Chapter 31 Cumulative Impacts

31.1 Regulatory Requirements for Analysis

Both CEQA and NEPA require the assessment of cumulative impacts as part of the environmental review process. Under CEQA, "cumulative impacts refer to two or more effects that when considered together are considerable or which compound or increase other environmental impacts" (State CEQA Guidelines, Section 15355). The State CEQA Guidelines go on to state that the types of projects that should be considered in a cumulative impact analysis are "closely related past, present, or reasonably foreseeable probable future projects" (State CEQA Guidelines, Section 15355; see also Section 15130, subd. (b)(1)(A)). The state lead agencies need not provide a discussion of the cumulative impacts at the same level of detail as provided for the impacts attributable to the project alone (State CEQA Guidelines, Section 15130, subd.(b)).

NEPA also provides guidance regarding treatment of cumulative impacts and how to determine the types of projects that should be considered in the impact analysis. The NEPA regulations adopted by the Council on Environmental Quality (CEQ) indicate that a cumulative impact is an impact on the environment that results from the incremental impact of a particular action when added to other past, present, or reasonably foreseeable future actions, regardless of the entity undertaking such an action (CEQ NEPA Regulations Part 1508, Section 1508.7). Additional guidance is provided by the Reclamation NEPA handbook which, similar to CEQA, indicates that past, present, and reasonably foreseeable projects should be included, although an exhaustive analysis of past projects is not required (U.S. Bureau of Reclamation 2012). The Reclamation NEPA handbook also indicates that how the cumulative impact assessment is incorporated into the NEPA document is at the lead agency's discretion (U.S. Bureau of Reclamation 2012).

The purpose of the cumulative impact analysis is to assess the impacts of a proposed action in combination with a group of actions or projects with similar or overlapping impacts.

31.2 Cumulative Project Selection and Approach

The cumulative impact analysis is generally based on a project list approach, considering projects identified in Table 31-1. The criteria for considering whether a past, present, or future project was reasonably foreseeable and probable for inclusion on the cumulative project list are:

- whether a project has been defined in adequate detail based upon publicly available environmental analysis documenting the potential environmental impacts of the project, because CEQA and NEPA do not require speculation related to future projects.

- whether a project would result in impacts on the same environmental resources that would be affected by the implementation of Alternatives 1, 2, and 3 (collectively referred to as the Project); projects that would not affect the same resources were considered outside the scope of the cumulative impact analysis. For example, the Project would not change the environment within Solano County; therefore, this cumulative impact analysis did not consider changes that would occur under the Solano County Multi-Species Habitat Conservation Plan (HCP).
- whether a project would result in similar impacts to those identified as potentially resulting from the Project and evaluated in Chapters 5 through 30 (i.e., resource chapters).

The projects identified as having no impact nexus with the Project are not considered in the cumulative analysis because they are not expected to have impacts that could combine with those of the Project. This determination is based on one or both of the factors below.

- The projects are located outside of the area where the Project would be constructed and thus would not cause impacts that would combine with effects of the Project.
- The project is of a type that would not produce impacts that could combine with impacts of the Project.

For example, as described in Chapter 2, the Project would not affect or result in changes in the operation of the CVP, Trinity River Division facilities (including Clear Creek). Therefore, the Trinity River Record of Decision (ROD), the 2017 ROD for the Long-Term Plan for the Lower Klamath River, and the provisions of the Trinity River Division CVP Act of 1955 are not addressed in the cumulative analysis.

The cumulative impact analysis also considers past, current, and reasonably certain projects and programs included in the assumptions for existing conditions (CEQA resources) or affected environment (NEPA-only resources) descriptions. These projects and programs are generally described in Appendix *5A, Surface Water Resources Modeling of Alternatives*; Appendix 5B, *Water Resources System Modeling*; throughout Chapters 5 through 30; and in Appendix 4A, *Regulatory Requirements*. Appendix 5A describes the hydrologic modeled representation of those ongoing policies, programs, or regulations. Appendix 4A describes ongoing policies, programs, or regulations. Plans and policies that are expected to continue and are described in Appendix 4A include:

- Central Valley Flood Protection Plan
- Colusa County General Plan
- County of Yolo 2030 Countywide General Plan
- FloodSAFE California
- Glenn County General Plan
- Glenn County General Plan Update, 2020 Existing Conditions Report

- National Marine Fisheries Service Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Salmon, and Central Valley Steelhead
- Tehama County General Plan
- U.S. Fish and Wildlife Service Giant Garter Snake Recovery Plan
- U.S. Fish and Wildlife Service Recovery Plan for Sacramento–San Joaquin Delta Native Fishes
- Yolo County HCP/Natural Community Conservation Plan (NCCP)
- Yolo Bypass Wildlife Area Land Management Plan (Yolo Bypass Wildlife Area LMP)
- Yolo County Storm Water Management Program

The cumulative analysis is primarily qualitative. The cumulative analysis qualitatively addresses projects listed in Table 31-1, such as Delta Conveyance Project. For many of the projects in Table 31-1 it would be speculative to define multiple parameters and assumptions within a numerical modeling effort. However, where applicable, the qualitative analysis is informed by quantitative modeling results describing the environmental setting for the existing conditions and appropriately applies those conditions to the Project. For example, the hydrologic modeling results are cumulative in nature because the model input must make allowances for the use of water outside the footprint of the alternatives, which captures "past projects" and "present projects", including Reinitiation of Consultation on the Long-Term Operation of the CVP and the SWP Biological Opinions (ROC ON LTO BiOps) and the Incidental Take Permit for Long-Term Operation of the SWP in the Sacramento-San Joaquin Delta (SWP ITP) in the baseline (No Action Alternative [NAA]). The model uses an 82-year historical hydrologic sequence to simulate a wide range of hydrologic conditions that could occur in the future, including extended wet periods and dry/critically dry periods. In addition, the model includes assumptions about population growth conditions that could occur in the future with or without the Project. In the case of the CALSIM modeling, this includes increased demand based on the level of buildout. This method of incorporating increased water demand into the CALSIM II modeling meets Reclamation's guidance on how to incorporate the cumulative analysis into the NEPA documentation. Therefore, the elements of the various impact assessments (e.g., surface water quality, aquatic biological resources, recreation) that relied on the hydrologic impact assessment for their respective analyses are also cumulative in nature. Projects that are represented by the modeling, and therefore also included in the cumulative impact analysis, are identified in Appendix 5A.

Table 31-1 Cumulative Project List

Project	Primary Agencies	Status[1]	Description	References
Flood Control Projects				
CALFED Levee System Integrity Program	DWR, California Department of Fish and Wildlife, USACE	Ongoing	The CALFED Record of Decision requires that the Levee System Integrity Program be managed 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. The primary focus is on the legal Delta as defined in Section 12220 of the California Water Code. Protection and maintenance of 1,300 miles of project and nonproject levees have taken place since the inception of the CALFED Levee System Integrity Program in 2000. Other major undertakings include restoration of native vegetation and reuse of dredge material to bolster levee stability. Major activities include levee maintenance, levee improvement, environmental mitigation, emergency response functions, and other components carried out using local funds, with additional funds provided by the state and federal governments. However, uncertainty in program funding has required that some goals be revised and schedules be extended. Proposition 50 provided $70 million for Delta levees.	CALFED Bay-Delta Program. 2000. *Levee System Integrity Program Plan*. Available: http://s3-us-west-2.amazonaws.com/ucldc-nuxeo-ref-media/677f7439-2b07-4494-a627-4a96260226fa. Accessed: October 12, 2020.
Delta Levees Flood Protection Program	DWR	Ongoing	The Bay-Delta Levees branch of DWR administers the Delta Levees Flood Protection Program as authorized by the California Water Code, Sections 12300–12318 and 12980–12995. This grants program works with more than 60 reclamation districts in the Delta and Suisun Marsh to maintain and improve the flood control system and provide protection to public and private investments in the Delta, including water supply, habitat, and wildlife. The program, through its two major components (Delta Levees Maintenance Subventions Program and Delta Levees Special Flood Control Projects), works with the local agencies to maintain, plan, and complete levee rehabilitation projects. The Delta Levees Maintenance Subventions Program provides financial assistance to local levee-maintaining agencies for the maintenance and rehabilitation of nonproject levees in the Delta. It has been in effect since passage of the Way Bill in 1973, which has been modified periodically by legislation. The program is under the authority of the CVFPB and is managed by DWR. Water Code Section 12987 calls on DWR to prioritize the islands for receipt of grant funds through the program and recommend the prioritization to the CVFPB. The CVFPB reviews and approves DWR's recommendation and enters into an agreement with reclamation districts to reimburse eligible costs. The Delta Levees Special Flood Control Projects provide financial assistance to local levee-maintaining agencies for rehabilitation of levees in the Delta. The program was established by the California legislature under SB 34, SB 1065, and AB 360. Since the inception of the program, more than $100 million have been provided to local agencies in the Delta for flood control and related habitat projects. The program currently 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.	California Department of Water Resources. 2020a. *Delta Levees Maintenance Subventions*. Available: https://water.ca.gov/Work-With-Us/Grants-And-Loans/Delta-Levees-Maintenance-Subventions. Accessed: October 8, 2020. California Department of Water Resources. 2020b. *Delta Levees Special Flood Control Projects*. Available: https://water.ca.gov/Work-With-Us/Grants-And-Loans/Delta-Levees-Special-Flood-Control-Projects#:~:text=The%20Delta%20Levees%20Special%20Flood,cultural%20resources%20in%20the%20Delta. Accessed: October 8, 2020.
Delta Risk Management Strategy	DWR	Completed	The 2000 CALFED Record of Decision presented a Preferred Program Alternative that described actions, studies, and conditional decisions to help the Delta. The Preferred Program Alternative for Stage 1 implementation included the completion of a Delta Risk Management Strategy (DRMS) that would examine the sustainability of the Delta and would assess major risks to Delta resources for projections ranging from 50 to 200 years. The first phase of DRMS analyzed the risks and consequences of levee failure in the Delta region. The analysis considered current and future risks of levee failures from earthquakes, high-water conditions (storms and tides), climate change, subsidence, dry-weather events, and a combination of these factors. The analysis also estimated the consequences of levee failures to the local and state economy, public health and safety, and the environment. The DRMS Phase 1 report findings developed a set of strategies to manage levee failure risks in the Delta and to improve the management of state funding that supports levee maintenance and improvement. Phase 2 considered various scenarios to reduce the risks and consequences of levee failure.	DWR. 2011. Delta Risk Management Strategy Phase 2 Executive Summary. June.
DWR Small Communities Flood Risk	DWR, Yolo County	Ongoing	In 2017, Yolo County received a grant from the DWR Small Communities Flood Risk Reduction Program to complete a feasibility study with a primary goal of identifying a preferred plan to reduce flood risk to Knights Landing. Based on the preliminary and final screening in the feasibility study, Alternative 12 was selected as the Preferred Alternative that accomplishes the goals of the study. The Preferred Structural Alternative includes the following:	California Department of Water Resources. 2021a. *Small Communities Flood Risk Reduction*. Available: https://water.ca.gov/Work-With-Us/Grants-And-Loans/Small-Communities-Flood-Risk-Reduction.

Project	Primary Agencies	Status[1]	Description	References
Reduction Program			six levee improvement locations along the right bank of Sacramento River between levee mile 0.86 and 5.4 to address underseepage, through seepage, and landslide stability concerns adjacent to community and applicable freeboard/geometry repairs; levee improvements along the left bank of Knights Landing ridge cut to improve stability and protection against erosion from levee mile 4.9 to 5.8, and a new cross levee just east of Knights Landing between the Sacramento River and the Knights Landing Ridge Cut.	Accessed: April 2, 2021. Yolo County. 2019. *Knights Landing Small Community Flood Risk Reduction Feasibility Study*. July 2019. Available: https://www.yolocounty.org/home/showpublisheddocument?id=58945. Accessed: June 2, 2021.
Folsom Dam Safety and Flood Damage Reduction Joint Federal Project	U.S. Department of the Interior, USACE	Completed	The Folsom Dam was built by the USACE and transferred to Reclamation in 1956. The Folsom DS/FDR was developed to coordinate Reclamation's and USACE's multiple authorized projects at the Folsom facility. A FONSI and Final Supplemental EA were signed in April 2008. Phase II was completed by Reclamation in 2011 and handed off to USACE to construct Phase III, a control structure.	U.S. Department of the Interior, Bureau of Reclamation. 2020a. *Joint Federal Project*. Last updated: July 29, 2020. Available: https://www.usbr.gov/mp/jfp/index.html. Accessed: October 12, 2020.
Folsom Dam Safety/Flood Damage Reduction Project	Reclamation, USACE, SAFCA, and CVFPB	Completed	The project represents a coordinated effort of Reclamation and the USACE to address dam safety and enhanced flood control at Folsom Dam. 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. Construction on the auxiliary spillway began in 2008. The modifications to the dam allow for the release of water sooner, with the potential for higher releases should the downstream levees be improved to accommodate the increased flows. These larger, earlier releases from Folsom Lake would create and conserve flood storage space based on projected reservoir inflows resulting from a major storm impacting the upper American River watershed.	U.S. Department of the Interior, Bureau of Reclamation. 2020b. *Project Details for Folsom Dam Safety and Flood Damage Reduction EIS/EIR, Folsom Dam Safety and Flood Damage Reduction Supplemental Environmental Assessment/Initial Study, and Folsom Dam Safety and Flood Damage Reduction Project Right Bank Stabilization FONSI*. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=1808. Accessed: October 8, 2020.
Levee Repair–Levee Evaluation Program	DWR	Ongoing	On February 24, 2006, Governor Arnold Schwarzenegger declared a State of Emergency for California's levee system, commissioning up to $500 million of state funds to repair and evaluate state/federal project levees. Following the emergency declaration, the Governor directed DWR to secure the necessary means to fast-track repairs of critical erosion sites. Hundreds of levee sites were identified for immediate repair throughout the Central Valley. These repairs are necessary to maintain the functionality of flood control systems that have deteriorated over time and/or do not meet current design standards. While many of the most urgent repairs have been completed or are near completion, other sites of lower priority are still in progress, and still more are in the process of being identified, planned, and prioritized. In general, repairs to state/federal project levees are being conducted under three main programs: the Critical Erosion Repairs Program, the Sacramento River Bank Protection Project, and the PL84-99 Rehabilitation Program. A fourth program to repair critically damaged levees on the San Joaquin Flood Control System is under development by DWR. DWR is conducting geotechnical exploration, testing, and analysis of state and federal levees that protect the highly populated urban areas of greater Sacramento, Stockton/Lathrop, and Marysville/Yuba City. This program is being implemented simultaneously with the various urgent levee repairs. To expedite efforts to protect these communities, levee evaluations are being conducted in a fast-track manner over a 2- to 3-year period. During this time, technical specialists are reviewing existing levee historical data; mapping near-surface geology; conducting field explorations; performing engineering, stability and seepage analyses; and preparing preliminary design and construction estimates for repairing and upgrading the levees, where needed.	California Natural Resources Agency. 2020a. *Levee Evaluations Program*. Available: https://bondaccountability.resources.ca.gov/Program.aspx?ProgramPK=86&Program=Levee%20Evaluations%20Program&PropositionPK=5. Accessed: October 8, 2020.
Lower Cache Creek/Woodland Flood Risk Management Project	City of Woodland, USACE, DWR, CVFPB	Ongoing	The Final EIR and Final EIS evaluate impacts associated with a proposed flood risk reduction project on Lower Cache Creek. As part of the overall effort, USACE is also preparing a project feasibility study. Similarly, the City of Woodland is partnering with DWR through its Urban Flood Risk Reduction Program to identify and implement the flood risk reduction project to meet the State's urban level of protection requirements in a cost-effective manner that would be compatible with and supportive of elements of the Integrated Watershed Monitoring Program. Project components include secondary earthen levees and a	City of Woodland. 2021a. *Lower Cache Creek Feasibility Study (LCCFS)*. Available: https://www.cityofwoodland.org/1196/Lower-Cache-Creek-Feasibility-Study-LCCF. Accessed: April 2, 2021.

Project	Primary Agencies	Status[1]	Description	References
			diversion channel to redirect overland flood flows into the Yolo Bypass, modification of the Cache Creek Settling Basin to allow conveyance of flood flows into the Yolo Bypass, and various bridge and/or culvert improvements to facilitate conveyance of flood flows in the diversion channel.	City of Woodland. 2021b. *Woodland Flood Risk Management Project Final Environmental Impact Report*. Available: https://www.cityofwoodland.org/DocumentCenter/View/6628/Woodland_FRMP_Final_EIR_January2021_WEB. Accessed: April 2, 2021.
Oroville Facilities Relicensing	DWR	Completed	The Oroville Facilities, as part of the State Water Project, are also operated for flood management, power generation, water quality improvement in the Delta, recreation, and fish and wildlife enhancement. The objective of the relicensing process was to continue operation and maintenance of the Oroville Facilities for electric power generation, along with implementation of any terms and conditions to be considered for inclusion in a new FERC hydroelectric license. The initial FERC license for the Oroville Facilities, issued on February 11, 1957, expired on January 31, 2007. DWR published the Final Environmental Report in June 2008.	California Department of Water Resources. 2020c. *Oroville Facilities (P-2100)*. Available: https://water.ca.gov/Programs/State-Water-Project/SWP-Facilities/Oroville/HLPCO-Oroville-Facilities-Project-2100. Accessed: October 11, 2020.
Sacramento River Bank Protection Project	USACE, CVFPB, SAFCA, WSAFCA, Three Rivers Levee Improvement Authority	Ongoing	The SRBPP is a continuing construction project authorized by Section 203 of the Flood Control Act of 1960. The purpose of the project is to provide erosion protection to the existing levee and flood management facilities of the SRFCP. To date, project work has been carried out in two phases, and a total of approximately 840,000 feet of riverbank has been stabilized. Phase I consisted of 435,000 feet, and Phase II's original authorization was for 405,000 feet. An additional 80,000 feet (a supplement to Phase II) has been authorized under the Water Resources Development Act of 2007 and is being supported by a Post Authorization Change Report, Engineering Documentation Report, and EIS/EIR. The authorization would be applied by USACE to the Sacramento River and other sites within the SRFCP that are identified as critical levee erosion sites.	U.S. Army Corps of Engineers. 2021a. *Sacramento River Bank Protection Project*. Available: https://www.spk.usace.army.mil/Missions/Civil-Works/Sacramento-River-Bank-Protection/. Accessed: April 2, 2021.
Sacramento River Flood Control System Evaluation, Phase III Mid-Valley Sites	USACE, DWR, KLRCDD, Reclamation District 108, Yolo County	Ongoing	The project proposes to repair levees at 13 sites northwest of the City of Sacramento that have required flood fighting or experienced seepage and boils during previous flood events. The repair of levees in Area 3 as part of Phase III will nearly triple the level of flood protection afforded the town of Knights Landing and the adjacent agricultural areas. Area 3 levee reconstruction involves 3.4 miles of levee repair along the Knights Landing Ridge Cut and 1.3 miles of levee repair along the west bank of the Sacramento River. Mid-Valley sites 9, 10, and 11 are being evaluated further by Yolo County through the DWR Small Communities Flood Risk Reduction Program. Funding for construction of sites 9, 10, and 11 is not allotted yet but is anticipated.	U.S. Army Corps of Engineers and Central Valley Flood Protection Board. 2013. *Final Environmental Assessment/Initial Study Sacramento River Flood Control System Evaluation, Phase III, Mid-Valley, Contract Area 3, Yolo County, California*. April 2013. Available: https://www.spk.usace.army.mil/Portals/12/documents/usace_project_public_notices/MidValley_FINALEAIS.pdf. Accessed: April 2, 2021.
System Reoperation Program	DWR	Completed	DWR is conducting an SRS to identify potential reoperation strategies for the statewide flood protection and water supply systems. The SRS includes four phases completed between 2011 and 2016.	California Department of Water Resources. 2016. *System Reoperation: A Resource Management Strategy of the California Water Plan*. July 29, 2016. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/RMS/2016/06_System_Reoperation_July2016.pdf. Accessed: October 11, 2020.
American Basin Fish Screen and Habitat Improvement Project	Reclamation, California Department of Fish and Wildlife, and Natomas Central Mutual Water Company	Ongoing	Reclamation and the California Department of Fish and Wildlife propose to authorize and provide funds to the Natomas Central Mutual Water Company (Natomas Mutual) to construct and operate the American Basin Fish Screen and Habitat Improvement Project. The purpose of the project is: (1) to avoid or minimize potentially adverse effects on fish, particularly anadromous juvenile fish, due to water diversions from the Sacramento River and Natomas Cross Canal by Natomas Mutual and other small pumps operated by individual landowners for diversion of water into the Natomas Basin created by the operation of the Natomas Mutual's water distribution facilities. The project would result in modifications of Natomas Mutual's water diversion and distribution system adjacent to the Sacramento River and Natomas Cross Canal in Sacramento and Sutter Counties, California. The modifications include the construction and operation of one or two positive-barrier fish screen diversion facilities; decommissioning and removing the	California Office of Planning and Research. 2008. CEQA Net: American Basin Fish Screen and Habitat Improvement Project. Available: https://ceqanet.opr.ca.gov/2003092006/2 Accessed: September 7, 2021

