by Environmental Commitment 12, *Methylmercury Management,* and design of habitat restoration sites for Alternatives 1A–5 would similarly be guided by CM12, *Methylmercury Management,* both of which require development of site-specific mercury management plans as restoration actions are implemented. In addition, existing OEHHA standards would reduce the public's exposure to mercury-contaminated fish.

The effectiveness of minimization and mitigation actions implemented according to the mercury management plans is not known at this time, although the potential to reduce methylmercury concentrations exists based on current research. Although Environmental Commitment 12 and CM12 would be implemented with the goal to reduce this potential effect, the uncertainties related to site-specific restoration conditions and the potential for increases in methylmercury concentrations in the Delta could contribute substantially to the cumulative condition for mercury in the Delta.

Thus, the incremental contribution of implementing CM4, CM5, and CM10, and possibly CM2 for Alternatives 1A–5 and Environmental Commitments 4 and 10 for Alternatives 4A, 2D, and 5A in combination with projects shown in Table 5.2.2.21-1 and Table 25-11 could make a considerable incremental contribution to methylation of mercury in these restored wetland habitats and to the existing cumulative condition for mercury in the Delta. Because the existing condition is already considered cumulatively adverse, the cumulative effect would be adverse.

Alternatives 6A–C and 7–9

Water quality modeling results for Alternatives 6A–C and 7–9 water supply operations indicate that there may be small, insignificant increases in waterborne mercury and methylmercury concentrations at various modeled Delta locations within the study area; these increases are not expected to substantially alter the existing adverse cumulative condition for mercury and the mercury impairment in the Delta. Therefore, the incremental contribution to the existing adverse cumulative condition for waterborne mercury in the study area would not be considered adverse.

However, under Alternatives 6A–6C and 7–9, modeling results indicated that water supply operations would result in substantial increases in fish tissue mercury concentrations at certain Delta locations (see Impact PH-3 for Alternatives 6A–6C and 7–9) relative to the No Action Alternative. Thus, body burdens of mercury in fish would be measurably higher, and could thereby substantially increase the health risks to people consuming those fish. The incremental contribution of operating the water conveyance facilities under these action alternatives to increasing fish tissue mercury concentrations in fish, and thus contributing to potential public health effects from mercury bioaccumulation in the study area is considered cumulatively considerable and cumulatively adverse.

Further, as would occur for implementation of Alternatives 1A–5 (including Alternative 4A), implementation of CM4 (tidal wetland habitat), CM5 (floodplain habitat), CM10 (nontidal marsh habitat), and possibly CM2 (Yolo Bypass fisheries enhancements) could create conditions resulting

in increased methylation of mercury within the Delta per unit time, increased biotic exposure to and uptake of methylmercury, and result in increased mercury bioaccumulation in fish tissues. The incremental contribution of implementing these conservation measures in combination with projects shown in Table 5.2.2.21-1 and Table 25-11 could make a cumulatively considerable contribution to methylation of mercury in these restored wetland habitats and to the existing cumulative condition for mercury in the Delta. Because the baseline condition is already considered cumulatively adverse, the cumulative effect would be adverse.

***CEQA Conclusion*:** Water conveyance facilities operations and maintenance under Alternatives 1A–9 would not be expected to substantially alter the existing adverse cumulative condition for mercury and the Delta's mercury impairment. However, water quality modeling results indicate that water supply operations for Alternatives 6A–6C and 7–9 would result in substantial increases in fish tissue mercury concentrations at certain Delta locations. Additionally, implementing CM4, CM5, CM10, and possibly CM2 as part of Alternatives 1A-9, and Environmental Commitments 4 and 10 as part of Alternatives 4A, 2D, and 5A could create conditions resulting in increased methylation of mercury within the Delta per unit time, increased biotic exposure to and uptake of methylmercury, and result in increased mercury bioaccumulation in fish tissues. These potential increases in the bioaccumulation of mercury by fish in the study area could increase the health risks to people consuming those fish. As such, the incremental contribution of the BDCP action alternatives to the cumulative impact would be significant. Therefore, there would be a cumulatively considerable (i.e., significant) impact on public health due to increased body burdens of mercury in fish as a result of implementing the BDCP action alternatives.

To help reduce the severity of this impact design and implementation of wetland, floodplain, tidal and nontidal habitat shall conform to the relevant requirements of the Delta Mercury Control Strategy of the Central Valley Water Board Basin Plan. Requirements of the Delta Mercury Control Strategy include the following.

- Required participation in efforts to evaluate and minimize health risk associated with eating mercury contaminated fish.
- Required participation in monitoring methylmercury loading from wetlands.
- Implementation of appropriate and site-specific methylmercury control measures.

Appropriate methylmercury control measures shall be developed at the time of formal restoration planning and design. All practicable measures (i.e., those that are both feasible and reasonable from a cost-benefit perspective) to reduce methylmercury formation shall be considered for implementation. As part of CM12 and Environmental Commitment 12, appropriate strategies and control measures to minimize the production of methylmercury in restored tidal wetland areas will promote the following actions.

- Assessment of pre-restoration conditions to determine the risk that the project could result in increased mercury methylation and bioavailability
- Definition of design elements that minimize conditions conducive to generation of methylmercury in restored areas
- Definition of adaptive management strategies that can be implemented to monitor and minimize actual postrestoration creation and mobilization of methylmercury into environmental media and biota

Implementation of Environmental Commitment 12 would be consistent with the revised description of CM12 (see Appendix D, *Substantive BDCP Revisions*, of this RDEIR/SDEIS). Development and implementation of this environmental commitment would be done in coordination with the *Sacramento-San Joaquin Delta Methylmercury Total Maximum Daily Load* (Methylmercury TMDL) and *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin Delta Estuary* (Mercury Basin Plan Amendments)(Central Valley Regional Water Quality Control Board 2010, 2011).

The methylmercury control measures implemented under CM12 and Environmental Commitment 12 may not completely eliminate the contributions identified to the adverse cumulative water quality conditions, but would be expected to lessen the contributions to the degree feasible. Hence, some level of contribution to adverse cumulative conditions is anticipated to remain after mitigation, and therefore this impact would remain cumulatively considerable.

Impact PH-12: Cumulative Impact on Public Health from Construction, Operation or Maintenance of the BDCP Alternatives with Respect to Pathogens, Trace Metals, Vectors, and EMFs

***NEPA Effects*:** When the effects of implementing any one of the Alternatives 1A–9, 4A, 2D, and 5A on pathogens and trace metals (including the new water conveyance facilities, fish screens, gates, and other physical structures and their operations and maintenance activities) are considered together with the potential effects of projects listed in Table 5.2.2.21-1 and Table 25-11, as well as in Appendix 3D, *Defining Existing Conditions*, *the No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, the cumulative water quality condition in the study area for the pathogens and trace metals is not considered to be adverse. Primary sources of trace metals to Delta waters include acid mine drainage (e.g., zinc, cadmium, copper, lead) from abandoned and inactive mines (i.e., Iron Mountain and Spring Creek mines) in the Shasta watershed area, which enter the Sacramento River system through Shasta Lake and Keswick Reservoir; agriculture (e.g., copper and zinc); POTW discharges (e.g., copper, zinc, and aluminum); and urban runoff (e.g., zinc, copper, lead, cadmium). Continued efforts to control acid mine drainage into the Sacramento River system and increasingly stringent regulations are expected in the future. Monitoring and regulatory controls on agricultural runoff, POTW discharges, and urban runoff are anticipated to prevent trace metal concentration under the cumulative condition from becoming adverse.