Project	Primary Agencies	Status[1]	Description	References
			Verona Diversion Dam and lift pumps; removing five pumping plants and one small private diversion; and modifying the distribution system.	
Anadromous Fish Screen Program	Reclamation, U.S. Fish and Wildlife Service	Ongoing	The primary objective of the AFSP is to protect juvenile Chinook salmon (all runs), steelhead, green and white sturgeon, striped bass, and American shad from entrainment at priority diversions throughout the Central Valley. Section 3406 (b)(21) of the CVPIA requires the Secretary of the Interior to assist the State of California in developing and implementing measures to avoid losses of juvenile anadromous fish resulting from unscreened or inadequately screened diversions on the Sacramento and San Joaquin Rivers, their tributaries, the Delta, and the Suisun Marsh. Additionally, all AFSP projects meet Goal 3 of the CALFED Ecosystem Restoration Program's Draft Stage 1 Implementation Plan.	U.S. Fish and Wildlife Service. 2015. *Central Valley Project Improvement Act (CVPIA) Project Implementation Division, The Anadromous Fish Screen Program (AFSP)*. Last updated: December 22, 2015. Available: https://www.fws.gov/cno/fisheries/cvpia/AnadromFishScreen.cfm. Accessed: October 8, 2020.
Cache Slough Complex Restoration	DWR, California Department of Fish and Wildlife	Ongoing	The Cache Slough Complex is located in the northern Delta where Cache Slough and the southern Yolo Bypass meet. It currently includes Liberty Island, Little Holland Tract, Prospect Island, Little Egbert Tract, and the surrounding waterways. Levee height on these tracts is restricted and designed to allow overtopping in large flow events to convey water from the upper Yolo Bypass. Since 1983 and 1998 respectively, Little Holland Tract and Liberty Island have remained breached. Restoration is occurring naturally on the islands. Restoration in the Cache Slough Complex was identified as an Interim Delta Action by Governor Schwarzenegger in July 2007. The Cache Slough Complex has potential for restoration success because of its relatively high tidal range, historic dendritic channel network, minimal subsidence, and remnant riparian and vernal pool habitat. Restoration efforts would support native species, including delta smelt, longfin smelt, Sacramento splittail, and Chinook salmon, by creating or enhancing natural habitats and improving the food web fish require. Surrounding lands that are at elevations that would function as floodplain or marsh if not separated by levees could also be included in the Cache Slough area. This broader area includes roughly 45,000 acres of existing and potential open water, marsh, floodplain, and riparian habitat. The goals of restoration in the Cache Slough Complex are to (1) re-establish natural ecological processes and habitats to benefit native species, (2) contribute to scientific understanding of restoration ecology, and (3) maintain or improve flood safety. Three restoration actions are being considered in the Cache Slough Complex, including restoration actions at Calhoun Cut, Little Holland Tract, and Prospect Island.	California Department of Fish and Wildlife. 2020a. *Cache Slough Complex*. Public Draft. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=149819&inline. Accessed: October 7, 2020.
Central Valley Joint Venture Program	Central Valley Joint Venture	Ongoing	The Central Valley Joint Venture (CVJV) is a self-directed coalition consisting of 22 state and federal agencies and private conservation organizations. The partnership directs their efforts toward the common goal of providing for the habitat needs of migrating and resident birds in the Central Valley of California. The CVJV was established in 1988 as a regional partnership focused on the conservation of waterfowl and wetlands under the North American Waterfowl Management Plan. It has since broadened its focus to the conservation of habitats for other birds, consistent with major national and international bird conservation plans and the North American Bird Conservation Initiative. The CVJV provides guidance and facilitates grant funding to accomplish its habitat goals and objectives. Integrated bird conservation objectives for wetland habitats in the Central Valley identified in the 2006 Implementation Plan include restoration of 19,170 acres of seasonal wetland, enhancement of 2,118 acres of seasonal wetland annually, restoration of 1,208 acres of semi-permanent wetland, and restoration of 1,500 acres of riparian habitat.	Central Valley Joint Venture. 2020. *Conserving Migratory Birds and Their Habitats in the Central Valley Area of California*. Available: http://www.centralvalleyjointventure.org/. Accessed: October 8, 2020.
Contra Costa Canal Fish Screen Project	Contra Costa Water District	Completed	Contra Costa Water District diversion of water from the Sacramento-San Joaquin Delta at Rock Slough serves as a major component of its water supply. Between 120,000 and 130,000 acre-feet of water per year is diverted by the canal for irrigation and municipal and industrial uses. The diversion at Rock Slough is one of the largest unscreened Delta sites. The project would install fish screens at the Rock Slough diversion to minimize the entrainment losses of sensitive fish species. It includes flow control and transition structures necessary to reduce tidal influences and maintain flow rates. This will help the screen perform properly and allow fish to pass by it easily. Improvements at the diversion site also would reduce potential predation on target species, fulfill legal requirements of the U.S. Fish and Wildlife Service's 2008 Biological Opinion for the threatened delta smelt, complete the mitigation for the Los Vaqueros Biological Opinion, and complete CVPIA requirements in Section 3406(b)(5). Construction is estimated to be complete in 2011.	U.S. Department of the Interior, Bureau of Reclamation. 2012. *Rock Slough Fish Screen Hydraulic Evaluation*. Hydraulic Laboratory Technical Memorandum PAP-1067. September 2012. Available: https://www.usbr.gov/tsc/techreferences/hydraulics_lab/pubs/PAP/PAP-1067.pdf. Accessed: October 12, 2020.
Cypress Avenue Bridge North	Glenn-Colusa Irrigation District and	Completed	Side Channel Habitat Restoration and Enhancement Project – Restored a side-channel to create salmon rearing habitat along 1/3 mile stretch of the Sacramento River upstream of the east end of the Cypress Avenue Bridge in Redding.	Northern California Water Association. 2019. *Sacramento Valley Salmon Recovery Program*. September 2019. Available:

Project	Primary Agencies	Status[1]	Description	References
	Sacramento River Forum			https://norcalwater.org/wp-content/uploads/SacValleySalmonRecoveryProgram.fulloct2018.pdf. Accessed: March 29, 2021.
Ecosystem Restoration Program Conservation Strategy	California Department of Fish and Wildlife	Ongoing	The Ecosystem Restoration Program (ERP) is a multi-agency effort aimed at improving and increasing aquatic and terrestrial habitats and ecological function in the Delta and its tributaries. The ERP Focus Area (JPG) includes the Sacramento-San Joaquin Delta, Suisun Bay, the Sacramento River below Shasta Dam, the San Joaquin River below the confluence with the Merced River, and their major tributary watersheds directly connected to the Bay-Delta system below major dams and reservoirs. Principal participants overseeing the ERP are CDFW, the U. S. Fish and Wildlife Service (USFWS), and the NOAA's National Marine Fisheries Service (NMFS), collectively known as the ERP Implementing Agencies. The ERP implements restoration projects through grants administered by the ERP Grants Program. The vast majority of these projects focus on fish passage issues, species assessment, ecological processes, environmental water quality, or habitat restoration. The ERP is guided by the following six strategic goals: • Recover endangered and other at-risk species and native biotic communities; • Rehabilitate ecological processes; • Maintain or enhance harvested species populations; • Protect and restore habitats; • Prevent the establishment of and reduce impacts from non-native invasive species; and • Improve or maintain water and sediment quality.	California Department of Fish and Wildlife. 2021. *Ecosystem Restoration Program (ERP)*. Available: https://nrm.dfg.ca.gov/ERP/Default.aspx. Accessed: June 7, 2021.
Franks Tract Project	DWR, Reclamation	Ongoing	DWR and Reclamation are conducting studies to evaluate the feasibility of modifying the hydrodynamic conditions near Franks Tract to improve Delta water quality and enhance the aquatic ecosystem. The results of these studies have indicated that modifying the hydrodynamic conditions near Franks Tract may substantially reduce salinity in the Delta and protect fishery resources, including populations of delta smelt, a federally listed and State-listed species that is endemic to the Delta. As a result, 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 the installation of 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. The Franks Tract Project is consistent with ongoing planning efforts for the Delta to help balance competing uses and create a more sustainable system for the future. By protecting fish resources, this project also could improve operational reliability of the SWP and CVP because curtailments in water exports (pumping restrictions) are likely to be less frequent. Franks Tract was previously evaluated as part of DWR's Flooded Island Pre-Feasibility Study Report (DWR, 2007).	U.S. Department of the Interior, Bureau of Reclamation. 2020c. *Willows Construction Office, Franks Tract Project*. Last updated: July 29, 2020. Available: https://www.usbr.gov/mp/frankstract/. Accessed: October 8, 2020.
Fremont Weir Adult Fish Passage Modification Project	DWR	Completed	The existing fish ladder at Fremont Weir was widened and deepened and upstream and downstream adjoining channels were reconfigured to enhance flow through the structure and migratory fish passage. In addition, one agricultural road crossings along the Tule Canal that delayed migration was replaced, and another removed.	U.S. Department of the Interior, Bureau of Reclamation. 2021a. *Fremont Weir Adult Fish Passage Modification Project*. Last updated: March 8, 2021. Available: https://www.usbr.gov/mp/bdo/fremont-weir.html. Accessed: March 29, 2021.
Hamilton City Flood Damage Reduction and Ecosystem Restoration Project	USACE	Phase 1 Levee Construction Complete	The Hamilton City Levee Construction and Revegetation Project is a dual-purpose flood risk management and ecosystem restoration project, which will construct approximately 6.8 miles of levee for improved flood protection and about 1,500 acres of native habitat. The new setback levee will provide improved levels of flood risk management and levee stability. The restoration work will benefit the recovery and stability of numerous federal and state-listed species and provide a more natural river function, contributing significantly to aquatic ecosystem restoration along this reach of the Sacramento River.	U.S. Army Corps of Engineers. 2021b. *Hamilton City Flood Damage Reduction & Ecosystem Restoration*. Available: https://www.spk.usace.army.mil/Missions/Civil-Works/Hamilton-City/. Accessed: March 29, 2021. Sacramento River Forum. 2021a. *Hamilton City Flood Damage Reduction & Ecosystem Restoration Project*. Available:

Project	Primary Agencies	Status[1]	Description	References
				https://www.sacramentoriver.org/forum/index.php?id=hamilton_city. Accessed: March 29, 2021.
Knights Landing Outfall Gates (KLOG) Fish Barrier Project	Reclamation District 108 and California Natural Resources Agency	Completed	The project installed a positive fish barrier on the downstream side of the existing Knights Landing Outfall Gates to eliminate adult salmon straying off of the Sacramento River. Rehabilitate the outfall gates by repairing known structural deficiencies (including scouring found at the inlet and outlet gates), replacing worn out appurtenances, construct a trash barrier system to protect the gates and ease debris collection, and upgrading the electrical and communication system to include backup capability to meet current USACE O&M standards This project has been identified as one of the projects that will be implemented under California EcoRestore.	Northern California Water Association. 2019. *Sacramento Valley Salmon Recovery Program*. September 2019. Available: https://norcalwater.org/wp-content/uploads/SacValleySalmonRecoveryProgram.fulloct2018.pdf. Accessed: March 29, 2021. U.S. Department of the Interior, Bureau of Reclamation. 2015. *Reclamation Releases Finding of No Significant Impact for Knights Landing Outfall Gates Fish Passage Project*. September 22, 2015. Available: https://www.usbr.gov/newsroom/newsroomold/newsrelease/detail.cfm?RecordID=50440. Accessed: March 29, 2021. California Department of Natural Resources. 2020. *Knights Landing Outfall Gate Fish Barrier Project*. Available: https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Knights_Landing_Outfall_Gate.pdf. Accessed: October 12, 2020.
Lake California Side Channel Reconnection Project	Reclamation District 108 and Sacramento River Forum	Completed	The project removed accumulated gravel at the inlet and reconnect and existing side channel to the Sacramento River during the low flows of late fall and early winter between river mile 269 and 270 to create rearing habitat for juvenile salmon	Northern California Water Association. 2019. *Sacramento Valley Salmon Recovery Program*. September 2019. Available: https://norcalwater.org/wp-content/uploads/SacValleySalmonRecoveryProgram.fulloct2018.pdf. Accessed: March 29, 2021.
Liberty Island Conservation Bank	Reclamation District 2093	Completed	This project received permits and approvals in 2009 to create a conservation bank on the northern tip of Liberty Island that would preserve, create, restore, and enhance habitat for native Delta fish species, including Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead, delta smelt, and Central Valley fall- and late fall-run Chinook salmon. The project consists of creating tidal channels, perennial marsh, riparian habitat, and occasionally flooded uplands on the site. The project also includes the breaching of the northernmost east-west levee, and preservation and restoration of shaded riverine aquatic habitat along the levee shorelines of the tidal sloughs. The island's private levees failed in the 1997 flood and were not recovered, leaving all but the upper 1,000 acres and the adjacent levees permanently flooded. These upper acres encompass the proposed bank. The lower nearly 4,000 acres will remain, at least for the near future, predominantly open water and subtidal because tidal elevations are too great for marsh or riparian habitat.	Wildlands. 2020. *Liberty Island Conservation Bank*. Available: https://www.wildlandsinc.com/banks/liberty-island-conservation-bank-salm/. Accessed: October 12, 2020.
Lower American River Modified Flow Management Standard	Sacramento Water Forum	Completed	The Modified Flow Management Standard for the lower American River has the goals of protecting anadromous salmonids and avoiding catastrophic water shortages in the basin. Flows are currently released on the American River to achieve these goals.	Sacramento Water Forum. 2015. *The Lower American River Modified Flow Management Standard: A Drought Buffer for the Environment and Local Water Supplies*. Available: http://www.waterforum.org/wp-content/uploads/2017/08/WF-Modified-FMS-10_8_final_Single.pdf. Accessed: April 2, 2021.
Lower Yolo Restoration Project	State and Federal Contractors Water Agency,	On hold	The project is located in the lower Yolo Bypass and is a tidal and seasonal salmon habitat project restoring tidal flux to about 1,100 acres of existing pasture land. The project site includes the Yolo Ranch, also known as McCormack Ranch, which was purchased in 2007 by the Westlands Water District (WWD). 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	California Natural Resources Agency. 2020b. *Lower Yolo Restoration Project*. Available: https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Lower_Yolo_Restoration.pdf. Accessed: October

Project	Primary Agencies	Status[1]	Description	References
	DWR, and MOA Partners		enhanced flood protection. The Lower Yolo wetlands restoration project is part of an adaptive management approach in the Delta to learn the relative benefits of different fish habitats, quantify the production and transport of food and understand how fish species take advantage of new habitat.	8, 2020.
Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project	Reclamation, DWR	Ongoing	This project would comply with the NMFS Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and the State Water Project (2009 Biological Opinion) Reasonable and Prudent Actions (RPAs) 1.6.1 and 1.7. RPA Action 1.6.1 requires significantly increased seasonal floodplain rearing habitat availability with biologically appropriate frequency and duration from December through April in the lower Sacramento River Basin. RPA Action 1.7 requires improved fish passage throughout the Yolo Bypass. The alternative currently being pursued would construct and operate one or more gated and/or passive diversion channels to improve the connection between the Yolo Bypass and the Sacramento River at the Fremont Weir, and including passage improvements to the Tule Canal. A draft EIR/EIS was prepared to evaluate alternatives to meet the 2009 Biological Opinion requirements. Wallace Weir, described separately, is also intended to partially satisfy RPA Action 1.7.	U.S. Department of the Interior, Bureau of Reclamation. 2021b. *Yolo Bypass Salmonid Habitat Restoration and Fish Passage*. Last updated: March 8, 2021. Available: https://www.usbr.gov/mp/bdo/yolo-bypass.html. Accessed: April 2, 2021. California Department of Water Resources. 2021b. *Yolo Bypass Habitat Restoration Projects*. Available: https://water.ca.gov/Programs/Environmental-Services/Restoration-Mitigation-Compliance/Yolo-Bypass-Projects. Accessed: April 2, 2021.
North Delta Flood Control and Ecosystem Restoration Project	DWR	Ongoing	The North Delta Flood Control and Ecosystem Restoration Project is proposed near the confluence of the Cosumnes and Mokelumne rivers by DWR and encompasses approximately 197 square miles. The project is intended to improve flood management and provide ecosystem benefits in the North Delta area through actions such as construction of setback levees and configuration of flood bypass areas to create quality habitat for species of concern. These actions are focused on McCormack-Williamson Tract and Staten Island. The project would implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures in the 197 square-mile project study area. The Project as described in the Final EIR included levee modifications to allow controlled flow across McCormack-Williamson Tract and to mitigate hydraulic impacts; channel dredging to increase flood conveyance capacity; an off-channel detention basin on Staten Island; ecosystem restoration where floodplain forests and marshes would be developed at McCormack-Williamson Tract and the Grizzly Slough property; setback levee on Staten Island to expand the floodway conveyance; opening up the southern portion of McCormack-Williamson Tract to boating; improving the Delta Meadows property; providing access and interpretive kiosks for wildlife viewing; and providing restroom, circulation, parking, and signage infrastructure to support such uses (DWR 2010).	California Department of Water Resources. 2020d. *North Delta Program*. Available: https://water.ca.gov/Programs/Flood-Management/Delta-Conveyance-And-Flood-Protection/North-Delta-Program. Accessed: October 7, 2020. California Natural Resources Agency. 2020c. *Project: North Delta Flood Control and Ecosystem Restoration Project*. Available: https://bondaccountability.resources.ca.gov/Project.aspx?ProjectPK=8461&PropositionPK=5. Accessed: October 8, 2020.
Painter's Riffle Anadromous Fish Habitat Enhancement Project	Glenn-Colusa Irrigation District	Completed	The project reopened Painter's Riffle, a historic Sacramento River salmonid spawning side channel in Redding, by moving more than 8,000 cubic yards of gravel.	Northern California Water Association. 2019. *Sacramento Valley Salmon Recovery Program*. September 2019. Available: https://norcalwater.org/wp-content/uploads/SacValleySalmonRecoveryProgram.fulloct2018.pdf. Accessed: March 29, 2021. Glenn-Colusa Irrigation District. 2021. *Painter's Riffle Anadromous Fish Habitat Enhancement*. Available: https://www.gcid.net/painters-riffle-project. Accessed: March 29, 2021.
Red Bluff Diversion Dam Fish Passage Project	Reclamation and Tehama Colusa Canal Authority	Completed	The project modifies the Red Bluff Diversion Dam to reduce or minimize impacts on migration of anadromous fish and improve the reliability of agricultural water supply in the Tehama-Colusa and Corning Canal systems. The project includes a new pumping plant and fish screen with a pumping capacity of 2,500 cubic feet per second (cfs). The initial installed pumping capacity is 2,000 cfs. There is no increase in water diversions above 2,500 cfs. The original diversion dam is currently in the decommissioning process.	Tehama-Colusa Canal Authority. 2013. *Fish Passage Improvement Project at the Red Bluff Diversion Dam*. Available: https://www.tccanal.com/RBDD-Bro-Spring2013_pages.pdf. Accessed: October 12, 2020.

Project	Primary Agencies	Status[1]	Description	References
Restoring Ecosystem Integrity in the Northwest Delta	California Department of Fish and Wildlife	Completed	This project proposes to acquire conservation easements within the Cache Slough complex, along the Barker, Lindsey and Calhoun Sloughs, north Delta tidal channels located west of the Yolo Bypass. Acquisition of conservation easements will be on 1,100 acres of existing riparian, wetland and/or agricultural lands. Currently in the process of acquiring an agricultural easement on 292 acres. Manage and restore up to 1,300 acres of perennial grassland/vernal pool complex in Solano County, CA, and develop a management plan for the Pembco property or other acquisition within the Jepson Prairie Preserve Island Corridor.	EcoAtlas. 2020. *Restoring Ecosystem Integrity in the Northwest Delta: Phase II*. Available: https://www.ecoatlas.org/regions/adminregion/delta/projects/5876. Accessed: October 11, 2020.
Upper Sacramento River Anadromous Fish Habitat Restoration Project(s)-	California Department of Fish and Wildlife, DWR, Reclamation, Glenn-Colusa Irrigation District	Completed	The Upper Sacramento River Anadromous Fish Habitat Restoration Project is located at multiple sites along the Sacramento River, including: Market Street, Gravel Placement Project, Turtle Bay Side Channel Project, Sand Slough Side Channel Enhancement Project, Anderson River Park Side Channels Project, Reading Island Side Channel Project, Lake California Side Channel Project, and Keswick Gravel Injections. Between 2012 and 2021, restoration projects have been conducted and include the addition of 20,000 tons of spawning gravel to the river just below Keswick Dam, the construction of constructing up to four additional perennial side channels on the island with associated placement of instream habitat structure to provide juvenile salmonid rearing and spawning habitat, the enhancement of an existing constructed side channel to improve its performance as juvenile salmonid rearing habitat, the modification of an existing side channel to provide suitable flows for juvenile salmon throughout the year, the creation of 11,500 linear feet of suitable perennial habitat for salmon of all age classes (including endangered winter-run Chinook), steelhead and trout, and the establishment of .95 miles of perennially flowing side channels along the Sacramento River to provide rearing habitat for juvenile Chinook salmon.	Sacramento River Forum. 2021b. *Upper Sacramento River Anadromous Fish Habitat Restoration Program*. Available: https://www.sacramentoriver.org/forum/index.php?id=channels. Accessed: March 29, 2021. U.S. Department of the Interior, Bureau of Reclamation. 2021c. *Upper Sacramento River Anadromous Fish Habitat Restoration Program*. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=23758. Accessed: March 29. 2021. Reclamation District 108. 2021. *Market Street Gravel Project*. Available: https://www.rd108.org/market-street-gravel-project/. Accessed: March 29, 2021. Sacramento Valley Ecological Restoration. 2021. *Sand Slough Side Channel Enhancement Project*. Available: http://www.saverfoundation.org/sand-slough/#:~:text=The%20Sand%20Slough%20Side%20Channel,River%20in%20Tehama%20County%2C%20California. Accessed: March 29, 2021. Northern California Water Association. 2019. *Sacramento Valley Salmon Recovery Program*. September 2019. Available: https://norcalwater.org/wp-content/uploads/SacValleySalmonRecoveryProgram.fulloct2018.pdf. Accessed: March 29, 2021.
Upper Sacramento River Salmon Rearing Habitat Project	River Garden Farms	Completed	Installed 25 juvenile salmon shelter structures, consisting of tree trunks and root wads bolted to limestone boulders installed in the Sacramento River near Redding.	Sacramento River Forum. 2021b. *Upper Sacramento River Anadromous Fish Habitat Restoration Program*. Available: https://www.sacramentoriver.org/forum/index.php?id=channels. Accessed: March 29, 2021.
Wallace Weir Fish Rescue Facility Project	Reclamation District 108	Completed	Constructed a permanent weir with a positive fish barrier and fish collection facility in the Yolo Bypass to prevent adult salmon from straying into the Colusa Basin Drain and to facilitate relocation of adult salmon that have strayed into the Yolo Bypass.	California Natural Resources Agency. 2021. *Wallace Weir Fish Rescue Facility Project*. Available: https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Wallace_Weir_Modification.pdf. Accessed: April 2, 2021.
Infrastructure and Development Projects				
Alternative Intake Project	Contra Costa Water District,	Completed	The Alternative Intake Project was completed in 2010. The project located a new drinking water intake at Victoria Canal, about 2.5 miles east of Contra Costa Water District's (CCWD) existing intake on the Old River, which allows CCWD to divert higher quality	U.S. Department of the Interior, Bureau of Reclamation. 2020d. *Contra Costa Water District Alternative Intake*