There are numerous potential sources of disease-causing pathogens in the Delta, including urban runoff, wastewater treatment discharges, agricultural discharges, and wetlands. Tidal wetland creation, which would occur under several of the cumulative projects and the action alternatives, could encourage increased coliform presence because of the aquatic, terrestrial, and avian wildlife that would be drawn to these areas. However, the localized nature of pathogen generation and the quick die-off of pathogens once released into water bodies would generally prevent substantial pathogen exposure to recreationists and the cumulative effect would not be considerable or adverse. Accordingly, the incremental contribution of the action alternatives would not be cumulatively considerable.

Although the cumulative projects could result in an increase in potential mosquito habitat (e.g., more standing shallow water), vector habitat is already present in the study area and programs to prevent mosquitoes from breeding and multiplying are in place. With any action alternative, implementation of environmental commitments, such as coordination with MVCDs and

implementation of BMPs under MMPs (as described under Impact PH-1 for Alternative 1A and in Appendix 3B), would help control mosquitoes and reduce the potential for an increase in mosquito breeding habitat, and a cumulatively considerable increase in vector-borne diseases is unlikely to result. Furthermore, mosquito predators would likely increase as a result of restoration and enhancement actions undertaken for the cumulative projects, including the action alternatives. Therefore an action alternative's incremental impacts associated with vectors would not be cumulatively considerable or adverse.

Past, present and reasonably foreseeable future projects have resulted in the development and operation of transmission lines in the study area that expose existing populations and sensitive receptors to EMFs. Although existing populations and sensitive receptors are exposed to EMFs, it is not considered a cumulatively considerable condition because current scientific evidence does not show conclusively that EMF exposure can increase health risks. Design and implementation of new temporary or permanent transmission lines under BDCP alternatives will incorporate CPUC's EMF Design Guidelines if feasible, which includes shielding, cancelation, and measures to reduce EMF exposure. Accordingly, although BDCP alternatives (except for Alternative 9) would have new EMF-generating facilities, they would not be a cumulatively considerable incremental contribution. There would not be a cumulative or adverse effect with respect to an increase in public exposure to EMFs.

***CEQA Conclusion*:** Construction, and operation and maintenance of the action alternatives would not result in a significant incremental contribution to pathogens, trace metals, vectors, or EMFs in the study area. In combination with other past, present, and reasonably foreseeable future within the Delta, these alternatives would not result in cumulative impacts on public health related to pathogens, trace metals, disease vectors, or electromagnetic fields. This cumulative impact would be less than cumulatively considerable (i.e., less than significant).

Impact PH-13: Cumulative Impact on Public Health due to Increases in *Microcystis* Bloom Formation as a Result of Operation of the Water Conveyance Facilities and Implementation of CM2 and CM4 or Environmental Commitment 4

***NEPA Effects*:** Neither operation of the water conveyance facilities or implementation of CM2 and CM4 (Alternatives 1A–9) or Environmental Commitment 4 (Alternatives 4A, 2D, and 5A) would be expected to promote *Microcystis* bloom formation in the reservoirs and watersheds upstream of the Delta. *Microcystis* blooms in the Export Service Areas could increase due to increased water temperatures resulting from climate change, but not due to water conveyance facility operations. Hydraulic residence times in the Export Service Area would not be affected by operations of CM1, and therefore conditions in those areas would not be more conducive to *Microcystis* bloom formation. Water exported from the Delta to the Export Service Area is expected to be a mixture of *Microcystis*-affected source water from the south Delta intakes and unaffected source water from the Sacramento River for all action alternatives except Alternatives 6A–6C. It cannot be determined whether operations and maintenance under Alternative 5 will result in increased or decreased levels of *Microcystis* and microcystins in the mixture of source waters exported from Banks and Jones pumping plants.

Operation of the water conveyance facilities, as well as implementation of CM2 and CM4 under Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A, would increase hydraulic residence time during the summer period in the Delta relative to the No Action Alternative. As described in Chapter 8, *Water Quality*, (Appendix A of this RDEIR/SDEIS) the changes in hydraulic residence time are driven by a number of factors accounted for in the modeling, including the

hydrodynamic effects of restoration actions planned under CM2 and CM4, diversion of Sacramento River water at the proposed north Delta intake facility, as well as changes in net Delta outflows. To the extent that restoration actions alter hydrodynamics within the Delta region, which affects mixing of source waters, these effects are included in this assessment of operations-related changes of water residence times and its effects on *Microcystis* production. Thus, siting and design of restoration areas would have a substantial influence on the magnitude of residence time increases that would occur under all Action Alternatives 1A–9. Water temperatures in the Delta are projected to increase with implementation of Alternatives 1A–9. However, this increase is not different from the No Action Alternative and would therefore be due to climate change alone. Regardless, increased water temperatures in the Delta could potentially lead to earlier attainment of the water temperature threshold of 19°C required to initiate *Microcystis* bloom formation. In addition, warmer water temperatures could increase bloom duration and magnitude.

Restoration activities implemented under CM2 and CM4 that would create shallow backwater areas could result in local increases in water temperature that may encourage *Microcystis* growth during the summer bloom season. This would result in further degradation of water quality beyond the hydrodynamic effects of CM2 and CM4 on *Microcystis*. An increase in *Microcystis* blooms with implementation of CM2 and CM4 could potentially result in adverse effects on public health through exposure via drinking water quality and recreational waters.

As indicated in the Water Quality sections of this RDEIR/SDEIS (Sections 4.3.4, 4.44, and 4.54), there was not modeling available that adequately accounted for the effects of operation of the water conveyance facilities and the hydrodynamic impacts of the environmental commitments on long-term average residence times in the Delta for Alternatives 4A, 2D, and 5A. Accordingly, for these alternatives the hydrodynamic effects on *Microcystis* were determined qualitatively and the effects discussed for the Delta are related entirely to operations and maintenance and not the hydrodynamic effects of the restoration actions. Although there is uncertainty, water supply operations under Alternatives 4A, 2D, and 5A are not expected to increase water residence times or ambient water temperatures throughout the Delta, and therefore Delta waters are not expected to be adversely affected by *Microcystis* blooms. Enhancement of the Yolo Bypass (CM2) would not occur as part of Alternatives 4A, 2D, and 5A, and Environmental Commitment 4 would have negligible effect on creating conditions conducive to *Microcystis* bloom formation in the study area. However, improvements in the Yolo Bypass, as well as restoration of 8,000 acres of tidal habitat, would be implemented under a plan separate and distinct from Alternative 4A, 2D, and 5A. Climate change is also expected to increase hydraulic residence times in the Delta, but that change is expected to be small. Longer hydraulic residence times could potentially result in increases in *Microcystis* blooms in the Delta and adversely affect beneficial uses, including drinking water and recreational waters, which could adversely affect public health as a consequence.

Therefore, the effects on hydraulic residence time in the Delta of operating the water conveyance facilities under Alternatives 1A–9 relative to the No Action Alternative, as well as the effects of implementing CM2 and CM4, could result in an adverse effect on public health due to the potential adverse effects of *Microcystis* and microcystin on beneficial uses, including drinking water and recreational waters. As such, there would be an adverse effect on public health. Mitigation Measures WQ-32a and WQ-32b may reduce the combined effect on *Microcystis* from increased local water temperatures and water residence time. However, the effectiveness of these mitigation measures to result in feasible measures for reducing water quality effects, and therefore potential public health effects, is uncertain. Other past, present, and probable future projects and programs in the region (identified in Table 5.2.2.21-1, Table 25-11 and Appendix 3D) that could contribute to lower flows

and longer hydraulic residence times and water temperatures conducive to *Microcystis* blooms. The predicted increase in *Microcystis* blooms in the Delta as a result of operation of the water conveyance facilities and implementation of CM2 and CM4 under all action alternatives except Alternative 4A would be cumulatively considerable. Accordingly, there would be a cumulative adverse effect on public health as a result of increasing *Microcystis* blooms and microcystin levels in the Delta.