Project	Primary Agencies	Status[1]	Description	References
	Reclamation, DWR		water when it is available. The new screened intake includes a 2.5-mile pipeline extension and a new pumping plant that ties into CCWD's existing conveyance system. The new intake has the same capacity and similar design as the existing Old River intake (250 cubic feet of water per second).	*Project EIR/EIS*. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=1818. Accessed: October 12, 2020.
Colusa Generating Station	California Energy Commission	Ongoing	The CGS is fueled by natural gas delivered to the site via an 8 inch, 1,500-foot pipeline owned and operated by PG&E. Water for the project is provided by the Glenn-Colusa Irrigation District (GCID) via the Tehama-Colusa Canal (TC Canal), which is located to the west of the project site. The project uses a Zero Liquid Discharge wastewater system. Air emissions from the facility are controlled using Best Available Control Technology with air pollution credits obtained from the Colusa County Air Pollution Control District. The facility is interconnected to the nearby existing electrical infrastructure owned by PG&E. The electrical switchyard and transmission facilities allow delivery of the power plant's output to PG&E's existing Cottonwood to Vaca-Dixon 230-kilovolt (kV) transmission corridor located approximately 1,800 feet east of the project site.	California Energy Commission. 2021. *Colusa Generating Station*. Available: https://ww2.energy.ca.gov/sitingcases/colusa/. Accessed: March 29, 2021.
Contra Costa Canal Replacement Project	Contra Costa Water District	Ongoing	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. The first phase was initiated in 2009. The project would encase a 1,900-foot portion of the Contra Costa Canal to reduce salinity and water quality impacts of groundwater seepage from adjacent agricultural areas, as well as to increase public safety and flood protection. Contra Costa Water District will be initiating plans for the remaining sections.	California Natural Resources Agency. 2020d. *Project: Rock Slough Water Quality Improvements: Contra Costa Canal Replacement Project*. Available: http://bondaccountability.resources.ca.gov/Project.aspx?ProjectPK=9461&PropositionPK=4. Accessed: October 8, 2020.
Davis-Woodland Water Supply Project	City of Davis, City of Woodland, and University of California, Davis	Completed	The Davis-Woodland Water Supply Project would divert up to about 46,100 AF per year of surface water from the Sacramento River and convey it for treatment and subsequent use in Davis and Woodland and on the University of California, Davis campus. The purposes of the project are to provide a reliable water supply to meet existing and future needs, improve water quality for drinking supply purposes, and improve treated wastewater effluent quality through 2040. Project activities would include construction and operation of a water intake/diversion, conveyance, and water treatment facilities. Surface water supplies would be acquired through new water rights and water rights transfers from senior water rights holders. The Project would be located in the east-central portion of Yolo County, between and within the cities of Woodland and Davis, the University of California, Davis campus, and west of the Sacramento River. The new water diversion facility would be constructed on the Sacramento River near the Interstate 5 crossing at the location of the existing Reclamation District 2035 diversion. The water treatment plant to treat the surface water diverted from the Sacramento River would have an ultimate capacity of up to 106 millions of gallons per day (MGD). Water diversions under the 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.	Woodland-Davis Clean Water Agency. 2020. *Project Overview*. Available: https://www.wdcwa.com/project-overview. Accessed: October 12, 2020.
Del Puerto Canyon Reservoir	Del Puerto Water District and San Joaquin River Exchange Contractors Water Authority	Approved; ongoing	Del Puerto Water District and the Exchange Contractors would construct and operate the Del Puerto Canyon Reservoir. The project will deliver existing contracted water from the Delta-Mendota Canal into the new 80 thousand acre-feet (TAF) reservoir. The reservoir would allow water to be delivered into storage during wetter periods until it is needed in drier periods for irrigation, groundwater recharge, or wildlife beneficial uses. The reservoir would be located in Del Puerto Canyon in the Coast Range foothills west of Patterson and south of the Sacramento–San Joaquin Delta, just west of Interstate 5.	Del Puerto Canyon Reservoir. 2021. https://www.delpuertocanyonreservoir.com/. Accessed: July 1, 2021
Delta Conveyance	DWR, USACE	Ongoing	Delta conveyance refers to State Water Project (SWP) infrastructure in the vast network of waterways comprising the Sacramento-San Joaquin Delta (Delta) that collects and moves fresh affordable water to homes, farms and businesses throughout major regions of the state from the Bay Area to southern California. DWR is the owner and operator of the SWP and is responsible for all associated upgrades and maintenance, including the proposed Delta Conveyance Project that will modernize SWP conveyance. The Project would add new diversions in the north Delta to promote a more resilient and flexible SWP in the face of unstable future conditions.	California Department of Water Resources. 2020e. *Delta Conveyance*. Available: https://water.ca.gov/deltaconveyance. Accessed: October 8, 2020.

Project	Primary Agencies	Status[1]	Description	References
El Dorado Supplemental Water Rights Project	El Dorado Water & Power Authority	Ongoing	The El Dorado Water & Power Authority (EDWPA) proposes 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 (EID) and Georgetown Divide Public Utility District service areas, and other areas located within El Dorado County that are outside of these service areas. The EDWPA filed petitions for partial assignment of each of State Filed Applications 5644 and 5645, and accompanying applications allowing for the total withdrawal for use of 40,000 acre-feet per year, consistent with the diversion and storage locations allowed under the El Dorado-Sacramento Municipal Utility District Cooperation Agreement with the State Water Board, Division of Water Rights.	State of California. 2020a. *Supplemental Water Rights Project*. Available: https://ceqanet.opr.ca.gov/2008102090. Accessed: October 7, 2020.
Folsom Lake Temperature Control Device	El Dorado Irrigation District, Reclamation	Ongoing	The EID, in collaboration with Reclamation, proposes to construct facilities on the bank of Folsom Lake to withdraw water from the warm upper reaches of the lake while preserving the cold water pool at the bottom of the lake to protect downstream aquatic species. The facilities will include a large diameter concrete-lined vertical shaft and five lined horizontal adits extending from the shaft. This structure, known as a Temperature Control Device, will replace EID's five existing raw pump casings that currently extract water from Folsom Lake. The new facility will be sized to accommodate over twice the current capacity.	El Dorado Irrigation District. 2020. *Folsom Lake Intake Project*. Available: https://www.eid.org/about-us/project-updates/folsom-lake-intake-project. Accessed: October 7, 2020.
Lake Natoma Lower American River Temperature Reduction Project (formerly known as the Lake Natoma Temperature Curtains Pilot Project)	U.S. Fish and Wildlife Service, Reclamation, Sacramento Water Forum	Unknown	The USFWS, Reclamation, and Sacramento Water Forum are proposing the Lower American River Temperature Reduction Modeling Project. The objective of the project is to develop predictive tools that will (1) reduce uncertainties in the performance of identified temperature control actions that could be implemented to improve the management of cold water resources in the Folsom/Natoma reservoir system and the lower American River, and (2) be available for daily operations, planning, and salmon and steelhead habitat studies by other project operators and other stakeholders. The project adapted, calibrated, and verified existing thermodynamic and hydrologic mathematical models for application at Folsom Reservoir, Lake Natoma and the lower American River. The models were used to assess the effectiveness of the identified actions individually and in combination and develop a recommendation for development and implementation of one or more actions for the purpose of reducing temperatures in the lower American River. The actions identified to improve transport of cold water through Lake Natoma and reduce the temperature of the lower American River included a Nimbus Dam curtain, a Lake Natoma plunge zone curtain, Nimbus power plant debris wall removal, dredging Lake Natoma, and modifying Folsom Power plant peak loading operation.	U.S. Department of the Interior, Bureau of Reclamation. 2007. *Temperature Modeling of Folsom Lake, Lake Natoma, and the Lower American River*. April 2007. Available: https://www.flow3d.com/wp-content/uploads/2014/08/Temperature-Modeling-of-Folsom-Lake-Lake-Natoma-and-the-Lower-American-River.pdf. Accessed: October 7, 2020.
Los Vaqueros Reservoir Expansion Phase II	Contra Costa Water District, Los Vaqueros Reservoir Joint Powers Authority, Reclamation	Ongoing	Los Vaqueros Reservoir is an off-stream reservoir in the Kellogg Creek watershed to the west of the Delta. The Los Vaqueros Reservoir initial construction was completed in 1997 as a 100,000 acre-foot off- stream storage reservoir owned and operated by Contra Costa Water District (CCWD) to improve delivered water quality and emergency storage reliability for CCWD's customers. In 2012, the Los Vaqueros Reservoir was expanded to a total storage capacity of 160,000 acre-feet (Phase 1) to provide additional water quality and supply reliability benefits, and to adjust the timing of its Delta water diversions to accommodate the life cycles of Delta aquatic species, thus reducing species impact and providing a net benefit to the Delta environment. An additional expansion up to 275,000 acre-feet. (Phase 2) is being evaluated by CCWD. The alternatives considered in the evaluation also consider methods to convey water from Los Vaqueros Reservoir to the South Bay Aqueduct to provide water to Zone 7 Water Agency, Alameda County Water District, and Santa Clara Valley Water District (Reclamation et al. 2010).	Contra Costa Water District. 2020. *Los Vaqueros Reservoir Expansion Project: Project Documents*. Available: https://www.ccwater.com/993/Project-Documents. Accessed: October 7, 2020. U.S. Department of the Interior, Bureau of Reclamation. 2020e. *Reclamation and Contra Costa Water District Advance Plan To Increase Water Reliability*. February 28, 2020. Available: https://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=69643. Accessed: October 7, 2020.
Maxwell Intertie Project	U.S. Department of Agriculture and Sites Project Authority	Approved	The overall purpose of the proposed Project is to increase the efficiency and reliability of water management in the western Sacramento Valley by adding to or improving existing facilities to facilitate greater flexibility in water conveyance, which would increase the drought resistance of rural communities. Rural development in California has frequently been limited by the availability and reliability of water to support the existing economic engines and the people of rural California. While rural water supplies appear to be plentiful, they are reliant on aging single-purpose water management facilities and winter storm precipitation. Water shortages during droughts and regulatory constraints on the operations of the TC Canal and the GCID Main Canal have decreased the reliability of the water supplies to rural agencies in the Sacramento Valley and affected Central Valley Project deliveries. Some individual Tehama Colusa Canal Authority (TCCA) member districts have independently explored	Northern California Water Association. 2018. Federal Agencies Advance Rural Water Infrastructure for Multi-Benefits in the Sacramento Valley. November. Available: http://www.norcalwater.org. Accessed: September 7, 2021.

Project	Primary Agencies	Status[1]	Description	References
			potential conveyance points between the GCID canal system and individual TCCA landowners and/or individual TCCA district facilities. The proposed Project comprehensively addresses this need and facilitates the flexibility of water conveyance to improve the resiliency of participants during dry years. The Maxwell Water Intertie (MWI) pipeline would connect existing canal systems west of the Sacramento River (the GCID Main Canal and the TC Canal) to achieve this flexibility. The proposed project is comprised of a set of new project features or facilities that would allow for the efficient bi-directional exchange of water from two existing, large water management systems in the western portion of the Sacramento Valley of California. The project features included: A 1,200-AF capacity Terminal Regulating Reservoir (TRR) covering 130 acres with a spillway to the local irrigation ditch system and bottom drain, both of which ultimately connect to Funks Creek; TRR Pumping Plant with a 900-cfs maximum pumping capacity, a 1-acre Electrical Switchyard adjacent to the plant, and a 3.5-mile power line; a GCID Main Canal Connection to TRR including a gated inlet control structure, short inlet channel, and concrete canal lining in the GCID Main Canal immediately upstream and downstream of the TRR connection; a 3.5-mile MWI pipeline sized for 900 cfs pumped capacity and 900 cfs gravity flow capacity, private access bridge over the GCID Main Canal for construction access and maintenance of the pipelines, and a 2.7-mile gravel access road that would run most of the length of the MWI pipeline alignment. The approved project included the granting of a loan from the USDA to assist in the financing of the Maxwell Water Intertie Project.	
North Bay Aqueduct Alternative Intake	Solano County Water Agency	On hold	DWR issued a Notice of Preparation on December 2, 2009 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 segment of pipe. The proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct Alternative Intake at Barker Slough. The project would be designed to improve water quality and to provide reliable deliveries of SWP supplies to its contractors, the Solano County Water Agency, and the Napa County Flood Control and Water Conservation District (DWR 2011).	Sonoma County Water Agency. 2020. *North Bay Aqueduct Alternate Intake Project*. Available: https://www.scwa2.com/wp-content/uploads/2020/01/NBA-Funding-Flyer.pdf. Accessed: October 7, 2020. Delta Stewardship Council. 2020. *North Bay Aqueduct*. Available: https://viewperformance.deltacouncil.ca.gov/pm/north-bay-aqueduct#:~:text=The%20North%20Bay%20Aqueduct%20Alternate%20Intake%20Project%20(NBA%20AIP)%20will,Slough%20(existing%20intake%20location). Accessed: October 7, 2020.
North Delta Flow Action	DWR, Reclamation	Ongoing	In fall 2019 agricultural flows will be directed into Yolo Bypass for up to a month. The action is designed to generate a modest, seasonal positive flow pulse (e.g., 24 TAF) through the Yolo Bypass, but will be well below levels that would result in local flooding. The goal of the action is to support the Delta food web in downstream areas. By routing agricultural drain water through Yolo Bypass instead of the Sacramento River, DWR scientists predicted that a flush of plankton-rich water would provide a "seed" for the downstream Delta, enhancing food resources for delta smelt.	Bay Delta Live. 2020. *North Delta Flow Action 2019 Food Web Study Fact Sheet*. Available: https://www.baydeltalive.com/assets/5c92b61032e1bfd2c6a30d4ee74773aa/application/pdf/North_Delta_Food_Web_Study_Fact_Sheet_06272019.pdf. Accessed: October 8, 2020.
Pacheco Reservoir/San Luis Reservoir Low Point Improvement Project	Reclamation, Santa Clara Valley Water District, San Luis and Delta Mendota Water Authority	Ongoing	Reclamation and DWR jointly manage San Luis Reservoir for the purpose of storing and reregulating CVP and SWP water from the Sacramento-San Joaquin Delta. San Luis Reservoir is an offstream water storage facility that stores water for both projects. The San Luis Reservoir Low Point Improvement Project is proposed by Reclamation, the Santa Clara Valley Water District, and the San Luis and Delta Mendota Water Authority. The project is designed to address water supply reliability issues in San Luis Reservoir that result when water levels fall below 369 feet above sea level (corresponding to a reservoir capacity of 300,000 acre-feet) and create water quality degradation that has the potential to interrupt a portion of the San Felipe Division's water supply. The term "low point" refers to a range of minimum pool elevations in San Luis Reservoir. During the late summer months if the reservoir elevation drops below 369 feet above sea level, the conditions in San Luis Reservoir promote the growth of algae in the reservoir. The water quality during the algal blooms is not suitable for agricultural water users with drip irrigation systems in San	U.S. Department of the Interior, Bureau of Reclamation. 2020f. *San Luis Reservoir Low Point Improvement Project (SLLPIP)*. Available: https://www.usbr.gov/mp/sllpp/. Accessed: October 7, 2020.

Project	Primary Agencies	Status[1]	Description	References
			Benito County or municipal and industrial water users relying on existing water treatment facilities in Santa Clara County. The low point issue increases progressively as the reservoir continues to drop below elevation 369 feet. The comprehensive plan would involve increasing groundwater recharge and recovery capacity, implementing desalination measures, re-operating Santa Clara Valley Water District's raw- and treated- water systems, and implementing institutional measures. If Pacheco Reservoir were to be enlarged, the reservoir would be filled with Delta water; thus, additional impacts on Delta aquatic species (e.g., juvenile salmonids and delta smelt) could result from an increase in Delta exports.	
B.F. Sisk Dam Raise and Reservoir Expansion Project/San Luis Reservoir Expansion (includes dam safety modifications)	Reclamation, DWR, and San Luis & Delta-Mendota Water Authority	Ongoing	Reclamation and DWR jointly manage San Luis Reservoir for the purpose of storing and reregulating CVP and SWP water from the Sacramento-San Joaquin Delta. San Luis Reservoir is an offstream water storage facility that stores water for both projects. This project would add 10 feet to the crest of B.F. Sisk Dam while implementing dam safety modifications. The additional space would be used to store water that could be delivered to south-of-Delta water contractors and wildlife refuges. This water would be used to meet existing contractual obligations and not serve any new demands. The additional 10 feet of dam embankment could add approximately 130 TAF of water storage to San Luis Reservoir. Final EIR/EIS was released in December 2020. The reservoir additional capacity would be filled with Delta water during excess conditions; thus, additional impacts on Delta aquatic species (e.g., juvenile salmonids and delta smelt) could result from an increase in Delta exports.	U.S. Department of the Interior, Bureau of Reclamation. 2013. *San Luis Reservoir Expansion, Draft Appraisal Report*. December 2013. Available: https://www.usbr.gov/mp/sllpp/docs/2013-11-19-draft-san-luis-expansion-appraisal-report.pdf. Accessed: October 9, 2020. U.S. Department of the Interior, Bureau of Reclamation. 2020g. *Trump Administration Advances Plan to Increase San Luis Reservoir Water Storage.* December 30, 2020. Available: https://www.usbr.gov/newsroom/newsroomold/newsrelease/detail.cfm?RecordID=73366. Accessed: April 13, 2021. U.S. Department of the Interior, Bureau of Reclamation. 2021d. *Project Details: B.F. Sisk Dam Raise and Reservoir Expansion Project*. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=44425. Accessed: April 13, 2021.
Shasta Lake Water Resources Investigation	Reclamation	Ongoing	The Shasta Lake Water Resources Investigation is currently being conducted by Reclamation to determine the type and extent of federal interest in a multiple purpose plan to modify Shasta Dam and Reservoir to increase the survival of anadromous fish populations in the upper Sacramento River and increase water supplies and water supply reliability for agricultural, municipal, industrial, and environmental purposes. To the extent possible through meeting these objectives, alternatives include features to benefit other identified water and related resource needs including ecosystem conservation and enhancement, improved hydropower generation capability, flood damage reduction, increased recreation opportunities, and improved water quality conditions in the Sacramento River and the Delta. Anticipated alternatives for expansion of Shasta Lake include, among other features, raising the dam from 6.5 to 18.5 feet above current elevation, which would result in additional storage capacity of 256 TAF to 634 TAF, respectively. The increased capacity is expected to improve water supply reliability and increase the cold water pool, which would provide improved water temperature conditions for anadromous fish in the Sacramento River downstream of the dam. The final EIS and Feasibility Study for the project were completed in July/August 2015. The Final Supplemental Environmental Impact Statement (FEIS) was transmitted to Congress in January 2020 for the project.	U.S. Department of the Interior, Bureau of Reclamation. 2020h. *Shasta Lake Water Resources Investigation*. Available: https://www.usbr.gov/mp/ncao/shasta-lake.html. Accessed: October 7, 2020. U.S. Department of the Interior, Bureau of Reclamation. 2020i. *Shasta Lake Water Resources Investigation EIS*. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=1915. Accessed: October 11, 2020.
South Delta Temporary Barriers Project	DWR	Ongoing	The South Delta Temporary Barriers Project, initiated as a test project in 1991, was developed partially in response to a 1982 lawsuit filed by the South Delta Water Agency. The South Delta Temporary Barriers Project consists of 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 State Water Project to help reduce fishery impacts and improve fishery conditions. Of the four rock barriers, the barrier at the head of Old River serves as a fish barrier (intended to primarily benefit migrating San Joaquin River Chinook salmon) and is installed and operated from April through May and again from September through November. The remaining three barriers (Old River at Tracy, Grant Line Canal, Middle River) serve as	California Department of Water Resources. 2020f. *South Delta Temporary Barriers Project*. Available: https://water.ca.gov/Programs/Bay-Delta/Water-Quality-And-Supply/South-Delta-Temporary-Barriers-Project. Accessed: October 8, 2020. State of California. 2020b. *South Delta Temporary Barriers Project (California Endangered Species Act Incidental Take*

Project	Primary Agencies	Status[1]	Description	References
			agricultural barriers (intended to primarily benefit agricultural water users in the south Delta) and are installed and operated between April 15 and November 30 of each season. In 2008, a court order designed to protect delta smelt prohibited the installation of the spring Head of Old River (HOR) barrier pending fishery agency actions or further order of the court. The remaining three barriers serve as agricultural barriers and are installed between April 15 and September 30 of each season. An experimental underwater, non-physical barrier was installed in 2009. The channel will be open to navigation.	*Permit No. 2081-2011-019-03 (ITP) Amendment No. 3)*. Available: https://ceqanet.opr.ca.gov/2000112054/12. Accessed: October 9, 2020.
South Willows Residential Development	City of Willows	Ongoing	The 143.4-acre project site is located in the southern portion of the city of Willows, Glenn County, California, south of the Glenn-Colusa Irrigation Canal (GCIC), east of Interstate 5 and west of California State Route 99 (Tehama Street). The site is bounded on the south by agricultural land that is currently approved for commercial uses (South Willows Commercial Industrial Center). The Project would subdivide the 143.4-acre subject property into 419 single-family residential lots, one multiple-family lot, a neighborhood park site, several "open space" parcels, and a pedestrian-only bridge over the GCIC. Residential lots would range in size from 6,000 square feet to 15,117 square feet; the multiple-family lot would occupy a 8.1-acre parcel, arranged around the 3.7-acre neighborhood park and set back from Interstate 5, Tehama Street, and the California Northern Railroad transportation corridors and the South Willows Commercial Industrial development to the south. The open space parcels would be graded to accommodate storm and nuisance water runoff. An 8-feet-tall, 3,125-feet-long sound wall would be constructed along the western boundary of the residential subdivision to shield residences from Interstate-generated noise. Construction is anticipated to occur between 2021 and 2028.	City of Willows. 2020. *Initial Study/Subsequent Mitigated Negative Declaration for the South Willows Residential Neighborhood Project*. December 1, 2020. Prepared by Willdan Engineering. Available: https://www.cityofwillows.org/assets/resources/South-Willows-Residential-2020-Initial-Study-FINAL-dec-1-2020-BASIN-Amended-Project.pdf. Accessed: May 28, 2021.
Wal-Mart	City of Willows	Completed	The project built a Wal-Mart Supercenter at 470 N. Airport Road, Willows. The Supercenter contains a grocery component of about 45,951 square feet, and a Tire and Lube Express, as well as a garden center of approximately 14,479 square feet (including 9,581 square feet of hard-fenced outdoor garden center). The use also includes outdoor sales, as well as a seasonal sales area in a portion of the parking lot. Along the front of the Supercenter will be series of small internal "shops" occupying a total floor area of approximately 10,499 square feet. Some of these spaces will be occupied by Wal-Mart services such as optical and pharmacy, while others will be leased to non-Wal-Mart vendors and service providers (e.g., bank, hair salon, dry cleaners, etc.), although vendors have not been identified. The Supercenter will also include sales of alcohol (for off-site consumption). The new Supercenter will be open 24 hours per day, seven days per week. Through a lot line adjustment, two separate parcels or "pad sites" will be configured along Wood Street (State Route 162) at the very front of the Supercenter site. These two parcels are designed to provide for a single fast-food restaurant with drive-through window, and a fuel station. The fuel station will have 12 fueling positions located in the southwest corner of the site near the Wood Street/North Airport Avenue intersection. The fuel station is anticipated to be constructed concurrently with, or very shortly after, the Wal-Mart. The entire project site is zoned "CG General Commercial with a PD Overlay.	City of Willows. 2006. *Final Environmental Impact Report: Willows Wal-Mart Project*. January 2006. Available: https://www.cityofwillows.org/assets/resources/Willows-Walmart-Project-FEIR-Final-Environmental-Impact-Report.pdf. Accessed: May 28, 2021. State of California. 2021. *Willows Wal-Mart Project*. Available: https://ceqanet.opr.ca.gov/2004062128/4. Accessed: May 28, 2021.
Upper San Joaquin River Basin Storage Investigation (Formerly Temperance Flat Dam)	Reclamation	On hold	The Upper San Joaquin River Basin Storage Investigation (Formerly Temperance Flat Dam and the Bay-Delta Conservation Plan, formerly the Peripheral Canal) is being conducted by Reclamation and DWR to evaluate alternative plans to increase Upper San Joaquin River Storage to enhance the San Joaquin River restoration efforts and improve water supply reliability for agricultural, municipal and industrial, and environmental uses in the Friant Division, the San Joaquin Valley, and other regions of the state. The investigation will also evaluate integration of conjunctive management and water transfer concepts into project formulations. Additional storage is also expected to provide incidental flood damage reduction benefits. Reclamation is analyzing alternatives for a new dam and a 1.26 MAF reservoir at San Joaquin River Mile 274, in an area known as Temperance Flat. Primary planning objectives are to (1) increase water supply reliability, and (2) enhance flow and temperature conditions to support the San Joaquin River Restoration Program. To the extent possible, the investigation will explore opportunities to provide other benefits that could include hydropower, flood control, and recreation. Operation variables include reservoir carryover, new or shifting water supply beneficiaries, and alternative conveyance routes. Operations alternatives evaluated in the draft Feasibility Report will be selected from combinations that most economically accomplish the planning objectives.	U.S. Department of the Interior, Bureau of Reclamation. 2019. *Upper San Joaquin River Basin Storage Investigation*. Last updated: December 31, 2019. Available: https://www.usbr.gov/mp/sccao/storage/. Accessed: October 7, 2020.
San Joaquin River	Reclamation	Ongoing	The U.S. Bureau of Reclamation (Reclamation) is implementing the Stipulation of Settlement (Settlement) in NRDC et al. v. Kirk Rodgers et al., consistent with the San Joaquin River Restoration Settlement Act in Public Law 111-11. The San Joaquin River Restoration Program is a comprehensive, long-term effort to restore flows to the San Joaquin River from Friant Dam to the	U.S. Department of the Interior, Bureau of Reclamation. 2009. Finding of No Significant Impact, Water Year 2010 Interim Flows Project, San Joaquin River Restoration

Project	Primary Agencies	Status[1]	Description	References
Restoration Program			confluence with the Merced River, restoring a self-sustaining Chinook salmon population in the river while reducing or avoiding adverse water supply impacts from Restoration Flows. The Settlement calls for the restoration of flows to the San Joaquin River, improvements to the San Joaquin River channel and construction of structures (fish bypasses, fish screens, and similar) to improve fish habitat and provide for fish passage, and the reintroduction of spring-run and fall-run Chinook salmon. The Settlement also calls for a number of activities to reduce the water supply impacts to the Friant Division Central Valley Project Contractors, including restoration the capacity of the Friant-Kern and Madera canals, considering the possibility to reverse the flow in sections of the Friant-Kern Canal, and providing financial assistance for groundwater banking. Reclamation is currently implementing the Settlement in coordination with USFWS, NMFS, DWR, and CDFW.	Program. FONSI-09-09-MP. December. Available: https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=4403. Accessed: October 12, 2020.
Other Projects				
Bay-Delta Water Quality Control Plan Update	State Water Resources Control Board	Ongoing	The State Water Board is updating the 2006 Bay-Delta Water Quality Control Plan (Bay-Delta Plan). The Bay-Delta Plan is being updated through two separate processes (Plan amendments). First, on December 12, 2018, through State Water Board Resolution No. 2018-0059, the State Water Board adopted the Plan amendments and Final Substitute Environmental Document establishing the Lower San Joaquin River flow objectives and revised southern Delta salinity objectives. On February 25, 2019, the Office of Administrative Law approved the Plan amendments, which are now in effect. Second, the State Water Board is also considering Plan amendments focused on the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne Rivers), Delta outflows, and interior Delta flows.	California Water Boards. 2020. *San Francisco Bay/Sacramento – San Joaquin Delta Estuary (Bay-Delta) Watershed Efforts: Bay-Delta Plan Update*. Available: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/. Accessed: October 8, 2020.
Reinitiation of Consultation on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project Biological Opinion	Reclamation	Ongoing	This Record of Decision (ROD or Decision) approves Reclamation's preferred alternative, Alternative 1, to better integrate ESA compliance actions and water supply operations through an operational plan that improves Reclamation's flexibility to manage the CVP, and best meets the authorized Project purposes. Reclamation's Decision includes a significant commitment to improved coordinated operations with DWR to meet ESA requirements for delta smelt, North American green sturgeon, California Central Valley steelhead, Central Valley spring-run Chinook salmon and Sacramento winter-run Chinook salmon and their habitat (collectively, "listed species"), as well as other fish and wildlife species in the project area. This Decision is expected to modernize Reclamation's operations by integrating real-time monitoring and real-time operations to enhance operations. It better reflects the complexity of the Projects where Reclamation operators must address multi-purpose uses, multi-species' needs, and multi-year actions, while complying with federal and state obligations, including coordination with DWR. Reclamation's sound, scientifically-based approach should benefit both ecosystem needs and water supply, including commitments to ESA compliance actions to meet the needs of threatened and endangered species. Based on prior spending by Reclamation, DWR and water users, these measures entail an estimated $1.5 billion expenditure, with an anticipated $15 million annually for real-time monitoring.	U.S. Department of the Interior, Bureau of Reclamation. 2020j. *Record of Decision: Reinitiation of Consultation on the Coordinated Long-Term Modified Operations of the Central Valley Project and State Water Project*. February 2020. Available: https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=42324. Accessed: October 27, 2020.
Incidental Take Permit for Long-Term Operation of the State Water Project in the Sacramento–San Joaquin Delta	DWR	Ongoing	The California Department of Fish and Wildlife issued an Incidental Take Permit to DWR for long-term operations of the State Water Project. The permit covers four species protected under the California Endangered Species Act: delta smelt, longfin smelt, winter-run Chinook salmon and spring-run Chinook salmon.	California Department of Fish and Wildlife. 2020b. *Long-Term Operation of the State Water Project in the Sacramento San Joaquin Delta*. March 31, 2020. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Files/ITP-for-Long-Term-SWP-Operations.pdf?la=en&hash=AE5FF28E0CB9FA5DC67EF1D6367C66C5FF1B8B55. Accessed: May 27, 2021.

Notes: AB = Assembly Bill; AFSP = Anadromous Fish Screen Program; CVFPB = Central Valley Flood Protection Board; CVPIA = Central Valley Project Improvement Act; Delta = Sacramento–San Joaquin Delta; DRMS = Delta Risk Management Strategy; DWR = California Department of Water Resources; EA = Environmental Assessment; EIR = environmental impact report; EIS = environmental impact statement; ESA = Endangered Species Act; FERC = Federal Energy Regulatory Commission; Folsom DS/FDR = Folsom Dam Safety and Flood Damage Reduction; FONSI = Finding of No Significant Impact; KLRCDD = Knights Landing Ridge Cut Drainage District; Natomas Mutual = Natomas Central Mutual Water Company; Reclamation = U.S. Department of the Interior, Bureau of Reclamation; SAFCA = Sacramento Area Flood Control Agency; SB = Senate Bill; SRBPP = Sacramento River Bank Protection Project; SRFCP = Sacramento River Flood Control Project; USACE = U.S. Army Corps of Engineers; WSAFCA = West Sacramento Area Flood Control Agency;
[1]Projects identified as ongoing are projects considered present projects or reasonably foreseeable projects. Projects identified as complete are considered past projects. Projects identified as approved are considered reasonably foreseeable.

31.3 Cumulative Impacts Analysis by Resource

The potential for Project implementation to result in a cumulatively considerable incremental contribution was determined for each resource based on the associated thresholds of significance (or evaluation criteria for NEPA-only resources), as described in Chapters 5 through 30. To reduce any cumulatively considerable incremental contributions from the Project, feasible mitigation measures are proposed for all potentially substantial adverse direct and indirect effects. In some cases, no feasible mitigation could be applied to reduce effects and the cumulative effects are considered to be significant and unavoidable.

The Best Management Practices (BMPs) referenced in the following cumulative analysis by resource are listed and briefly discussed in the respective resource chapter. They are described more fully in Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies*. In addition, mitigation measures referenced are fully described in the resource chapters. Technical details related to the analysis of the alternatives can also be found in the respective resource chapter.

Not all of the projects included in Table 31-1 may have been considered within the cumulative assessment for each resource analyzed below. The projects were first reviewed to determine if they could have an impact on a specific resource being evaluated. If so, these projects were considered in the cumulative analysis for a particular resource. As such, the cumulative impact analysis varies between resources and by geographic area. For example, the list of cumulative projects identified for the cultural resources assessment may be different than the list developed for the water quality assessment, as each of the projects selected have common impact mechanisms that would result in an impact on cultural resources or water quality, but not both. Each resource section below identifies the projects in Table 31-1 that are relevant to the resource-specific cumulative analysis.

31.3.1. Surface Water Resources and Water Quality

The cumulative geographic scope for flood control and management resources includes local drainages associated with the Sites Reservoir (e.g., Funks, Stone Corral, and Hunters Creeks), as well as downstream waterbodies such as the Sacramento River, Yolo Bypass, and Delta. Engineered drainage canals (i.e., TC Canal, GCID Main Canal, and CBD) are also included. These areas are included for potential construction and operation impacts described in Chapter 5. Projects from Table 31-1 that are included in the geographic scope include flood control projects (e.g., CALFED Levee System Integrity Program, Delta Levees Flood Protection Program, Sacramento River Bank Protection Project [SRBPP]) and restoration projects (e.g., Ecosystem Restoration Program [ERP], Hamilton City Flood Damage Reduction and Ecosystem Restoration Project) that have the potential to affect flood control and management resources in local drainages, along the Sacramento River, and in the Delta. As described in Chapter 5, other watercourses and flood storage facilities associated with northern California's water delivery and flood management infrastructure are not considered with respect to flooding. Based on the various modeling results available for the Project, these areas are unlikely to include substantial increases in flow or storage that would increase likelihood of flooding.

The cumulative geographic scope for water supply focuses on the main points of diversion in the Central Valley and Delta. The following types of projects from Table 31-1 may affect water supply.

- Water storage projects (e.g., Los Vaqueros Reservoir Expansion, San Luis Reservoir Expansion, Shasta Lake Water Resources Investigation, and Upper San Joaquin River Basin Storage Investigation)
- Water supply projects (e.g., Davis-Woodland Water Supply Project and El Dorado Supplemental Water Rights Project)
- Regulatory projects (e.g., Bay-Delta Water Quality Control Plan Update, ROC ON LTO BiOps, SWP ITP, and ongoing implementation of Sustainable Groundwater Management Act).

The cumulative geographic scope for water quality is the same as described in Chapter 6 and consists of those areas with greatest potential to be affected by the Project and associated changes in operations. This study area includes drainages in the Sites Reservoir inundation area, Shasta Lake and the Sacramento River, Lake Oroville and the Feather River, Folsom Lake and the American River, Yolo Bypass, and the Delta. Conveyance and storage facilities for moving water to and from Sites Reservoir are also considered, especially the CBD due to its multiple beneficial uses and discharge to Yolo Bypass and the Sacramento River. In addition, San Luis Reservoir is considered due to potential changes in Delta export operations.

Projects from Table 31-1 that are considered in the cumulative analysis for water quality include past, present, and reasonably foreseeable future projects that could affect water quality in the study area. These projects include those with a construction component, which could result in temporary impacts on surface water quality, as well as projects that have the potential to affect water quality on a more long-term basis. For example, the Bay-Delta Plan updates and other regulatory projects might affect regulations regarding diversions and could affect the amount of water available for diversion to Sites Reservoir storage, as could upstream water storage projects such as raising Shasta Dam. Wetland and floodplain restoration projects that increase aquatic habitat (e.g., Cache Slough Complex Restoration, North Delta Flood Control and Ecosystem Restoration Project, Ecosystem Restoration Program Conservation Strategy, Lake California Side Channel Reconnection Project, Liberty Island Conservation Bank, Lower Yolo Restoration Project, and Yolo Bypass Habitat Restoration and Fish Passage Project) have the potential to affect concentrations of water quality constituents such as organic carbon and methylmercury. Other projects may improve water quality. For example, the North Bay Aqueduct alternative intake may improve water quality in the North Bay Aqueduct, Franks Tract gates may reduce salinity in the Delta, and further implementation of Total Maximum Daily Loads (TMDL) may reduce water quality impairments.

31.3.1.1. Alternatives 1, 2, and 3 – Flooding

Construction and operation would not result in an incremental contribution on flood control and management resources because effects would be minimal when considered in the broader flood control regime. Construction and operation of Alternative 1, 2, or 3 would not substantially increase the rate or amount of surface runoff in a manner which would result in onsite or offsite flooding. Streamflow present in Funks or Stone Corral Creeks would be contained behind coffer

dams and localized flooding in these creeks would be avoided during construction. Streamflow in the channels associated with construction of the South Road (under Alternative 2 only) would be contained in a similar manner. Equipment used during construction activities in mapped 100-year floodplains would not increase the rate or amount of surface runoff in a manner which would result in onsite or offsite flooding. Project facility design and BMPs would incorporate necessary design features (e.g., low impact development practices, bioswales, infiltration basins) to result in equivalent functioning of existing drainage system.

Operation of Alternative 1, 2, or 3 would not significantly change the overall volume of water in the Sacramento River, and would therefore not contribute to onsite or offsite flooding. A flood protection benefit would also be provided for the areas downstream of Sites Reservoir in the Stone Corral Creek and Funks Creek watersheds (including the community of Maxwell) by reducing the size of the floodplain in the region.

Construction and operation of Alternative 1, 2, or 3 would not impede or redirect flood flows. The main and saddle dams would be designed and constructed pursuant to required guidelines and criteria designed to prevent dam failure. The designs would incorporate multiple lines of defense or design redundancy as required to meet design standards. In addition, an Emergency Action Plan would be prepared and submitted to the Governor's Office of Emergency Services for Project construction and operation.

With respect to emergency releases, Sites Reservoir would be designed to release flows into downstream waterbodies (i.e., Hunters Creek, Stone Corral Creek, and Funks Creek). Emergency releases would have the potential to occur only during years of very heavy precipitation when the Sites Reservoir is already at capacity and a localized storm in the Sites Reservoir watershed creates a significant rise in the reservoir's water surface. The risk of an event requiring such an emergency release remains very small because inflow is controlled through pumping. Water diversions to Sites Reservoir would not occur once the reservoir reaches a certain stage and additional precipitation events are forecasted to occur. Further, should water diversions continue in a highly unlikely scenario, the Authority would be able to prepare for any necessary flood warnings to the public downstream of the reservoir per the Emergency Action Plan.

Reservoir releases to the CBD would be controlled by operations and would not inundate existing agricultural fields adjacent to the CBD through overtopping, seepage, or reverse flows. No flooding in the CBD area is anticipated as a result of Project operation. Reservoir releases potentially could be directed to the Yolo Bypass instead of the Sacramento River from August through October.

The types of projects that could result in cumulative impacts related to flood control and management resources are those that involve large-scale modifications to existing drainages. Most projects in Table 31-1 have not resulted in cumulatively considerable impacts on flood control and management resources because they have served to reduce the existing flood risk. Localized onsite or offsite stormwater runoff may have occurred or could occur during construction of projects that require soil disturbance. Implementation of standard BMPs (e.g., Stormwater Pollution Prevention Plans [SWPPPs]) for other projects would reduce these types of localized effects. Furthermore, localized effects would be separated both spatially (e.g., projects

would not always abut one another) and temporally (e.g., projects would have different construction periods).

Alternative 1, 2, or 3 would not cause an incremental impact that would be significant when added to the impacts on flood control and management resources from other past, present, and reasonably foreseeable future actions.

31.3.1.2. Alternatives 1, 2, and 3 – Water Supply

Limited water supply for municipal, industrial, and agricultural purposes in California is a cumulatively considerable challenge. Water supply impacts to other (non-Storage Partner) water users associated with the construction of Sites Reservoir as described in Impact HYDRO-1 would not cause an incremental impact that would be significant when added to the impacts on water supply from other past, present, and reasonably foreseeable future actions because the water used for construction would be sourced locally.

Water supply impacts to other (non-storage partner) water users associated with the operation of Sites Reservoir as described in Impact HYDRO-1 would be less than significant and would continue to be less than significant even with the addition of future cumulative projects. Future projects or regulatory changes could increase or decrease the amount of water available for water supply in California or for storage in Sites Reservoir, but this would not affect the requirement that Project operations follow all regulations. Operation of Alternative 1, 2, or 3 would not cause an incremental impact that would be significant when added to the impacts on water supply from other past, present, and reasonably foreseeable future actions because Project operations would adhere to water-rights law and regulations and would protect existing beneficial uses associated with existing water rights.

31.3.1.3. Alternatives 1, 2, and 3 – Water Quality

As described for Impact WQ-1 and WQ-3, construction of Project facilities and maintenance activities would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality in the study area. Implementation of BMPs (including SWPPPs, Spill Prevention and Hazardous Materials Management/Spill Prevention, Containment, and Countermeasure Plans [SPCCPs]) and the Standard Operating Procedures would minimize or avoid the potential discharge of pollutants to study area waterbodies and thereby minimize any incremental contribution to a cumulative impact during construction and maintenance. Furthermore, any changes in water quality associated with construction of Alternative 1, 2, or 3 would be temporary and highly localized to receiving waters in proximity to the construction activities and would not cause an incremental impact that would be significant when added to the impacts on water quality from other past, present, and reasonably foreseeable future actions because there are no other additional construction projects in proximity to receiving waters (e.g., Walker or Willow Creeks, Sacramento River at Hamilton City, or the Sacramento River discharge location under Alternative 2).

Releases from Sites Reservoir under Alternatives 1, 2, and 3 would not reduce drinking water quality downstream due to nutrients or organic carbon or cause low dissolved oxygen, because nutrients and organic carbon would be diluted and water would be aerated upon release (Impacts WQ-1 and WQ-2, Alternatives 1, 2, and 3). Therefore, Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to the impacts on water quality

related to these constituents from other past, present, and reasonably foreseeable future actions. Nutrient levels could promote harmful algal blooms (HABs) in Sites Reservoir especially during the initial fill period. If cyanobacteria and cyanotoxins were present in reservoir releases, concentrations would be greatly diluted when eventually discharged into the Sacramento River, either via CBD (Alternatives 1 or 3) or the Sacramento River discharge (Alternative 2), and cyanotoxins would undergo biodegradation and photodegradation relatively rapidly (e.g., over a period of several days for microcystins). Measures implemented as part of the Reservoir Management Plan (RMP) with regard to HABs including monitoring for cyanotoxins and cyanobacteria and restricting in-water recreation based on the presence of cyanobacteria and cyanotoxins, and releasing water from lower in the reservoir if cyanobacteria and cyanotoxins are confirmed near the I/O tower at a level at or exceeding the "Caution" action trigger level would further reduce any potential for adverse effects on water quality. Accordingly, Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to the impacts on water quality related to cyanobacteria and cyanotoxins from other past, present, and reasonably foreseeable future actions.