***CEQA Conclusion*:** Although there is uncertainty, water supply operations under Alternatives 4A, 2D, and 5A are not expected to increase water residence times or ambient water temperatures throughout the Delta, and therefore Delta waters are not expected to be adversely affected by *Microcystis* blooms. Implementation of Environmental Commitment 4 under Alternatives 4A, 2D, and 5A is not expected to contribute substantially to conditions conducive to *Microcystis* blooms because the area of restoration would be so small as to have no effect on through-Delta residence time or water temperature. Climate change would contribute to increased hydraulic residence times in small part only.

Modeling results indicate that water temperatures and hydraulic residence times in the Delta would increase under Alternatives 1A–9 relative to Existing Conditions. However, the water temperature increases in the Delta would be due to climate change primarily and not due to operation of the water conveyance facilities. Restoration activities implemented under CM2 and CM4 that create shallow backwater areas could result in local increases in water temperature conducive to *Microcystis* growth during summer bloom season. This could compound the water quality degradation that may result from the hydrodynamic impacts from CM2 and CM4. Under Alternatives 1A–9, the operation of the water conveyance facilities and implementation of CM2 and CM4 would increase hydraulic residence times in the Delta such that conditions would be favorable to *Microcystis* blooms, and therefore microcystin, throughout the area. Accordingly, beneficial uses including drinking water and recreational waters would be impacted and, as a result, so would public health. The incremental contribution of operation water conveyance facilities and implementation of CM2 and CM4 to the cumulative effect on public health related to *Microcystis* under Alternatives 1A–9 would be significant and therefore this impact is cumulatively considerable (i.e., significant).

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

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

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

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

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

5.2.4.21 Minerals

Since the time of the Draft EIR/EIS notice of preparation (NOP) in 2009, additional projects that could combine with the action alternatives to contribute to cumulative impacts on mineral resources are known to be reasonably foreseeable or probable. The list of projects included in the Draft EIR/EIS Table 26-9 is amended to include the additional projects shown in Table 5.2.2.22-1 below. These projects were added because they would involve land disturbing activities and may result in restricted access when completed. These additional cumulative projects are considered in combination with the projects included in Draft EIR/EIS Table 26-9. In addition, Alternatives 4A, 2D, and 5A have been added. Alternative 4A includes the same water conveyance features as Alternative 4 but substantially less land would be used for implementing environmental commitments. The footprint of Alternative 2D would be slightly greater than Alternative 4 as it includes two additional intakes and the footprint of Alternative 5A would be slightly less than Alternative 4 as it includes only a single intake. The total land area required for purposes of implementing environmental commitments would be similar between Alternatives 4A, 2D, and 5A.

Table 5.2.2.22-1. Effects on Mineral Resources from Additional Programs and Projects Considered for Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Mineral Resources
DWR	Cache Slough Area Restoration	Currently under study	Restoration of lands within the Cache Slough Complex located in the Delta	The project could reduce access to natural gas wells and aggregate resources. This project is examined under Alternatives 1A–4 and 5–9 of the BDCP.
DWR and Solano County Water Agency	North Bay Aqueduct Alternative Project	Currently under study	Extending the North Bay Aqueduct to the Sacramento River.	The project could reduce access to natural gas wells and aggregate resources
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Minor effects on mineral resources.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Minor effects on mineral resources.

Impact MIN-13: Cumulative Loss of Natural Gas Production from Construction, Operation, and Implementation of CM1–CM21

NEPA Effects: Construction of water conveyance facilities and implementing other conservation measures would result in an adverse effect on natural gas production by restricting access to some within the Plan Area that actively produce natural gas. In addition to the projects listed in Table 26-9, other projects within the Plan Area when implemented would also contribute to the loss of these natural gas resources by further restricting access to natural gas fields and ultimately affecting extraction of the resource. The combined effect of each alternative with the projects listed in Table 26-9 and Table 5.2.2.22-1 would result in an adverse effect on natural gas resources even with the implementing mitigation measures. Although Alternatives 4A, 2D, and 5A would result in fewer acres converted to meet environmental commitments, the combined effect of these alternatives with other projects would also be considered adverse. Mitigation Measures MIN-5 and MIN-6 would be available to reduce the effects attributable to Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A.

***CEQA Conclusion*:** Constructing the water conveyance facilities and implementing restoration measures would result in a significant impact of natural gas resources within the Plan Area. Access to sites that contain recoverable amounts of natural gas could be restricted as a result of restoring habitat. This impact would be exacerbated when combined with the other projects in the Plan Area as summarized in Table 26-9 and Table 5.2.2.22-1. The impact each action alternative would make on natural gas resources would be cumulatively considerable because of the large land area that would restored and the potential for limiting access to the these lands for purpose of recovering natural gas.

Implementing Mitigation Measures MIN-5 and MIN-6 would reduce the impact on natural gas resources, but not to a less-than-significant level. The mitigation measures cannot assure that all or a substantial portion of the existing natural gas wells or fields will remain accessible after implementation of the alternatives.

Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Impact MIN-14: Cumulative Loss of Aggregate from Construction, Operation, and Implementation of CM1–CM22

NEPA Effects: Construction of water conveyance facilities and implementing other conservation measures would result in an adverse effect on aggregate resources by restricting access to deposits. In addition to the projects listed in Table 26-9, other projects within the Plan Area when implemented would also contribute to the loss of aggregate resources by further restricting access to these deposits. Although Alternatives 4A, 2D, and 5A would result in fewer acres converted to

meet environmental commitments, the combined effect of these alternatives with other projects would also be considered adverse. The combined effect of each alternative with the projects listed in Table 26-9 and Table 5.2.2.22-1 would result in an adverse effect on aggregate resources even when implementing mitigation measures. Mitigation Measures MIN-11, MIN-13, and MIN-14 would be available to reduce the effects attributable to Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A.

***CEQA Conclusion*:** Constructing the water conveyance facilities and implementing restoration measures would result in a significant impact of aggregate resources located within the Plan Area. Access to sites within the Plan Area that contain recoverable amounts of aggregates could be restricted. This impact would be exacerbated when combined with the other projects in the Plan Area as summarized in Table 26-9 and Table 5.2.2.22-1. The impact each alternative would make on aggregate resources would be cumulatively considerable because of the large land area that would restored and the potential for limiting access to these areas for the purpose of extracting aggregates.

Implementing Mitigation Measures MIN-11, MIN 13, and MIN-4 would reduce the impact on natural gas resources, but not to a less-than-significant level. The mitigation measures cannot assure that all or a substantial portion of the aggregate deposits affected by the alternatives will remain accessible after implementation of the alternatives.

Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A in Appendix A of this RDEIR/SDEIS.

Mitigation Measure MIN-13: Recycle BDCP-Derived Materials and Use Recycled Materials to the Extent Practicable During Construction

Please see Mitigation Measure MIN-13 under Impact MIN-13 in the discussion of Alternative 1A in Chapter 26, *Mineral Resources*, of the Draft EIR/EIS.

Mitigation Measure MIN-14: BDCP Proponents Will Participate in the Local and Regional Aggregate Evaluation and Permitting Process

Please see Mitigation Measure MIN-14 under Impact MIN-14 in the discussion of Alternative 1A in Chapter 26, *Mineral Resources*, of the Draft EIR/EIS.

5.2.4.22 Paleontological Resources

Since the time of the Draft EIR/EIS notice of preparation (NOP) in 2009, additional projects that could combine with the action alternatives to contribute to cumulative impacts on paleontological resources are known to be reasonably foreseeable or probable. The list of projects included in the Draft EIR/EIS Table 26-9 is amended to include the additional projects shown in Table 5.2.2.23-1 below. These additional cumulative projects are considered in combination with the projects included in Draft EIR/EIS Table 26-9. These projects were added because they would involve land disturbing activities that could damage paleontological resources.