The Delta and several tributaries to the Delta (including the Sacramento River) are impaired by mercury, and fish tissue methylmercury concentrations in the Delta currently exceed the Delta methylmercury TMDL objectives for trophic level 3 and 4 fish (0.08 mg/kg and 0.24 mg/kg, wet weight, respectively) (Central Valley Regional Water Quality Control Board 2011). The Delta acts as a sink for mercury and methylmercury. Sources of mercury and methylmercury to the Delta include discharges from past and present projects identified on Table 31-1, such as restored wetlands and floodplains, irrigated agriculture, water deliveries to the Delta, dredging projects, runoff from urban areas, and municipal and industrial wastewater. Ongoing and future floodplain and wetland restoration projects in the study area would also be expected to contribute to some degree to the cumulative condition of increased methylmercury in the cumulative geographic scope that could lead to exceedances of water quality standards. Numerous regulatory programs are being implemented or are being developed (e.g., the Statewide Mercury Control Program for Reservoirs) to minimize mercury and methylmercury loading to the Delta. These programs include the Delta methylmercury TMDL, Cache Creek mercury TMDL (Central Valley Regional Water Quality Control Board 2005); Clear Lake mercury TMDL (Central Valley Regional Water Quality Control Board 2002); and American River watershed methylmercury TMDL (Central Valley Regional Water Quality Control Board 2010). These programs are intended to reduce transport of mercury and the production of methylmercury in the Delta and would be expected to reduce the current levels of mercury and methylmercury over time.

As described for Impact WQ-1 and WQ-2, elevated methylmercury concentrations in Sites Reservoir, especially in the short term, i.e., during the initial filling of the reservoir and for 10 years after the initial filling, may cause measurable increases in aqueous and fish tissue methylmercury concentrations in the north Delta, particularly in the short term and in Dry and Critically Dry Water Years during the release period. Alternative 1, 2, or 3 would result in an incremental contribution to the cumulative effect of methylmercury on water quality because, based on the estimated reasonable worst-case short-term methylmercury concentration (0.3 nanograms/liter [ng/L]) in Sites Reservoir releases, aqueous and fish tissue methylmercury concentrations in the Sacramento River at Freeport may increase by 28% and 50%, respectively, above existing conditions. Elevated methylmercury concentrations due to the initial filling of the

reservoir would also increase aqueous and fish tissue methylmercury concentrations in CBD during the release period of below normal and drier water year types. In the long-term (i.e., following the 10 years after the initial filling period), fish tissue methylmercury concentrations in Sites Reservoir may exceed the sport fish tissue methylmercury objective (0.2 mg/kg, wet weight), and releases with the estimated worst-case long-term methylmercury concentration (0.15 ng/L) would increase aqueous methylmercury concentrations in CBD during the release period to the greatest degree in Dry and Critically Dry Water Years. Releases may also contribute mercury and methylmercury to Funks and Stone Corral Creeks, and this contribution would be greater in the short term. Releases from Sites Reservoir following the 10 years after the initial filling period under Alternative 1, 2, or 3 would increase aqueous and fish tissue methylmercury concentrations in the north Delta relative to existing conditions to some degree in Dry and Critically Dry Water Years. At the estimated long-term methylmercury concentration in releases (0.1 ng/L), the aqueous and fish tissue methylmercury concentrations in the north Delta would increase by approximately 3% and at least 5%, respectively. Therefore, implementation of Alternatives 1, 2, and 3 would have an incremental contribution to the cumulative impact of methylmercury on water quality in Funks and Stone Corral Creeks and the north Delta, which would be substantially greater in magnitude during the initial fill period and for up to 10 years following this period in Dry and Critically Dry Water Years. Implementation of methylmercury reduction measures under Mitigation Measure WQ-1.1 (described in Chapter 6), would minimize the magnitude of this effect, thereby potentially reducing the magnitude of the Project's incremental contribution to cumulatively considerable impacts on water quality. The effectiveness of methylmercury minimization actions implemented as part of Mitigation Measure WQ-1.1 at Sites Reservoir is not known at this time. Most of the methylmercury reduction actions under this mitigation measure are recommended actions for new reservoirs as part of the Statewide Mercury Control Program for Reservoirs (State Water Resources Control Board 2017). The potential to reduce methylmercury concentrations exists based on current research, although it is uncertain whether this reduction could eliminate an incremental effect. Due to this uncertainty, the incremental contribution of the Project to the cumulative impact would be cumulatively considerable. Implementation of regulatory programs described above (e.g., Statewide Mercury Control Program for Reservoirs) is expected to reduce the transport of mercury and the production and transport methylmercury to the Delta over time because the primary purpose of these regulations is to reduce mercury. Alternatives 1, 2, and 3 would cause an incremental impact that would be significant when added to the impacts on water quality from mercury and methylmercury from other past, present, and reasonably foreseeable future actions.

Effects of additional water quality constituents evaluated for Impact WQ-2 (e.g., pesticides, salinity, and non-mercury metals) would also not result in cumulatively considerable impacts. Alternatives 1, 2, and 3 would not result in an incremental impact on salinity impairments in the Delta that would be significant when added to the impacts on water quality related to salinity from other past, present, and reasonably foreseeable future actions because the Project would not cause increases in seawater intrusion that could lead to violation of salinity standards and would not cause any substantial increases in salinity (due to evapoconcentration and saline input from Salt Pond). Alternatives 1, 2, and 3 would not cause metal impairments in the Sacramento River even when combined with future projects because those projects are expected to either have no effect on metal concentrations or could reduce metal concentrations (e.g., through implementation of TMDLs and continued control of contamination sources). Potential Project

effects on non-mercury metal concentrations in Stone Corral Creek would be mitigated by implementation of Mitigation Measure WQ-2.1. Furthermore, potential effects on Stone Corral Creek would be highly localized and projects identified in Table 31-1 would not be located in the creek vicinity and therefore would have no ability to contribute to a cumulative effect.

Potential Project effects on non-mercury metal and pesticide concentrations in Yolo Bypass due to redirection of some of the CBD load during August through October would be mitigated by Mitigation Measures WQ-2.2. Effects associated with redirection of CBD flows would primarily be limited to the Yolo Bypass because the metals and pesticides from CBD already enter the Sacramento River and Delta under existing conditions. Any increases in metals and pesticides in the Yolo Bypass associated with redirection of CBD flows would not cause cumulative effects when combined with future projects because those projects are not expected to release flows to the Yolo Bypass, aside from the North Delta Flow Action. The North Delta Flow Action would have releases similar to those that would occur under Alternatives 1, 2, or 3 to the Yolo Bypass. These releases could be an additional water source for the North Delta Flow Action. The potential benefits and adverse effects of the North Delta Flow Action to aquatic communities are currently being evaluated by other public agencies and would be considered within the context of the Sites Reservoir releases.

If regulatory or upstream storage projects (e.g., amendments to the Bay-Delta Plan and expansion of Shasta Lake) reduce the amount of water that can be diverted from the Sacramento River for storage in Sites Reservoir, some water quality concerns might be exacerbated. Reduction in the amount of water available for storage and discharge from Sites Reservoir could result in increased evapoconcentration, warmer water temperatures, and increased potential for the formation of HABs. If there were an increase in evapoconcentration, constituents would become more concentrated in the reservoir. However, because the volume of water released from the reservoir would be smaller, the constituent load released from the reservoir would also be lower. Warmer reservoir temperatures may be beneficial to rice growers and warm-water fish in Funks and Stone Corral Creeks and the consequences for Sacramento River temperatures would likely be small because temperature effects are expected to be dissipated during conveyance to the Sacramento River. If future water supplies for Sites Reservoir storage were reduced, the protocols of the RMP with regard to HABs, metals, water temperature, and Salt Pond (Appendix 2D) and mitigation measures (WQ-1.1, WQ-2.1, WQ-2.2, as identified above) would prevent changes in reservoir water supply from resulting in significant water quality impacts. The reductions in storage would not result in a cumulatively considerable impact on water quality.

In summary, Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to the impacts from water quality impairments evaluated in Impacts WQ-1, WQ-2, and WQ-3, except with respect to methylmercury, from other past, present, and reasonably foreseeable future actions. With the exception of potentially exacerbating the methylmercury water quality impairment in the Delta due to the uncertainty with respect to the effectiveness of methylmercury minimization actions in Mitigation Measure WQ-1.1, the water quality effects would either be minimal; be minimized through BMPs, the RMP, and mitigation measures; or be local in nature and not combine with effects of other projects.

As described for Impact WQ-4, multiple Project facilities would be placed in a flood hazard area and some of these facilities would store materials that could result in water quality effects if

released. Implementation of SPCCPs for facilities with sources of pollutants would prevent release through storage requirements and measures for hazardous materials. Therefore, construction and operation of Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to the impacts on water quality due to the release of pollutants in a flood or due to facility location in a flood hazard area from other past, present, and reasonably foreseeable future actions.

As described for Impact WQ-5, as a result of an overall increase in beneficial uses of water, Alternatives 1, 2, and 3 would not conflict with or obstruct a water quality control plan. While some reasonably foreseeable future projects might reduce the amount of water available for diversion to storage (e.g., amendments to the Bay-Delta Plan and expansion of Shasta Lake), these same projects could also increase the value of any water that is stored. Therefore, Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to the impacts on water quality as the result of conflict with or obstruction of water quality control plan from other past, present, and reasonably foreseeable future actions. In addition, implementation of existing water quality control plans and potential amendments to future plans (i.e., Bay-Delta Plan or Basin Plan) would establish objectives to reasonably protect beneficial uses and the Project would operate to meet those objectives.

As described for Impact WQ-6, Alternatives 1, 2, and 3 would not create or contribute to runoff that would exceed the capacity of existing or planned stormwater drainage systems or provide additional sources of polluted runoff. Paved roads, buildings, parking lots, and other Project facilities could generate polluted runoff during storm events. However, runoff would not exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff because the Project would be designed to adequately drain water and any runoff that reaches Sites Reservoir would be greatly diluted in the reservoir. Drainage evaluations would be made as part of final Project design; project engineers would evaluate preconstruction and postconstruction drainage needs and design Project features and implement strategies/practices to ensure equivalent functionality of local drainage infrastructure during and after construction. These measures would minimize any incremental contribution to a cumulative impact, and in addition any changes in water quality associated with runoff would be highly localized and would diminish with distance from the runoff source. Therefore, Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to impacts on water quality associated with runoff from other past, present, and reasonably foreseeable future actions.

31.3.2. Fluvial Geomorphology

The cumulative geographic scope for fluvial geomorphologic resources includes local drainages associated with the Sites Reservoir (e.g., Funks, Stone Corral, and Hunters Creeks), as well as downstream waterbodies of the larger Sacramento River Watershed, such as the Sacramento River, Yolo Bypass, and Delta. Engineered drainage canals (i.e., TC Canal, GCID Main Canal, and CBD) are also included. These areas are included for potential construction and operation impacts described in Chapter 7. Projects from Table 31-1 that are included in the cumulative geographic scope include flood control projects (e.g., CALFED Levee System Integrity Program, Delta Levees Flood Protection Program, SRBPP) and restoration projects (e.g., ERP, Hamilton

City Flood Damage Reduction and Ecosystem Restoration Project) that have the potential to affect fluvial geomorphology.

31.3.2.1. Alternatives 1 and 3

Construction and operation would not result in an incremental contribution on fluvial geomorphology because most effects would be limited to the Project footprint, other similar projects do not occur in the vicinity, or effects would be minimal when considered in the broader fluvial geomorphologic regime of the drainages.

Construction and operation of Alternative 1 or 3 would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in a substantial increase or decrease in onsite or offsite erosion or siltation. Where appropriate (i.e., depending on slope, soil type) the implementation of BMPs for erosion and sediment control would prevent increased soil erosion and sedimentation rates. The addition of impervious surfaces would not substantially alter the existing drainage patterns of a site or area because of the limited area of impervious surfaces and the ability of the surrounding open area to infiltrate precipitation.

Construction and operation of Alternative 1 or 3 would not substantially alter natural river geomorphic processes on the Sacramento River or substantially alter geomorphic processes upstream or downstream of the dam structures on Funks and Stone Corral Creeks. The overall volume of water available and the pattern of water diversion in the Sacramento River (and therefore in the canals, Yolo Bypass, and Delta) would generally be similar to the amount and pattern of water diversion under existing conditions.

The types of projects that could result in cumulative impacts related to fluvial geomorphology are those that involve large-scale modifications to existing drainages. Most projects in Table 31-1 have not resulted in cumulatively considerable impacts on fluvial geomorphology because many have served to reduce the existing flood risk and to restore geomorphic processes (i.e., excessive scour) and associated channel and floodplain habitat. Furthermore, these projects may result in localized changes to channel processes in the immediate proximity of the Project; however, they have limited ability to result in substantial changes to the overall Sacramento River system over its entire geography or over time. For those projects that could cause large-scale modifications to existing drainage patterns, the regulatory agencies (e.g., DWR, Reclamation, CDFW) would require that the projects incorporate mitigation and/or BMPs to maintain the systemwide geomorphic regime.

Although there is potential for the creation of localized areas of sediment deposition under Alternatives 1 and 3, a decrease in the amount of flow generally causes a corresponding decrease in flow velocity that typically induces sediment deposition. The relative amount of potential deposition would be limited because Alternative 1 or 3 diversions would only occur under higher flow regimes in the Sacramento River. These high flows would maintain sediment transport. As such, Alternative 1 or 3 would not result in a cumulative contribution to fluvial geomorphology. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on fluvial geomorphology from other past, present, and reasonably foreseeable future actions.

31.3.2.2. Alternative 2

The cumulative impacts associated with the construction and operation of Alternative 2 would be the same as those described above for Alternative 1 or 3 because the new facilities and construction footprints would be located in the same study area, would generally be the same size, and would generally affect the same drainages.

The Sacramento River discharge and the South Road, which are part of Alternative 2 only, would not result in an incremental contribution on fluvial geomorphology. The Sacramento River discharge would be located in an area on the river that has no current evidence of historical meandering. This area is also closely bordered by levees with extensive revetment and its lateral channel evolution is limited. The South Road would be located across multiple drainages in steep areas and would be more prone to accelerated erosion and sedimentation. BMPs would address potential increased erosion and siltation rates as a result of drainage pattern manipulation.

Alternative 2 would not result in a cumulative contribution to fluvial geomorphology. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on fluvial geomorphology from other past, present, and reasonably foreseeable future actions.

31.3.3. Groundwater Resources

The cumulative geographic scope for groundwater resources consists of the groundwater basins and subbasins that could be directly affected by construction and operation of Project facilities: Funks Creek groundwater basin; Antelope Creek groundwater basin; and the Red Bluff, Colusa, and Yolo Subbasins of the Sacramento Valley Groundwater Basin. Projects from Table 31-1 that could affect these groundwater basins include the Davis-Woodland Water Supply Project to reduce reliance on groundwater. In addition, current and continuing plans identified in Appendix 4A, such as general plans and groundwater management plans (GWMPs), could affect groundwater basins in the geographic scope by either using groundwater or replenishing groundwater basins.

31.3.3.1. Alternatives 1 and 3

Alternative 1 or 3 would not result in an incremental contribution on groundwater resources because during construction and operation the groundwater quality would be maintained and not degraded. Groundwater degradation from contaminants during dewatering and other construction activities would be unlikely due to depth to the groundwater aquifer in the study area and the implementation of BMPs. Groundwater degradation would not occur as a result of operations because Sacramento River fresh water be used to fill the reservoir. In addition, due to the saline density of the Salt Pond, saline water would stay near the bottom of the reservoir where it would mix with fresh water close to the Golden Gate Dam. This fresh water would dilute the saline water column and improve water quality.

Alternative 1 or 3 would not result in an incremental contribution on groundwater resources because during construction and operation the groundwater levels would either be maintained or not substantially reduced. Construction groundwater use would be less than 15% of the 2018 groundwater pumped for total groundwater use within Antelope and Funks Creek Basins (Table 8-2). Over time, the water used during construction would be replaced through groundwater

recharge. Modeling has shown little to no effect on existing groundwater recharge due to diversions. Inundation in previously unsaturated areas would result in higher groundwater in the shallow aquifer along the western margins of the Colusa Subbasin (in the immediate vicinity of the Sites Reservoir). Groundwater levels and recharge potential would slightly increase under Alternatives 1 and 3. Overall, Alternative 1 or 3 would not result in a measurable change in the availability of groundwater resources.

Alternative 1 or 3 would not result in an incremental contribution on groundwater resources because neither would conflict with or obstruct implementation of a sustainable groundwater management plan. Operations would not affect groundwater levels, flows, or water quality so they would not impede or conflict with the overarching Sustainable Groundwater Management Act goals. Operation would improve water supply and reliability by creating additional surface water storage to be used by SWP and CVP contractors. This increased water storage aligns with existing county Groundwater Management Plans and Basin Management Objectives, and with likely goals in counties' future Groundwater Sustainability Plans; it would lower dependency on groundwater pumping for crop irrigation in the Sacramento Valley and the San Joaquin Valley.

Sacramento Valley groundwater subbasins have experienced historical groundwater level declines and recoveries as a result of past hydrologic conditions (e.g., droughts and wet years), urban and municipal development and agricultural cultivation. Currently, the Colusa Subbasin and Yolo Subbasin are identified as high priority basins for water quality or groundwater levels (Appendix 8A, *Groundwater Resources Basin Setting*). Projects in Table 31-1 and plans identified in Appendix 4A would both continue to use groundwater supplies and would also reverse some of the groundwater quality and quantity reduction that has occurred in the Sacramento Valley.

Alternative 1 or 3 would not result in a cumulative contribution to groundwater resources because they would not result in a substantial measurable change in the availability of groundwater resources. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on groundwater resources from other past, present, and reasonably foreseeable future actions.

31.3.3.2. Alternative 2

The cumulative impacts associated with the construction and operation of Alternative 2 would be the same as those described above for Alternative 1 or 3 because the new facilities and construction footprints would be located in the same study area and would affect the same groundwater subbasins. Alternative 2 would not result in a cumulative contribution to groundwater. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on groundwater resources from other past, present, and reasonably foreseeable future actions.

31.3.4. Vegetation and Wetland Resources

The cumulative geographic scope for cumulative impact analysis for vegetation and wetland resources comprises the study area defined in Chapter 9 and areas in the vicinity (within 5 miles, which corresponds to the area of records search for the Project) where projects identified in Table 31-1 could similarly affect vegetation and wetland resources. The following projects from

Table 31-1 are included in the cumulative analysis: SRBPP; System Reoperation Program; Anadromous Fish Screen Program; Central Valley Joint Venture Program; ERP; Hamilton City Flood Damage Reduction and Ecosystem Restoration Project; RBDD Fish Passage Project; Upper Sacramento River Salmon Rearing Habitat Project; Colusa Generating Station; Maxwell Intertie Project; ROC ON LTO BiOps; SWP ITP; South Willows Residential Development; and Wal-Mart in the city of Willows.

Projects in the cumulative geographic scope have had and would have impacts on vegetation and wetland resources as a result of vegetation removal, filling of wetlands or non-wetland waters, and alteration of habitat hydrology. These projects either have implemented or would be required to implement mitigation measures to reduce impacts on vegetation and wetland resources. Although some of these projects have restored or would restore vegetation and wetlands (e.g., Central Valley Joint Venture Program, Cache Slough Complex Restoration), overall the projects would cause removal and degradation in the cumulative geographic scope. Therefore past, present, and reasonably foreseeable future projects have resulted in cumulatively considerable impacts on special-status plants, sensitive natural communities, wetlands, non-wetland waters, and blue oak woodland; impacts due to conflicts with adopted HCPs or NCCPs; and impacts from the introduction and spread of invasive plant species.

31.3.4.1. Alternatives 1 and 3

Impacts on special-status plants from Alternatives 1 and 3, including temporary and permanent losses of occupied habitat as described in Impact VEG-1, would likely result in an incremental contribution to impacts on special-status plants. Implementation of BMPs and Mitigation Measures VEG-1.1, VEG-1.2, and VEG-1.3, described in Chapter 9, would avoid, minimize, or compensate for direct and indirect impacts on special-status plants. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on special-status plants from other past, present, and reasonably foreseeable future actions.

Impacts on upland riparian habitat, sensitive natural communities in annual grasslands, and sensitive natural communities in oak savanna from Alternatives 1 and 3, including temporary and permanent losses of these sensitive natural communities as described in Impact VEG-2, would likely result in an incremental contribution to impacts on sensitive natural communities. Implementation of BMPs and Mitigation Measures VEG-2.1, VEG-2.2, and VEG-2.3, described in Chapter 9, would avoid, minimize, or compensate for direct and indirect impacts on sensitive natural communities. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on sensitive natural communities from other past, present, and reasonably foreseeable future actions.

Impacts on wetlands and non-wetland waters from Alternatives 1 and 3, including temporary and permanent losses of wetlands and non-wetland waters through direct removal of vegetation, filling, hydrological interruption, and other indirect impacts as described in Impact VEG-3, would likely result in an incremental contribution to impacts on wetlands and non-wetland waters. Implementation of BMPs and Mitigation Measures VEG-3.1, VEG-3.2, VEG-3.3, and VEG-3.4, described in Chapter 9, would avoid, minimize, or compensate for direct and indirect impacts on wetlands and non-wetland waters. Therefore, Alternative 1 or 3 would not cause an

incremental impact that would be significant when added to the impacts on wetlands and non-wetland waters from other past, present, and reasonably foreseeable future actions.