Table 5.2.2.23-1. Effects on Paleontological Resources from Additional Programs and Projects Considered for Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Paleontological Resources
DWR and USBR	In-Delta Storage Project	Currently under study	Water storage project that would inundate Webb Tract and Bacon Island and restore Holland Tract and Bouldin Island	The project could disturb or destroy paleontological resources.
Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Potential for effects on paleontological resources from construction of water supply infrastructure.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Potential for effects on paleontological resources from construction of restoration actions.
DWR	Dutch Slough Tidal Marsh Restoration Project	Currently under study	Restoration 1,178 acre site located in the South Delta to tidal marsh habitat.	The project could disturb or destroy paleontological resources.
DWR and Suisun Mash Preservation Agreement agencies	Miens Landing Restoration	Currently under study	Restoration of duck clubs to tidal marsh.	The project could disturb or destroy paleontological resources.
DWR	Cache Slough Area Restoration	Currently under study	Restoration of lands within the Cache Slough Complex located in the Delta	The project could disturb or destroy paleontological resources. This project is examined under Alternatives 1A–4 and 5–9 of the BDCP.

Impact PALEO-3: Cumulative Effect on Paleontological Resources from Construction Activities in the Plan Area and Delta Region

NEPA Effects: Construction of water conveyance facilities and implementing other conservation measures would result in an adverse effect on paleontological resources through earth moving and other ground disturbing activities required to complete each projects in the Delta Region. In addition to the projects listed in Table 27-16, other projects proposed within the Delta Region would also contribute to the damage or destruction of paleontological resources by increasing the amount of ground disturbing activities and therefore the potential to damage or destroy additional paleontological resources The combined effect of Alternatives 1A through 8, including Alternatives 4A, 2D, and 5A with the projects listed in Table 27-16 and Table 5.2.2.23-1 would result in an

adverse cumulative effect on paleontological resources even when implementing mitigation measures. Although Alternatives 4A, 2D, and 5A would result in fewer acres converted for habitat restoration purposes, they would include extensive subsurface excavation and when combined with other projects would also be considered adverse. Because Alternative 9 would not involve extensive subsurface excavation, adverse effects on paleontological resources could be avoided by implementing Mitigation Measures PALEO-1a through PALEO 1d.

***CEQA Conclusion*:** Constructing the water conveyance facilities and implementing restoration measures would result in a significant impact on paleontological resources within the Delta Region. Construction activities, including subsurface disturbance, could result in damage or destruction of paleontological resources within the region. This impact would be exacerbated when combined with other ground disturbing projects in the Plan Area as summarized in Table 27-16 and Table 5.2.2.23-1. The impact Alternatives 1A through 8 would have on paleontological resources would be significant and the action alternatives effect would be cumulatively considerable because of the extensive subsurface disturbance these alternatives would require when compared to the other projects listed. The impact on paleontological resources that would occur as a result of constructing these alternatives cannot be mitigated to a less than significant level. Therefore, this impact would remain cumulatively significant and unavoidable.

Because Alternative 9 would not involve tunneling and because Mitigation Measures PALEO-1a through PALEO-1d for surface excavation in sensitive geologic units associated with this alternative reduce the level of impact, it is not expected to have a cumulatively considerable contribution to impacts on paleontological resources.

Mitigation Measure PALEO-1a: Prepare a Monitoring and Mitigation Plan for Paleontological Resources

Please see Mitigation Measure PALEO-1a under Impact PALEO-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure PALEO-1b: Review 90% Design Submittal and Develop Specific Language Identifying How the Mitigation Measures Will Be Implemented along the Alignment

Please see Mitigation Measure PALEO-1b under Impact PALEO-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure PALEO-1c: Educate Construction Personnel in Recognizing Fossil Material

Please see Mitigation Measure PALEO-1c under Impact PALEO-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

Mitigation Measure PALEO-1d: Collect and Preserve Substantial Potentially Unique or Significant Fossil Remains When Encountered

Please see Mitigation Measure PALEO-1d under Impact PALEO-1 in the discussion of Alternative 4 in Appendix A of this RDEIR/SDEIS.

5.2.4.23 Environmental Justice

Since the time of the Draft EIR/EIS notice of preparation (NOP) in 2009, additional projects that could combine with the action alternatives to contribute to cumulative impacts on low-income and minority populations are known to be reasonably foreseeable or probable. The list of projects included in the Draft EIR/EIS Table 28-4 is amended to include the additional projects shown in Table 5.2.2.24-1 below. These additional cumulative projects are considered in combination with the projects included in Draft EIR/EIS Table 28-4. These projects were added because they would include actions that could result in a disproportionate impact on low-income or minority communities.

Table 5.2.2.24-1. Effects on Environmental Justice Resources from Additional Programs and Projects Considered for Cumulative Analysis

Agency	Program/Project	Status	Description of Program/Project	Effects on Low-Income and Minority Populations
DWR and USBR	In-Delta Storage Project	Currently under study	Water storage project that would inundate Webb Tract and Bacon Island and restore Holland Tract and Bouldin Island	The project would convert agricultural land to other uses.
DWR	Dutch Slough Tidal Marsh Restoration Project	Currently under study	Restoration 1,178 acre site located in the South Delta to tidal marsh habitat.	Land disturbing activities could disturb or destroy sensitive cultural resources.
DWR and Suisun Mash Preservation Agreement agencies	Miens Landing Restoration	Currently under study	Restoration of duck clubs to tidal marsh.	Land disturbing activities could disturb or destroy sensitive cultural resources.
DWR	Cache Slough Area Restoration	Currently under study	Restoration of lands within the Cache Slough Complex located in the Delta	Land disturbing activities could disturb or destroy sensitive cultural resources. This project is examined under Alternatives 1A–4 and 5–9 of the BDCP.
DWR	California Water Action Plan	Implementation phase	Provide assistance to disadvantage communities	Funding of projects within economically disadvantaged communities.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Restoration actions could convert agricultural land to other uses.

Alternatives 1A through 9, including Alternatives 4A, 2D, and 5A

Construction of water conveyance facilities and implementing other conservation measures would result in a disproportionate impact on low-income and minority populations. These disproportionate impacts would occur as a result of changes in land use, employment, aesthetics and

visual resources, cultural resources, public services and utilities, air quality and greenhouse emissions, noise, and public health effects. Disproportionate impacts on low-income and minority populations would also occur under Alternative 4A because the impact mechanisms would be the same for constructing and operating the water conveyance facilities as Alternative 4. However, the impacts resulting from restoration actions under Alternative 4A are expected to be substantially less when compared to the other alternatives because fewer acres would be converted from agriculture to wildlife habitat.

The previous cumulative impact assessment concluded that although the alternatives would result in a disproportionate impact on low-income and minority populations and also concluded that these impacts attributable to the alternative were determined to not be considerable. These impacts were determined not to be considerable because when compared to total low-income and minority employment within the study area, the loss of employment attributable to the alternatives was relatively small. The change in employment attributable to Alternative 4A would be less than the other alternatives because fewer acres would be converted from agriculture other uses. Including the additional projects summarized in Table 5.2.2.24-1 would reduce the cumulative contribution made by the alternatives to the total disproportionate impact on low-income or minority communities as these projects would make an additional contribution to the overall negative disproportionate impact.

Mitigation Measure AG-1, described in Chapter 14, *Agricultural Resources*, Section 14.3.3.2, would be available to reduce these effects by preserving agricultural productivity. The mitigation measure includes a broad program to offset the losses associated with construction of water conveyance facilities and restoration actions. The measures proposed under this program could benefit agricultural-related employment by offsetting the direct loss of agricultural lands and by providing employment opportunities associated with managing and maintaining restoration areas.

5.3 References

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