Impacts on blue oak woodland from Alternatives 1 and 3, including temporary and permanent losses of blue oak woodland as described in Impact VEG-4, would result in an incremental contribution to impacts on blue oak woodland. Implementation of BMPs and Mitigation Measures VEG-2.1, VEG-4.1, VEG-4.2, and VEG-4.3, described in Chapter 9, would avoid, minimize, or compensate for direct and indirect impacts on blue oak woodland. However, even with mitigation, there would be a substantial long-term loss of blue oak woodland due to the length of time required for newly planted trees to reach mature size and fully replace the habitat function and habitat value of the removed trees in the woodland community. Therefore, impacts from Alternatives 1 and 3 on blue oak woodland would cause an incremental impact that would be significant when added to the impacts on blue oak woodland from other past, present, and reasonably foreseeable future actions.

Impacts on special-status plant species habitats, sensitive natural communities, wetlands, and non-wetland waters from Alternatives 1 and 3, as summarized in Impact VEG-5, would likely result in an incremental contribution to conflicts with the Yolo County HCP/NCCP and Yolo Bypass Wildlife Area Land Management Plan (LMP). Implementation of Mitigation Measures VEG-2.1, VEG-2.2, VEG-3.1, VEG-3.2, VEG-3.3, VEG-4-1, and VEG-4.2, described in Chapter 9, would reduce the level of these impacts that could conflict with the adopted Yolo County HCP/NCCP and Yolo Bypass Wildlife Area LMP. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts associated with conflicts with adopted HCPs or NCCPs from other past, present, and reasonably foreseeable future actions.

Impacts due to introduction or increased spread of invasive plant species from Alternatives 1 and 3, as described in Impact VEG-6, would likely result in an incremental contribution to adverse effects from invasive species. Implementation of BMPs described in Chapter 9, including vegetation control measures as part of construction and the RMP for invasive weed control as part of operation, would reduce the potential for introduction and spread. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts related to invasive plant species from other past, present, and reasonably foreseeable future actions.

31.3.4.2. Alternative 2

The cumulative project list for Alternative 2 is the same as that of Alternatives 1 and 3. Alternative 2 would result in greater impacts on special-status plant habitat in chamise chaparral, foothill pine, mixed chaparral, pond, scrub-shrub wetland, intermittent stream, and upland riparian, primarily due to the South Road alignment. However, Alternative 2 would have smaller impacts on all other natural communities, wetlands, and non-wetland waters because of the smaller reservoir inundation area.

Implementation of BMPs and mitigation measures listed above for Alternatives 1 and 3 would avoid, minimize, or compensate for direct and indirect impacts on special-status plants, sensitive natural communities, wetlands, and non-wetland waters; conflicts with adopted HCPs or NCCPs; and the introduction or spread of invasive plant species. Therefore, Alternative 2 would not cause

an incremental impact that would be significant when added to the impacts on vegetation and wetland resources from other past, present, and reasonably foreseeable future actions. However, as described for Alternatives 1 and 3, impacts from Alternative 2 on blue oak woodland would remain significant after mitigation and would cause an incremental impact that would be significant when added to the impacts on blue oak woodland from other past, present, and reasonably foreseeable future actions.

31.3.5. Wildlife Resources

The cumulative geographic scope for the cumulative impact analysis for wildlife resources comprises the study area defined in Chapter 10 and areas in the vicinity (within 5 miles, which corresponds to the wildlife records search area for the Project) where projects identified in Table 31-1 could similarly affect wildlife species. The following projects from Table 31-1 are included in the cumulative impact analysis: SRBPP; System Reoperation Program; Anadromous Fish Screen Program; Central Valley Joint Venture Program; Ecosystem Restoration Program; Hamilton City Flood Damage Reduction and Ecosystem Restoration Project; RBDD Fish Passage Project; Upper Sacramento River Salmon Rearing Habitat Project; Colusa Generating Station; Maxwell Intertie Project; ROC ON LTO BiOps; SWP ITP; Cache Slough Complex Restoration; Fremont Weir Adult Fish Passage Modification Project; Lower Cache Creek/Woodland Flood Risk Management Project; Lower Yolo Restoration Project; and North Delta Flow Action.

Projects in the cumulative geographic scope have had and would have impacts on wildlife resources. These projects either have or would be required to implement mitigation measures to reduce impacts on wildlife resources. Although some of these projects have restored or would restore habitat for special-status wildlife (e.g., Central Valley Joint Venture Program, Cache Slough Complex Restoration), overall the projects would reduce habitat for special-status wildlife through removal and degradation and may cause mortality of individuals that impact populations of special-status wildlife in the cumulative geographic scope; therefore past, present, and reasonably foreseeable future projects have resulted in cumulatively considerable impacts on special-status wildlife.

31.3.5.1. Alternatives 1 and 3

Impacts on special-status wildlife from construction of Alternatives 1 or 3, including temporary and permanent losses of habitat from construction, inundation, and habitat conversion, as well as disturbance, injury, or mortality of individuals from noise, vibration, habitat destruction, contamination of aquatic habitat, and vehicle strikes (described in Impact WILD-1), would incrementally contribute to cumulatively considerable impacts on special-status wildlife within the cumulative impact analysis area. Implementation of BMPs and Mitigation Measures WILD-1.1 through WILD-1.8, WILD-1.10 through WILD-1.26, and WILD-1.28 through WILD-1.35 (described in Chapter 10) would avoid, minimize, or mitigate direct and indirect impacts on special-status wildlife, thereby reducing the incremental contribution of Alternatives 1 and 3 to cumulatively considerable impacts on special-status wildlife and their habitats. Even with implementation of mitigation measures, there would be a substantial net loss of some habitats (e.g., grassland that provides foraging and breeding habitat for many special-status species) and possible reductions in populations of special-status wildlife. For example, as described in Chapter 10, construction would result in significant and unavoidable impacts on golden eagles

and on the movement of a native resident or migratory wildlife species, including through established movement corridors. Therefore, construction of Alternative 1 or 3 would cause an incremental impact that would be significant when added to the impacts on special-status wildlife because of the net loss of habitats and potential reductions in special-status wildlife from other past, present, and reasonably foreseeable future actions.

Impacts on special-status wildlife from operation of Alternatives 1 or 3, including illness or mortality from pesticide, herbicide, or rodenticide use, impediments to movement, injury or mortality from vehicle collisions, new nighttime lighting, and injury or mortality from transmission line collision or electrocution, would incrementally contribute to cumulatively considerable impacts on special-status wildlife within the cumulative impact analysis area. Implementation of the Land Management Plan, Recreation Management Plan, and Mitigation Measures WILD-1.9, WILD-1.16, WILD-1.17, WILD-1.27, and WILD-1.28 (described in Chapter 10) would avoid, minimize, or mitigate operational impacts on special-status wildlife, thereby reducing the incremental contribution of Alternatives 1 and 3 to cumulatively considerable impacts on special-status wildlife. However, even with implementation of these plans and mitigation measures, operation of Alternatives 1 and 3 may still result in mortality of special-status wildlife from pesticide, herbicide, or rodenticide use, vehicle collisions, and transmission line collision or electrocution that could reduce populations in the cumulative impact analysis area. For example, as described in Chapter 10, operation would result in significant and unavoidable impacts on the movement of a native resident or migratory wildlife species and with established movement corridors. Operation of Alternatives 1 or 3 would cause an incremental impact that would be significant when added to the impacts on special-status wildlife because of the potential reductions in populations of special-status wildlife from other past, present, and reasonably foreseeable future actions.

Impacts on wildlife nursery sites and wildlife movement (described in WILD-2) from Alternatives 1 and 3, would incrementally contribute to cumulatively considerable impacts on wildlife nursery sites and wildlife corridors within the cumulative impact analysis area. These impacts include removal or disturbance of wildlife nursery sites and obstructions to wildlife movement, such as construction activity that deters or modifies movement patterns, fences, new roadways, additional vehicles on roadways, and Sites Reservoir. Implementation of BMPs and Mitigation Measures WILD-1.2, WILD-1.4, WILD-1.7, WILD-1.15, WILD-1.16, WILD-1.17 WILD-1.20, WILD-1.23, WILD-1.24, WILD-1.25, WILD-1.27, WILD-1.30, WILD-1.32, WILD-1.33 and WILD-1.35 would avoid, minimize, or mitigate impacts on wildlife nursery site and impediments to wildlife movement, excluding Sites Reservoir, thereby reducing the incremental contribution of Alternatives 1 and 3 to cumulatively considerable impacts on wildlife nursery sites and wildlife movement. Alternatives 1 and 3 would cause an incremental impact that would be significant when added to the impacts on wildlife movement and habitat connectivity because of the substantial barrier to wildlife movement and habitat connectivity created by Sites Reservoir from other past, present, and reasonably foreseeable future actions.

Implementation of the Recreation Management Plan, Land Management Plan, and Mitigation Measures WILD-1.1 through WILD-1.35 would avoid, minimize, and compensate for construction, operation, and impacts on wildlife nursery sites and wildlife movement from Alternative 1 or 3 but there would still be a net loss of land cover types that provide habitat for

special-status wildlife, there would likely still be potential reductions in populations of special-status species, Sites Reservoir would be a substantial barrier to wildlife movement and habitat connectivity. Therefore, the construction and operation impacts of Alternatives 1 and 3 would cause an incremental impact that would be significant when added to the impacts on wildlife nursery sites and wildlife movement from other past, present, and reasonably foreseeable future actions.

31.3.5.2. Alternative 2

The cumulative project list for Alternative 2 is the same as that for Alternatives 1 and 3. Depending on the species and land cover types, Alternative 2 would result in greater or fewer impacts on special-status wildlife habitat primarily because of the smaller inundation area and the longer South Road. Generally, construction impacts on special-status wildlife would be the same as described for Alternatives 1 and 3, except for overall amounts of affected habitat and the larger construction disturbance area associated with the longer South Road. The same mitigation measures identified above for Alternatives 1 and 3 would be implemented for Alternative 2.

Operation of Alternative 2 could result in additional impediments to wildlife movement and increased potential for injury or mortality from vehicle collisions, and noise disturbance associated with the longer South Road. Potential impacts on the Yolo Bypass from increased flows would be similar to Alternatives 1 and 3. The same mitigation measures identified above for Alternatives 1 and 3 would be implemented for Alternative 2.

Impacts on wildlife nursery sites and wildlife movement (described in WILD-2) from Alternative 2 would be similar to Alternatives 1 and 3 except that the longer South Road would be a greater impediment to movement and could result in increased potential for injury or mortality from vehicle collisions. While the inundation area is smaller under Alternative 2, it would still be a substantial barrier to wildlife movement and habitat connectivity. The same mitigation measures identified above for Alternatives 1 and 3 would be implemented for Alternative 2.

Implementation of the Recreation Management Plan, Land Management Plan, and Mitigation Measures WILD-1.1 through WILD-1.35 would avoid, minimize, and compensate for construction, operation, and impacts on wildlife nursery sites and wildlife movement from Alternative 2 but there would still be a net loss of land cover types that provide habitat for special-status wildlife, there would likely still be potential reductions in populations of special-status species, Sites Reservoir would be a substantial barrier to wildlife movement and habitat connectivity, and flow changes in the Yolo Bypass could result in habitat loss or a reduction in habitat suitability.

Overall, as outlined above, the construction and operation impacts of Alternative 2, would cause an incremental impact that would be significant when added to the impacts on special-status wildlife from other past, present, and reasonably foreseeable future actions because of the net loss of habitats, potential reductions in special-status wildlife, potential reductions in populations of special-status species, the substantial barrier to wildlife movement and habitat connectivity created by Sites Reservoir, and effects on wildlife nursery sites and wildlife movement.

31.3.6. Aquatic Biological Resources

The cumulative geographic scope for aquatic biological resources includes local drainages associated with the Sites Reservoir (e.g., Funks, Stone Corral, and Hunters Creeks), as well as downstream waterbodies, including the Sacramento River, its major tributaries and flood bypasses, and the Delta.

The Sacramento River, its major tributaries, and the Delta have undergone many changes over the last approximate 150 years. Waterways have been leveed, floodplains and riparian and wetlands disconnected, drained, and/or reclaimed for other uses, and flows altered as part of large-scale flood control and water supply infrastructure projects. The impacts of past and current projects, including past operation of the CVP and SWP, have been included in the description of the baseline environmental conditions provided in Chapter 11 and Appendix 11A, and as represented by the model and in modeling results as part of the NAA, further described in Appendix 5A. These past projects have resulted in a baseline consisting of a trending decline of listed fish species within the Sacramento River, Delta, and other waterways used by anadromous and resident fish populations. Multiple factors have contributed to this trending decline, and it is difficult to quantify the proportion of the decline attributable to a specific project, action, or event. Existing state and federal statutes and regulatory requirements on state and federal actions provide protective measures to avoid jeopardizing those species listed in accordance with the federal and California Endangered Species Acts (ESA and CESA), as described in Appendix 4A. Specifically, biological opinions were prepared to allow the SWP and CVP to continue operating without causing jeopardy to listed species or adverse modification to designated critical habitat. In addition, California requires an ITP for the long-term operation of the SWP facilities for the protection of CESA-listed species. Despite these protections, the cumulative impact of past modifications and other past and present projects has contributed to the continuing decline in Central Valley and Delta fish populations and their habitats.

Table 31-1 lists past, present, and reasonably foreseeable future projects capable of producing cumulative impacts in combination with the Project, including flood control, restoration, water storage, and ongoing water project operations. Projects from Table 31-1 that are included in the geographic scope for aquatic biological resources include several flood control projects (i.e., CALFED Levee System Integrity Program, Delta Levees Flood Protection Program, SRBPP), restoration projects (i.e., ERP, Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project, North Delta Flood Control and Ecosystem Restoration Project, Painter's Riffle Anadromous Fish Habitat Enhancement Project, Red Bluff Diversion Dam Fish Passage Project, Upper Sacramento River Anadromous Fish Habitat Restoration Project(s), Upper Sacramento River Salmon Rearing Habitat Project), water storage projects (i.e., Del Puerto Canyon Reservoir), and other projects/actions associated with ongoing water operations (i.e., Bay-Delta Water Quality Control Plan Update, ROC ON LTO BiOps, SWP ITP). These projects have the potential to affect aquatic biological resources in the Sacramento River, its major tributaries and flood bypasses, and in the Delta.

For many of the projects in Table 31-1, qualitative analysis is also informed by quantitative modeling results describing the environmental setting for the existing conditions and appropriately applies those conditions to Alternatives 1, 2, and 3 for evaluating effects on aquatic biological resources. The hydrologic modeling results are cumulative in nature because the

model input must make allowances for the use of water throughout the Central Valley and Delta. The CALSIM II and DSM2 models use an 82-year historical hydrologic sequence to simulate a range of hydrologic conditions that could occur in the future, including extended wet periods and dry/critically dry periods. In addition, the models include assumptions about human population growth conditions that could occur in the future with or without the Project. In the case of the CALSIM II and DSM2 modeling, they include increased demand based on the level of buildout. Therefore, the elements of the aquatic biological resources impact assessment that relied on the hydrologic impact assessment for the analyses (e.g., effects to Sacramento River, its major tributaries and flood bypasses, and Delta flows) are cumulative in nature. Both the ROC ON LTO BiOps and SWP ITP are included in the hydrologic modeling. The specific operational details of the Bay-Delta Water Quality Control Plan Update are not yet known and, as a result, are not include in the models. The Del Puerto Canyon Reservoir does not affect CVP/SWP operations and, as a result, is also not included in the models.

For the purpose of this cumulative analysis, the environmental impacts were divided into construction impacts, operations impacts, and maintenance impacts:

- Construction Impacts: The assessment of potential impacts to aquatic biological resources consisted of a qualitative evaluation of construction effects of the Project facilities. The impact assessment addressed two primary impact types: (1) temporary and localized impacts associated with construction of the Project facilities; and (2) permanent impacts associated with construction of Project facilities and filling of Sites Reservoir.
- Operations Impacts: The assessment of impacts from operations was based on qualitative and quantitative evaluation of operations under Alternatives 1, 2, and 3 and focuses on operations of the Project to divert and deliver water in the Sacramento River, its major tributaries and flood bypasses, and the Delta, identifying and analyzing potential near-field and far-field effects.
- Maintenance Impacts: The assessment of impacts from maintenance activities was based on a qualitative evaluation for the facilities included under Alternatives 1, 2, and 3 and focuses on maintenance activities that are near waterways and can affect fish species of management concern and their aquatic habitats.

31.3.6.1. Alternatives 1 and 3

Construction Impacts

Construction of Alternatives 1 and 3 would result in ground-disturbance activities, the use of heavy equipment and hazardous materials, in-water construction, and the filling of Sites Reservoir. These activities would result in temporary impacts on aquatic habitats, special-status fish, and other fish species of management concern during construction activities, as well as permanent impacts from placement of facilities and the conversion of stream habitat (e.g., Funks and Stone Corral Creeks) to open water habitat. Impact mechanisms include sediment disturbance, water quality effects, direct physical injury, and reduced habitat extent and access. Effects would be limited during construction for reasons described in Impact FISH-1, including limited spatial extent and distribution of fish species, lack of habitat, temporary nature and duration of construction, proximity to waterways, or limited population effects. In addition, construction BMPs, including timing restrictions for in-water work and water quality protection

measures, would minimize and/or avoid impacts on aquatic biological resources, including special-status fish and other fish species of management concern (Impact FISH-1). Furthermore, various mitigation measures identified above in Section 31.3.4, *Vegetation and Wetland Resources*, will benefit special-status fish or compensate for impacts on state and federally-listed fish and other special-status fish and their habitat. For example, with respect to Mitigation Measure VEG-2.2, compensation for the permanent loss of riparian habitat, including shaded riverine aquatic (SRA) cover, will occur. Therefore, system-wide or population-wide impacts on aquatic biological resources would not occur.

The types of projects that could result in cumulative construction-related impacts related to aquatic biological resources are those that involve in-water construction (e.g., restoration and flood control projects) and large-scale modifications to aquatic habitats (e.g., conversion of creek habitat to open water habitat associated with Del Puerto Canyon Reservoir). Projects in Table 31-1 may have effects on aquatic resources in the study area that are related to the effects of Alternative 1 and 3 described above, including positive and negative effects. All of these projects would include BMPs and or mitigation measures that would avoid and/or minimize temporary, construction-related impacts, and restore channel and floodplain habitats. These projects may result in temporary, localized changes to channel and associated habitat processes, but have limited ability to result in substantial adverse changes to the overall Sacramento River system over its entire geography or over time. Finally, projects identified in Table 31-1 that are present or ongoing would not overlap spatially or temporally with the various construction footprints Alternative 2. While the South Willows Development would be in close proximity to the GCID System Upgrades, it would implement mitigation measures and BMPs to reduce offsite effects such as sediment and erosion.

Construction of Alternative 1 or 3 would not result in an incremental contribution to cumulative impacts on aquatic biological resources because most effects would be limited to the construction footprint, other projects do not occur in the vicinity of construction, and/or effects would be reduced or avoided as a result of construction BMPs. Alternative 1 or 3 would not result in a cumulative contribution on construction-related impacts to aquatic biological resources. Therefore, construction of Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on aquatic biological resources from other past, present, and reasonably foreseeable future actions.

Operations Impacts

Operational impacts associated with Alternative 1 or 3 are organized by near-field and far-field effects on species and their aquatic habitats. Separate discussion for each is provide below with respect to Alternatives 1 and 3. The analysis of Alternative 1 includes Alternative 1A and 1B because the results evaluated in Chapter 11 show no material differences between these two options for Alternative 1. Alternative 1 and 3 operational effects, both near-field and far-field, would not result in an incremental contribution to impacts on aquatic biological resources in the Sacramento River, its major tributaries and flood bypasses, and the Delta. Overall, effects to all special-status fish species and other fish species of management concern discussed in Chapter 11 would be less than significant (some species will require mitigation measures, as described in Chapter 11) because Alternative 1 or 3 will operate to diversion criteria to avoid and/or minimize potential adverse effects on fish species and their habitats, including salmonids and sturgeon. In

addition, potential impacts are influenced by temporal and geographic distribution and presence of fish species during certain lifecycle stages; some fish are simply not present temporally or geographically to experience potential Alternative 1 or 3 effects. For example, native minnow spawning is not anticipated to be negatively affected due to operations of the Red Bluff and Hamilton City intakes for Alternatives 1 and 3 because of lack of presence or spatial distribution. Furthermore, the tolerance of certain fish species to changes in the environment (e.g., temperature, water quality constituents of concern) and if effects are within a tolerance range, fish species are unlikely to experience a population level effect. Finally, mitigation measures are proposed to reduce far-field effects to certain species (i.e., juvenile salmonids, longfin smelt, delta smelt).

Summary of Alternatives 1 and 3 Near-Field Effects

Project operations near-field effects to salmonids (i.e., Chinook salmon and steelhead) and sturgeon include screen exposure, entrainment through screens, impingement on the face of screens, stranding behind screens, and effects of intakes on predation. As described in Chapter 11, Impacts FISH-2 through FISH-7, potential exposure of juvenile salmonids and sturgeon to the Red Bluff and Hamilton City fish screens under Alternatives 1 and 3 would be expected to be similar or the same as under the NAA. Data suggest a very small proportion of juvenile salmonids would be of sufficiently small size to be susceptible to entrainment by the intakes' diversions if occurring at the faces of the fish screens and entrainment risk would be expected to be similar between the NAA and Alternatives 1 and 3. Further, technical studies and monitoring will address fish survival associated with diversion facility operations at the RBPP and Hamilton City Pump Station intakes under actual operating conditions in high Sacramento River flow conditions when Project diversions and technical studies would inform spatial distribution and other factors.

Available information generally suggests that impingement and screen passage/contact-related negative effects of the operation of the Red Bluff and Hamilton City intakes on juvenile salmonids would be limited. This is because these effects would only apply to the subset of juvenile salmonids encountering the intakes, and the screens are designed to protective standards (see Impacts FISH-2 through FISH-7). In addition, impingement would be monitored at the Red Bluff and Hamilton City intakes during the Sites Reservoir diversion period (i.e., winter months), in addition to long-term hydraulic evaluations of screen performance. Although overtopping can occur at the Red Bluff and Hamilton City intakes, these are relatively infrequent events that occur under existing conditions and would not be changed by the Alternatives 1 or 3. Further, technical studies and monitoring will address fish survival associated with diversion facility operations at the RBPP and Hamilton City Pump Station intakes under actual operating conditions in high Sacramento River flow conditions when Project diversions would occur (see Impacts FISH-2 through FISH-7).

Available information suggests that the effects of intakes on predation is limited; as a result, the effects of Alternatives 1 and 3 diversions from the Red Bluff and Hamilton City intakes would also be expected to be limited (Impacts FISH-2 through FISH-7). Further, technical studies and monitoring will address fish survival associated with diversion facility operations at the RBPP and Hamilton City Pump Station intakes under actual operating conditions in high Sacramento River flow conditions when Project diversions would occur.

Summary of Far-Field Alternatives 1 and 3 Effects

Potential operational far-field effects are different depending on the fish species and life stage; however, these effects include changes in water temperatures, redd scour and/or entombment, redd dewatering, changes in river habitat suitability (e.g., spawning, rearing), juvenile stranding, changes in floodplain inundation and availability (Yolo and Sutter Bypass and Sacramento River side-channel habitat availability), flow-related survival during migration, Delta rearing, and entrainment at diversions or export facilities. These potential effects were evaluated using modeling that incorporated past, present, and reasonably foreseeable projects (ongoing water operations), conceptual models, and additional lines of evidence. The modeling results for the far-field effects analyses indicate that in most cases either no changes between the NAA and Alternatives 1 or 3 or changes that would not be large enough to substantially affect salmonids, sturgeon, smelt, lamprey, starry flounder and northern anchovy, striped bass, American shad, threadfin shad, black bass, California bay shrimp, reservoir fish species, and southern resident killer whale populations. For example, the results for salmonid redd dewatering show few large changes between the NAA and Alternatives 1 and 3 (Appendix 11N, Table 11N-13). Changes for most months and water year types under all the alternatives are less than 2%. Overall, the effects of Alternatives 1 and 3 on salmonid redd dewatering are minor. In addition, Alternatives 1 and 3 are not expected to substantially affect winter-run Chinook salmon spawning habitat suitability (measured as weighted usable area [WUA]). These results indicate that Alternatives 1 and 3 would have minor effects on rearing habitat for salmonid juveniles in the Sacramento River. Further, Alternatives 1 and 3 are not expected to affect juvenile salmonid stranding (Appendix 11N). Alternative 1 or 3 would result in both reductions and increases in acreage and frequency of suitable inundated side-channel (rearing) habitat in the Sacramento River.

Application of the flow-threshold criteria from Michel et al. (2021) suggests that flow-survival effects on juvenile Chinook salmon (and also steelhead) would generally be limited by the Project's diversion criteria (Section 11P.2 of Appendix 11P, *Riverine Flow-Survival*). There is some uncertainty in the modeled flow-survival effects and in the ability to limit potential effects with real-time operational adjustments. Furthermore, spring flows (Michel et al. 2021) for migrating juvenile salmonids are important. Mitigation Measure FISH-2.1 (described in Chapter 11) will prevent Project diversions from reducing Sacramento River flow below 10,700 cfs at Wilkins Slough during March, April, and May and limits the potential for negative flow-survival effects to Chinook salmon and steelhead during their dispersal to rearing habitat and/or migration downstream toward the Delta (Section 11P.2 of Appendix 11P, *Riverine Flow-Survival*). This mitigation measure will ensure that spring flows for migrating juvenile salmonids are protected.

Additionally, far-field effect analyses indicate positive results and potential benefits for some species. For example, modeled results indicate that Alternatives 1 and 3 are not expected to have any substantial effect with regard to flow on spawning and egg incubation of green sturgeon in the Feather River. For the Feather River, modeling results indicate that Alternatives 1 and 3 provide slightly improved Feather River flow conditions for upstream and downstream passage. Operational impacts in the Delta and upstream effects associated with Alternatives 1 and 3 on green sturgeon and its spawning habitat would be negligible.

Operations impacts of Alternatives 1 and 3 on delta smelt include small differences assessed for flow-related zooplankton prey and other flow-related habitat attributes during spring, summer,

and fall; no increase in south Delta entrainment risk because south Delta exports of Sites water would not occur during times of the year when delta smelt are susceptible to entrainment; small reductions in suspended sediment to the Delta that would be addressed by the Sediment Technical Studies Plan and Adaptive Management for Sacramento River; and potential positive effects from summer/fall Sites Reservoir releases to move foodweb materials into the lower Yolo Bypass and Cache Slough Complex, as well as potential positive effects on prey from greater summer/fall Delta outflow. These impacts would be less than significant. However, impacts on delta smelt would be significant due to uncertainty associated with dissolved oxygen and temperature effects from Sites Reservoir releases and the population status of delta smelt (Appendix 11A). Mitigation Measure FISH-8.1 will prevent detrimental dissolved oxygen and water temperature effects associated with CBD water flowing through the Yolo Bypass. Existing dissolved oxygen and temperature levels suitable to delta smelt will be maintained and would not exceed recognized critical physiological thresholds through implementation of Mitigation Measure FISH-8.1. In addition, Mitigation Measure WQ-2.2 would control metal and pesticide effects associated with releases to the Yolo Bypass. The analyses of flow-related effects (differences in Delta outflow/X2) suggested the potential for small negative effects under the alternatives, albeit with uncertainty given the appreciably greater variability of longfin smelt abundance index estimates for a given alternative relative to the difference from NAA. As identified in Section 11.3, *Methods of Analysis*, operations resulting from the alternatives would be consistent with all applicable regulations to limit the potential for negative effects to fish and aquatic resources, including the existing spring outflow measures required by the CDFW 2020 SWP ITP. Nevertheless, the analysis concluded that mitigation is required for the small, uncertain negative outflow-related effect in consideration of longfin smelt's CESA-listed status; as such, Alternatives 1 and 3 provide tidal habitat restoration mitigation (Mitigation Measure FISH-9.1). Tidal habitat would expand the diversity, quantity, and quality of longfin smelt rearing and refuge habitat consistent with recent tidal habitat mitigation required for outflow impacts to the species. As shown by multiple recent tidal habitat restoration projects in the Delta, there are potential feasible opportunities for tidal habitat restoration directly applicable to longfin smelt. This mitigation will reduce impacts on longfin smelt by increasing potential habitat, thus lowering any potential incremental cumulative effect from other projects located in the Delta or upstream. The analyses of potential entrainment impacts of Alternatives 1 and 3 on longfin smelt suggested that entrainment risk under these alternatives would be similar to entrainment risk under the NAA.

Cumulative Projects

The cumulative projects include actions that affect the timing and magnitude of flow releases and seasonal water temperatures and actions that improve habitat of spawning, rearing, and migrating fish. The types of past, present, and reasonably foreseeable projects that could result in cumulative operations-related impacts related to aquatic biological resources are those that include diversions and/or ongoing water operations and associated flow alterations in combination with restoration projects that would improve habitat conditions over the long term (see descriptions above). Past and ongoing projects have resulted in positive and negative near-field and far-field effects. As described above, flows and diversions of completed projects are generally accounted for in the operational modeling of the NAA. Of the water supply and water quality projects that have not been completed and are reasonably foreseeable, those most likely to have cumulative effects related to the type of far-field effects similar to those of Alternative 1

and 3 are the Shasta Lake Water Resources Investigation (Shasta Dam Raise Project), the State Water Resources Control Board (State Water Board) Bay-Delta Water Quality Control Plan Update, and the Delta Conveyance Project. The restoration and water infrastructure projects in Table 31-1 have not resulted in cumulatively considerable operations-related impacts on aquatic biological resources because many have (or would) include screens that meet fish agency criteria and diversion criteria that are protective of aquatic biological resources, including special-status fish species and their habitats, and/or they are beneficial because they restore habitat functions. Furthermore, reasonably foreseeable projects would have to comply with the terms and conditions of regulatory permits (biological opinions and incidental take permits), which reduces the likelihood of substantial adverse effects to the overall Sacramento River system over its entire geography. Flows in the Sacramento River and Delta are highly altered compared to natural regimes, they are managed consistent with current regulatory requirements (e.g., Bay-Delta Water Quality Control Plan Update, ROC ON LTO BiOps, and SWP ITP). These managed flows provide essential habitat elements for a variety of species and ecological processes. Any new diversions, or ongoing operations, that have the potential to affect fish habitat resulting from a change in Sacramento River flow, would also be required to operate consistent with regulatory requirements. Flows in the Sacramento River, its major tributaries and flood bypasses, and the Delta are currently, and will continue to be, managed to meet regulatory objectives, which have been developed to be protective of fish, fish habitat, and ecological processes.

Given the mixture of potential negative and positive effects from the actions of the past, present, and reasonably foreseeable projects, there is some uncertainty in how Alternative 1 or 3 would ultimately affect the cumulative condition. However, the analyses contained in Chapter 11 and the best available scientific information suggest Alternative 1 or 3 would result in limited operational near-field impacts on fish species. In addition, analyses contained in Chapter 11 indicate far-field effects would be spatially and temporally limited, or would be mitigated for potential flow-related effects on Chinook salmon and steelhead (Mitigation Measure FISH-2.1), potential water quality-related effects on delta smelt (Mitigation Measure FISH-8.1), and potential habitat-related effects on longfin smelt (Mitigation Measure FISH-9.1). These mitigation measures would reduce potential cumulative effects by either providing for or protecting habitat when species are present and could be affected. For example, Mitigation Measure FISH-2.1 would ensure that spring flows for migrating juvenile salmonids are protected and thus flows would not be reduced by the Project and effects would not occur when combined with other potential cumulative projects. Additionally, Mitigation Measure FISH-9.1 would expand the diversity, quantity, and quality of longfin smelt rearing and refuge habitat consistent with recent tidal habitat mitigation required for outflow impacts to the species. Operation of Alternative 1 or 3 would not result in an incremental contribution to cumulative impacts. Therefore, operation of Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on aquatic biological resources from other past, present, and reasonably foreseeable future actions.

Maintenance Impacts

Maintenance-related impacts associated with Alternatives 1 and 3 would be less than significant because maintenance BMPs include measures to ensure sedimentation and contaminant releases are controlled by minimizing soil disturbance and implementing Stormwater Pollution Prevention Plan, Spill Prevention and Hazardous Material Management/Accidental Spill

Prevention, Containment, and Countermeasure Plans and Response Measures, and comply with Requirements of Central Valley Regional Water Quality Control Board Order R5-2016-0076-01 (NPDES No. CAG995002 for Limited Threat Discharges to Surface Water) or State Water Board Order No. 2003-0003-003 (Impact FISH-20).

The types of projects that could result in cumulative maintenance-related impacts related to aquatic biological resources are those that involve maintenance activities within or adjacent to aquatic habitats. Projects in Table 31-1 would not/have not resulted in cumulatively considerable maintenance-related impacts on aquatic biological resources because many have (or would) include BMPs that would avoid and/or minimize temporary, maintenance-related impacts. Furthermore, while these projects may result in temporary, localized changes to channel and associated habitat processes they would not occur in proximity of Alternatives 1 and 3 (i.e., there are no projects that are listed to occur in proximity to the reservoir, recreation areas, or Funks or TRR East PGPs and reservoirs or the Dunnigan Pipeline) or have limited ability to result in substantial adverse changes to the overall Sacramento River system over its entire geography or over time. Therefore, maintenance activities would not result in an incremental contribution to impacts on aquatic biological resources. Alternative 1 or 3 would not result in a cumulative contribution on maintenance-related impacts to aquatic biological resources. Therefore, maintenance for Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on aquatic biological resources from other past, present, and reasonably foreseeable future actions.

31.3.6.2. Alternative 2

Construction Impacts

The cumulative impacts associated with the construction of Alternative 2 would be similar as those described above for Alternative 1 or 3 because the new facilities and construction footprints would generally be located in the same study area, would generally be the same size, and would generally affect the same aquatic habitats and species.

The Sacramento River discharge and the South Road, which are part of Alternative 2 only, would result in additional ground-disturbance activities, the use of heavy equipment and hazardous materials, in-water construction at the Sacramento River. These activities would result in temporary impacts on aquatic habitats and special-status and other fish species of management concern during construction activities and permanent modification of habitat conditions where the discharge is located. Impact mechanisms include hydroacoustic impacts associated with pile driving and other in-water noise-generating work; sediment disturbance, water quality effects, direct physical injury, reduced prey availability, increased predation, loss of riparian vegetation (including shaded riverine aquatic cover) and increased water temperature, and reduced habitat extent and access. However, design-based avoidance (e.g., avoiding/minimizing construction activities at or near sensitive habitats, to the extent feasible) and construction BMPs, including timing restrictions for in-water work and operational controls, would minimize and/or avoid impacts on aquatic biological resources, including special-status and other fish species of management concern, as described in Impact FISH-1. Therefore, system-wide or population-wide impacts on aquatic biological resources would not occur. Projects identified in Table 31-1 that are present or ongoing would not overlap spatially or temporally with the various construction footprints for Alternative 2. While the South Willows Residential Development

project would be in close proximity to the GCID system upgrades, it would include implementing mitigation measures and BMPs to reduce effects and would not alter the GCID Main Canal. Further, the Sacramento River discharge would be located in an area on the river that has no current evidence of historical meandering. This area is also closely bordered by levees with extensive revetment where aquatic habitat functions are limited, including SRA. Along the Sacramento River at the Sacramento discharge, any water temperature increases as a result of decreased riparian vegetation under Alternative 2 are anticipated to be small and localized, and the effects on fish from changes in water temperature are expected to be minimal. Furthermore, implementing mitigation measures identified above in Section 31.3.4, *Vegetation and Wetland Resources*, will benefit special-status fish or compensate for impacts on state and federally-listed fish and other special-status fish and their habitat For example, implementation of Mitigation Measure VEG-2.2 would compensate for the permanent loss of riparian habitat, including SRA cover. The South Road would be located across multiple drainages in steep areas and would be more prone to accelerated erosion and sedimentation and associated effects on aquatic habitats. BMPs would address potential increased erosion and siltation rates as a result of drainage pattern manipulation. In addition, there are no projects being constructed in this area that would contribute to erosion and siltation.

Construction of Alternative 2 would not result in a cumulative contribution on construction-related impacts to aquatic biological resources. Therefore, construction of Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on aquatic biological resources from other past, present, and reasonably foreseeable future actions.

Operations and Maintenance Impacts

The Sacramento River discharge and the South Road, which are part of Alternative 2 only, would not result in an incremental contribution to impacts on aquatic biological resources. As discussed in Chapter 11, the effect of the Alternative 2 on water temperatures at the Sacramento River discharge would be relatively small with the Sites water releases generally tending to cause a slight reduction in water temperature (see Impact FISH-2 through FISH-5). Therefore, temperature-related effects of the alternatives on salmonids in river and at the Sacramento River discharge location would be minimal and thus not cumulatively considerable.

The apron of the Sacramento Discharge has the potential to increase predation risk to juvenile salmonids; however, any negative effects would be extremely limited relative to the overall extent of the Sacramento River and other areas used for rearing by special-status fish species and fish species of management concern. Although discharge flow would be dissipated by the energy dissipation structures and the apron, the rate of flow discharged in April/May could attract migrating adult salmonids, if present during this time period, that might attempt to move upstream by leaping out of the river toward the discharge flow; however, the design of the apron and weir of the discharge structure would eliminate the risk of stranding for any fish attempting to move up the flow.

The South Road would be located across multiple drainages in steep areas and would be more prone to accelerated erosion and sedimentation and associated effects on aquatic habitats. BMPs would address potential increased erosion and siltation rates as a result of drainage pattern manipulation.

All other cumulative effects associated with the operation and maintenance of Alternative 2 would be similar to those described for Alternative 1 and 3 because the operations and maintenance impacts would be the same or very similar (Impacts FISH-2 through FISH-20).

Alternative 2 would not result in a cumulative contribution to operations- or maintenance-related impacts to aquatic biological resources. Therefore, operation and maintenance of Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on aquatic biological resources from other past, present, and reasonably foreseeable future actions.

31.3.7. Geology and Soils

The cumulative geographic scope for geology and soils consists of the Project footprint and adjacent areas that could be directly affected by construction and operation of Project facilities. These areas are included for potential construction and operation impacts. Projects from Table 31-1 that are included in the cumulative geographic scope are those that involve large-scale excavation or construction of structures and have the potential to be affected by seismic events, ground failure, or soil issues or that could affect paleontological resources. These projects include the Maxwell Intertie Project and the Folsom Dam Safety and Flood Damage Reduction Joint Federal Project because they would require large-scale excavation and would build structures that could fail during a seismic event. The types of projects that could result in a cumulative impact related to geologic and soils hazards are those that involve large-scale excavation or construction of structures. Projects from Table 31-1 that could contribute to a cumulative geologic impact include infrastructure and development projects such as the Davis-Woodland Water Supply Project, the Delta Conveyance Project, and the B.F. Sisk Dam Raise and Reservoir Expansion Project/San Luis Reservoir Expansion. The types of projects that could result in a cumulative impact related to paleontological resources are those that involve large-scale excavation. Projects from Table 31-1 that could contribute to a cumulative impact on paleontological resources include flood control projects, such as the SRBPP; restoration projects, such as the Hamilton City Flood Damage Reduction and Ecosystem Restoration Project and the North Delta Flood Control and Ecosystem Restoration Project; and infrastructure and development projects, such as the Contra Costa Canal Replacement Project, and the Delta Conveyance Project.

31.3.7.1. Alternatives 1 and 3

As described in Chapter 12, *Geology and Soils*, Alternatives 1 and 3 facilities would be constructed in a seismically active region and in areas of steep terrain. These facilities could be subject to surface fault rupture, strong ground motion, ground failure, landsliding, reservoir-triggered seismicity (RTS), and soils issues. The Project would be designed to address these geologic conditions (e.g., per the California Building Standards Code and the seismic design criteria of Reclamation and/or DSOD). Impacts related to geology and soils would be less than significant.

In some locations, excavation has the potential to disturb paleontological resources, and therefore Mitigation Measures GEO 7.1–GEO-7.5 have been developed to reduce impacts on paleontological resources to a less-than-significant level for most locations. However, for TRR East, where cement deep soil mixing would occur, the impact would remain significant and unavoidable.

Alternative 1 or 3 would not result in a meaningful incremental contribution related to geology and soils because most effects would be limited to the construction footprint and/or because other past, present, and reasonably foreseeable projects do not occur in the vicinity. Alternative 1 or 3 would not result in a meaningful incremental contribution on paleontological resources because impacts would be limited to the construction footprint and mitigation measures would be in place to preserve discovered fossils. Landslides and liquefaction would affect the construction footprint and a limited area around the footprint and other projects would not spatially overlap in location. Where seismic hazards could result in the failure or overtopping of a feature, such as dams and pipelines, other similar projects do not occur in the vicinity and therefore the failure would not combine with other projects to contribute to a cumulative impact. Soil impacts caused by erosion and expansive soils would also be limited to the construction footprint. Because geology, seismic, soils, and paleontological resource impacts would be limited to the construction footprint and would not spatially overlap with other projects or combine with other projects, these impacts would not contribute to a cumulative impact.

Alternative 1 or 3 would not result in a cumulative contribution to geology, soils, or paleontological resources. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on geology, soils, or paleontological resources from other past, present, and reasonably foreseeable future actions.

31.3.7.2. Alternative 2

The cumulative impacts associated with the construction and operation of Alternative 2 would be the same as those described above for Alternative 1 or 3 because most new facilities and construction footprints would be located in the same study area and would generally be the same size. The South Road, TRR West, and Sacramento River discharge would also be in the same general location and seismic and geologic setting. Alternative 2 would not result in a cumulative contribution to geology, soils, or paleontological resources. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on geology, soils, or paleontological resources from other past, present, and reasonably foreseeable future actions.

31.3.8. Minerals

The cumulative geographic scope for mineral resources consists of the mineral resources available for construction and operation of Project facilities in Tehama, Glenn, Colusa, and Yolo Counties and where facilities would be located in Tehama, Glenn, Colusa, and Yolo Counties. Mineral resources include natural gas, aggregate (i.e., gravel and sand), and borrow (i.e., mixture of sand, silt, and clay). Projects from Table 31-1 that could affect mineral resources include all projects that involve constructing residential and commercial development, public facilities, or infrastructure that would require aggregate or borrow, including Maxwell Intertie Project, South Willows Residential Development, Wal-Mart in the city of Willows, and Delta Conveyance Project. In addition, current and continuing plans identified in Appendix 4A, such as general plans that plan for urban development that may require aggregate or borrow during construction, could affect mineral resources.

31.3.8.1. Alternatives 1 and 3

Construction and operation of Alternative 1 or 3 would not result in an incremental contribution on mineral resources. Project effects would be limited to the construction footprint where there are a lack of natural gas fields, natural gas wells, or other mineral sources. In addition, if natural gas was found in the affected area it would not be permanently lost as a result of construction or operation of Alternative 1 or 3 because the natural gas fields would be accessible from the immediately adjacent area.

Alternative 1 or 3 would not result in a cumulative contribution to mineral resources. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on mineral resources from other past, present, and reasonably foreseeable future actions.

31.3.8.2. Alternative 2

The cumulative impacts associated with the construction and operation of Alternative 2 would be the same as those described above for Alternative 1 or 3 because the new facilities and construction footprints would be located in the same cumulative geographic scope, would generally be the same size, and would generally require the same type of mineral resources. Alternative 2 would not result in a cumulative contribution to mineral resources. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on mineral resources from other past, present, and reasonably foreseeable future actions.

31.3.9. Land Use

The cumulative geographic scope for land use consists of the three counties where new Project facilities would be constructed: Colusa, Glenn, and Yolo Counties. Projects in Table 31-1 that are part of this cumulative geographic scope are Colusa Generating Station and the Maxwell Intertie Project. Land use planning documents (e.g., county general plans) identified in Appendix 4A are also included in this cumulative impact analysis.

31.3.9.1. Alternatives 1 and 3

Construction and operation of Alternative 1 or 3 would not result in an incremental contribution on land use or divide an established community. Construction and operation of Alternative 1 or 3 would not conflict with the Yolo County or Glenn County land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect because there are none relevant to the facilities located in these particular counties. Construction and operation of Alternative 1 or 3 would be consistent with Colusa County land use plans, policies, and regulations adopted for the purpose of supporting the construction and operation of Sites Reservoir. The Authority would work with the Counties of Glenn and Colusa to modify or amend general plans and/or zoning ordinances to bring lands into consistency with designated land uses and zoning. Privately owned parcels surround the inundation area in Glenn and Colusa Counties and are mainly designated as foothill agriculture with supporting zoning. These parcels are primarily rural residential development, grazing, non-developed foothill space. Surrounding land uses are not expected to conflict with Alternative 1 or 3 because surrounding land uses would continue to exist as they currently do with implementation of these alternatives. Through the existing zoning and land use designations any future development would be highly restricted and would ultimately require zoning or land use designation changes reviewed and approved by

local governments. If any future change to surrounding land uses occurred, they would be evaluated at that time by local governments to determine if conflicts would occur.

Projects identified in Table 31-1 and in Appendix 4A have resulted in or would potentially result in land use designation or zoning changes consistent with various plans and policies of local jurisdictions. The local jurisdiction would be responsible for determining consistency and amending general plans or zoning to allow for the project. The Maxwell Intertie Project included facilities that are the same as Alternative 1 or 3 and therefore would not result in additional impacts beyond those already disclosed for Alternative 1 or 3.

Alternative 1 or 3 would not result in a cumulative contribution to significant land use effects. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on land use from other past, present, and reasonably foreseeable future actions.

31.3.9.2. Alternative 2

Construction and operation of Alternative 2 with respect to land use would be similar to Alternatives 1 and 3; however, Alternative 2 would result in the physical division of established communities. There would be a physical division for the community of Lodoga, even though the South Road would be constructed under Alternative 2 and would connect Lodoga to Maxwell. There are no projects in Table 31-1 or plans in Appendix 4A that would result in dividing an established community in the Antelope Valley or immediate proximity. Therefore, because there are no other projects that would result in a cumulative impact, Alternative 2 would not result in a cumulatively considerable contribution. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on land use from other past, present, and reasonably foreseeable future actions.

31.3.10. Agriculture and Forestry

The cumulative geographic scope for agriculture and forestry resources consists of Colusa, Glenn, and Yolo Counties because aboveground Project facilities would be located in these counties. Tehama County is not included because the sole Project activity occurring in that county is the installation of two new pumps in an existing facility, which would not affect agricultural or forestry resources. The three-county area was identified as the geographic context for analysis of cumulative impacts on agricultural resources to encompass regional impacts of Project construction on agricultural resources. The agricultural resources identified in Chapter 15 encompass FMMP Important Farmland, FPPA Important Farmland, parcels under Williamson Act contract, and land zoned for agricultural use. Projects in Table 31-1 that are part of this cumulative geographic scope are Colusa Generating Station and the Maxwell Intertie Project. In addition, restoration projects or flood control or water supply infrastructure project, including restoration projects occurring within the Yolo Bypass or adjacent to the Bypass in Yolo County, have or would likely result in conversion of agricultural lands. Land use planning documents (e.g., county general plans) identified in Appendix 4A are also included in this cumulative impact analysis.

31.3.10.1. Alternatives 1 and 3

Alternatives 1 and 3 would not result in incremental contribution to impacts on FMMP and FPPA Important Farmland through temporary construction disturbance. Permanent conversion of such farmland to nonagricultural uses is not anticipated during construction because agricultural land temporarily disturbed during construction would be restored to preconstruction condition and would continue to be used for agricultural production.

Alternatives 1 and 3 would result in incremental contribution to impacts on FMMP and FPPA Important Farmland through permanent conversion of Important Farmland to nonagricultural uses, even with mitigation. Mitigation Measure AG-1.1 would require the Authority to purchase conservation easements to mitigate FMMP Important Farmland being permanently converted by the Alternatives 1 and 3 to preserve regional FMMP Important Farmland (including where FMMP Important Farmland overlaps with FPPA Important Farmland). However, as discussed in Chapter 15, because the measure would not replace or restore the acres of Important Farmland permanently converted to nonagricultural uses under each alternative, Alternative 1 and 3 would still result in permanent conversion of FMMP and FPPA Important Farmland. Conversion of Important Farmland to nonagricultural uses in the geographic context has been documented through California Department of Conservation's FMMP. As described in Chapter 15, a total of approximately 16,000 acres of FMMP Important Farmland were converted to other uses in the three-county region between 2006 and 2016. While similar statistics for FPPA Important Farmland are not available, it is reasonable to assume that these three counties also experienced conversion of FPPA Important Farmland to nonagricultural uses because the two types of Important Farmland overlap in geographic context. Further, cumulative projects discussed in Table 31-1 have resulted in conversion of Important Farmland to nonagricultural uses through placement of Alternatives 1 and 3 facilities on Important Farmland or ecosystem restoration of Important Farmland for biological resources; therefore, past, present, and reasonably foreseeable future projects can be anticipated to result in these types of conversion impacts. Accordingly, a cumulative impact regarding conversion of FMMP and FPPA Important Farmland exists in the geographic context. Mitigation Measure AG-1.1 would not reduce the contribution of Alternatives 1 and 3 to this significant cumulative impact to a less-than-significant level. Further, as discussed in Section 15.4, it is infeasible to restore Important Farmland converted as a result of facilities as a mitigation measure because Alternatives 1 and 3 involve permanent facilities that, once in place, cannot be easily removed. Impacts would remain cumulatively considerable. Therefore, Alternative 1 or 3 would cause an incremental impact that would be significant when added to the impacts on designated Important Farmland from other past, present, and reasonably foreseeable future actions.

Alternatives 1 and 3 would result in an incremental contribution on lands under Williamson Act contracts because of the permanent removal of land from Williamson Act contracts and would result in remnant parcels of land that may be too small to remain under Williamson Act contract, even with mitigation. Mitigation Measure AG-2.1 would minimize impacts by requiring the Authority to comply with California Department of Conservation procedures associated with land acquisition. The measure would not prevent removal of land from Williamson Act contracts and cancellation of Williamson Act contracts through creation of remnant parcels. Cumulative projects discussed in Table 31-1 have resulted in removal of land from Williamson Act contracts and cancellation of Williamson Act contracts through creation of remnant parcels as a result of

placement of Alternatives 1 and 3 facilities on land under Williamson Act contract or ecosystem restoration of land under Williamson Act contract for biological resources. Therefore, past, present, and reasonably foreseeable future projects can be anticipated to result in these impacts. Accordingly, a cumulative impact regarding removal of land from Williamson Act contracts exists in the geographic context. Mitigation Measure AG-2.1 would not reduce the contribution of Alternatives 1 and 3 to this significant impact to a less than significant level. Further, there are no other feasible mitigation measures to address this impact for a project of this nature and magnitude, because the lands are needed for Alternatives 1 and 3 to be constructed and operated. Impacts would remain cumulatively considerable. Therefore, Alternative 1 or 3 would cause an incremental impact that would be significant when added to the impacts on Williamson Act contracts from other past, present, and reasonably foreseeable future actions.

Alternatives 1 and 3 would not result in an incremental contribution to impacts on land zoned for agricultural use. Because of the zoning modifications and amendments that would be carried out under Alternative 1 or 3, no cumulative impact regarding conflicts with zoning for agricultural land exists within the geographic context. Accordingly, Alternative 1 or 3 would not result in a cumulative contribution to a zoning or land use designation cumulative impact. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on land zoned for agricultural use from other past, present, and reasonably foreseeable future actions.

31.3.10.2. Alternative 2

Alternatives 2 would not result in incremental contribution to impacts on FMMP and FPPA Important Farmland through temporary construction disturbance. Permanent conversion of such farmland to nonagricultural uses is not anticipated during construction because agricultural land temporarily disturbed during construction would be restored to preconstruction condition and would continue to be used for agricultural production.

Alternative 2 would result in an incremental contribution to impacts on FMMP and FPPA Important Farmland through permanent conversion of Important Farmland to nonagricultural uses, even with implementation of Mitigation Measure AG-1.1. Mitigation Measures AG-1 would not reduce impacts of Alternative 2 to a less than significant level. Further, as discussed in Section 15.4, it is infeasible to restore Important Farmland converted as a result of facilities as a mitigation measure because the Project consists of permanent facilities that, once in place, cannot be easily removed. Impacts would remain cumulatively considerable. Therefore, Alternative 2 would cause an incremental impact that would be significant when added to the impacts on designated Important Farmland from other past, present, and reasonably foreseeable future actions.

Alternative 2, like Alternatives 1 and 3, would result in an incremental contribution to impacts on Williamson Act lands through removal of land from Williamson Act contracts and cancellation of Williamson Act contracts as a result of creation of remnant parcels, even with implementation of Mitigation Measure AG-2.1. Mitigation Measures AG-2.1 would not reduce impacts of Alternative 2 to a less than significant level. Further, there are no other feasible mitigation measures to address this impact for a Project of this nature and magnitude, since the lands are needed for the Project to be constructed and to operate. Impacts would remain

cumulatively considerable. Therefore, Alternative 2 would cause an incremental impact that would be significant when added to the impacts on Williamson Act contracts from other past, present, and reasonably foreseeable future actions.

Alternative 2 would not result in an incremental contribution to impacts on land zoned for agricultural use. Because of the zoning modifications and amendments that would be carried out under Alternative 2, no cumulative impact regarding conflicts with zoning for agricultural land exists within the geographic context. Accordingly, Alternative 2 would not result in a cumulative contribution to zoning or land use designations. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on land zoned for agricultural use from other past, present, and reasonably foreseeable future actions.

31.3.11. Recreation Resources

The cumulative geographic scope for recreation resources includes the Project inundation area and construction footprint of the associated facilities. The cumulative geographic scope also encompasses the following areas where recreation resources could be affected by Project operation:

- regional SWP and CVP reservoirs (i.e., Shasta Lake, Lake Oroville, Folsom Lake, San Luis Reservoir)
- rivers downstream of SWP and CVP reservoirs
- recreational facilities or areas in the region, such as the Sutter and Yolo Bypasses or wildlife areas and wildlife refuges, that receive water from SWP or CVP facilities

Projects in Table 31-1 located in the cumulative geographic scope include those infrastructure or restoration projects along rivers used for recreation (e.g., Sacramento River) and those projects that have developed recreational amenities for the public, including: Oroville Facilities Relicensing; Cache Slough Complex Restoration; Central Valley Joint Venture Program; Ecosystem Restoration Program; Davis-Woodland Water Supply Project; Delta Conveyance Project; Los Vaqueros Reservoir Expansion Phase II; Maxwell Intertie Project; Pacheco Reservoir/San Luis Reservoir Low Point Improvement Project; B.F. Sisk Dam Raise and Reservoir Expansion Project/San Luis Reservoir Expansion; Shasta Lake Water Resources Investigation; Bay-Delta Water Quality Control Plan Update; ROC ON LTO BiOps; and SWP ITP.

31.3.11.1. Alternatives 1 and 3

Construction and operation of Alternative 1 or 3 would not result in an incremental contribution to cumulative impacts on recreation resources because either recreational resources are lacking or changes would be imperceptible to recreational users. Construction of Alternative 1 or 3 would not increase use of existing neighborhood and regional parks or other recreational facilities that would result in new or accelerated substantial physical deterioration of those facilities. Construction would primarily occur in areas that are not used for recreation. Operation of Alternative 1 or 3 is anticipated to result in operational changes at the regional SWP and CVP reservoirs and the rivers below them. These changes are not expected to be perceptible to recreational users and would not increase recreationist use of these reservoirs or increase use at recreational facilities (e.g., boat ramps, campgrounds) associated with these reservoirs and rivers

because the hydrologic changes attributable to the operation of the Project are small. These changes, when combined with other projects, are not expected to be of the scale or duration which would adversely affected recreation opportunities within the cumulative geographic scope.

The past construction and current operation of multiple projects in Table 31-1 have provided reservoir and river recreational amenities to the public. Construction of future infrastructure and restoration projects (e.g., Delta Conveyance Project, Los Vaqueros Reservoir Expansion Phase II, B.F. Sisk Dam Raise and Reservoir Expansion Project/San Luis Reservoir Expansion) would occur in different geographies of the river and reservoir system of California and in different timeframes for variable durations. Potentially recreational resources or amenities could be affected in a highly localized manner that would generally cease when construction is complete. The Maxwell Intertie Project included facilities that are the same as Alternative 1 or 3 and therefore would not result in an additional impact beyond those already disclosed for Alternative 1 or 3.

Alternative 1 or 3 would not result in a meaningful incremental contribution to cumulative effects on recreation impacts. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on recreation from other past, present, and reasonably foreseeable future actions.

31.3.11.2. Alternative 2

The cumulative impacts associated with the construction and operation of Alternative 2 would be the same as those described above for Alternative 1 or 3 because the new facilities and construction footprints would be located in the same cumulative geographic scope and would generally be the same size. The South Road and the Sacramento River discharge, which are part of Alternative 2 only, would not result in an incremental contribution on recreation resources. The South Road is located in an area with no public recreational amenities. The Sacramento River discharge would temporarily construction a coffer dam in the river that would not prohibit the use of the river by recreationists. Alternative 2 would not result in a cumulative contribution to recreation. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on recreation from other past, present, and reasonably foreseeable future actions.

31.3.12. Energy

The cumulative geographic scope for electricity supply for construction and operation is the regional electricity transmission and distribution system including PG&E and the Western Area Power Authority (WAPA) as well as California's statewide electricity system more broadly. The six-county area in which Project facilities and equipment would operate is included in the geographic scope. The cumulative geographic scope for electricity supply also includes cumulative projects that would consume and/or generate electricity and that could potentially affect regional energy supply and peak and base period electricity demand. Cumulative projects for which construction has been completed and for which electricity consumption for operations and maintenance would be intermittent (e.g., ecosystem/habitat restoration projects) would not cumulatively affect regional electricity supply and are therefore not included in the assessment of cumulative project impacts on energy resources. Furthermore, the Maxwell Intertie Project would include facilities that are the same as for Alternative 1, 2, and 3 and therefore would not

result in an additional impact beyond those already disclosed for Alternative 1, 2, and 3. Therefore, projects in Table 31-1 within the cumulative geographic scope include: Folsom DS/FDR Project; Lower Cache Creek/Woodland Flood Risk Management Project; Oroville Facilities Relicensing; Colusa Generating Station; Delta Conveyance Project; El Dorado Supplemental Water Rights Project; Folsom Lake Temperature Control Device; Lake Natoma Lower American River Temperature Reduction Project; Los Vaqueros Reservoir Expansion Phase II; Pacheco Reservoir/San Luis Reservoir Low Point Improvement Project; B.F. Sisk Dam Raise and Reservoir Expansion Project/San Luis Reservoir Expansion; Shasta Lake Water Resources Investigation; Upper San Joaquin River Basin Storage Investigation; and Diablo Canyon Nuclear Plant Closure/Decommissioning.

Construction and operation of the Project would utilize petroleum-based fuels (gasoline, diesel fuel) that would be supplied through the regional liquid fuel distribution infrastructure. The cumulative geographic scope for potential impacts associated with petroleum-based fuel consumption consists of the local study area described in Chapter 17 for Glenn, Colusa, Sutter, Tehama, Yolo, and Yuba Counties, where most fuel purchases during Project construction and operation would be anticipated to occur. It also includes cumulative projects located in these counties and located in adjacent counties for which construction and/or operation would involve consumption of petroleum products. Other cumulative projects located in non-adjacent counties outside of the petroleum products study area (e.g., Siskiyou County, Contra Costa County) are not included in the assessment of cumulative project impacts on energy resources. Construction schedules for cumulative projects could overlap in time with the construction schedule for the Project and therefore petroleum products demand for the Project and cumulative projects could potentially result in cumulative effects. For example, construction of the Delta Conveyance Project is anticipated to occur between 2026 and 2039, and Project construction is anticipated to occur between 2023 and 2030. Cumulative projects for which construction has been completed and for which petroleum products consumption for operations and maintenance would be intermittent (e.g., ecosystem/habitat restoration projects) would not cumulatively affect regional petroleum products supply and are therefore not included in the assessment of cumulative project impacts on energy resources. Projects in Table 31-1 within the cumulative geographic scope include: CALFED Levee System Integrity Program; Delta Levees Flood Protection Program; DWR Small Communities Flood Risk Reduction Program; Folsom DS/FDR Project; Levee Repair–Levee Evaluation Program; Lower Cache Creek/Woodland Flood Risk Management Project; SRBPP; Sacramento River Flood Control System Evaluation, Phase III Mid-Valley Sites; American Basin Fish Screen and Habitat Improvement Project; Anadromous Fish Screen Program; Cache Slough Complex Restoration; Central Valley Joint Venture Program; Ecosystem Restoration Program Conservation Strategy; Franks Tract Project; Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project; North Delta Flood Control and Ecosystem Restoration Project; Delta Conveyance Project; Folsom Lake Temperature Control Device; and Lake Natoma Lower American River Temperature Reduction Project.

31.3.12.1. Alternatives 1 and 3

Alternative 1 and 3 would not result in an incremental contribution on energy resources because they would not result in wasteful, inefficient, or unnecessary consumption of energy. Alternative 1 and 3 conforms to applicable energy efficiency standards for construction and operation as described in Chapter 17.

Cumulative projects including flood control projects (e.g., Lower Cache Creek/Woodland Flood Risk Management Project), restoration projects (e.g., Cache Slough Complex Restoration), and infrastructure and development projects (e.g., Delta Conveyance Project and other water supply and infrastructure projects) would use electricity and petroleum products during construction for various activities including site lighting, operation of construction equipment, and operation of temporary construction buildings and facilities operation of off-road construction vehicles and equipment and for operation of on-road vehicles. In general, off-road construction vehicles and equipment would be fueled on site using tanker trucks and/or on-site temporary fuel storage equipment; off-road vehicles and equipment (e.g., excavators) would not generally directly access the retail fuel distribution system. Fueling locations for on-road vehicles and equipment would be distributed throughout the petroleum products geographic scope depending upon the construction site location, construction worker locations, and construction material sources and disposal locations.

The electricity and fuel use during construction would be temporary and would cease after construction is completed. The temporal and spatial distribution of these projects would result in limited and localized effects to the electricity system and petroleum supply system. In addition, given the local and state requirements of energy efficiency standards it is anticipated that these projects would implement standard BMPs to reduce energy use and comply with existing energy efficiency standards depending on the type of project. These standards and requirements generally include off-road construction equipment meet Tier 4 engine standards, installation of energy efficient site lighting, minimizing construction equipment idling times, maintaining all construction equipment in proper working condition, and using renewable diesel fuel where available. The California Energy Efficiency Standards for Residential and Nonresidential Buildings (which would be applicable to buildings for Alternatives 1 and 3) and the U.S. Department of Energy's Energy Efficiency Standards for Clean Water Pumps under 10 CFR 431.462 (which would be applicable to water conveyance equipment).

Electricity would be consumed during operations of projects on Table 31-1 in the cumulative geographic scope for operation of fixed facilities and for operation of water conveyance equipment including intakes, control structures, and pumping facilities (e.g., for the Delta Conveyance Project and other reservoir operation and maintenance projects). Petroleum products would be consumed for operation and maintenance of cumulative projects including for operation of maintenance vehicles and equipment and operation of on-road vehicles for transport of operations and maintenance workers and materials. Fueling locations for on-road vehicles and equipment would be distributed throughout the petroleum products geographic scope depending upon the site location, operation and maintenance worker locations, and operation and maintenance material sources and disposal locations.

Alternative 1 or 3 would not result in a cumulative contribution to the wasteful and inefficient use of energy resources. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts regarding the wasteful and inefficient use of energy resources from other past, present, and reasonably foreseeable future actions.

Alternative 1 and 3 would not result in an incremental contribution on energy resources because of a conflict with state and local plans and policies for energy efficiency and renewable energy or interfere with projects to conform with applicable renewable energy requirements. Alternatives 1

and 3 would comply with all requirements as described in Chapter 17 by employing energy efficient standards on construction and operation equipment and ensuring renewable use through the applicable 60% target.

Projects identified in the cumulative geographic scope would be subject to applicable state and local plans for renewable energy and energy efficiency. Mitigation measures may be applied to mitigate any potential conflicts that are identified during the CEQA review process and/or permitting and licensing process of infrastructure or development projects. In addition, hydroelectric generation and water withdrawals and transfers for federally-regulated hydroelectric projects (e.g., Folsom Reservoir) would be consistent with Federal Energy Regulatory Commission (FERC) license conditions and other applicable conditions. State-regulated cumulative projects (e.g., CVP/SWP projects) would be operated in accordance with applicable policies and procedures and applicable regulations and standards.

Alternative 1 or 3 would not result in a cumulative contribution to conflict with state and local plans and policies for energy efficiency and renewable energy or interfere with projects to conform with applicable renewable energy requirements. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts regarding conflicts with state and local plans and policies for energy efficiency and renewable energy from other past, present, and reasonably foreseeable future actions.

Alternative 1 and 3 would not result in an incremental contribution to energy resources by placing a substantial demand on regional energy supply or require substantial additional capacity or substantially increase peak and base period electricity demand. Alternatives 1 and Alternative 3 would be net consumers of electricity both for long-term operation and under dry and critically dry year conditions. Electricity modeling conducted for Alternatives 1 and 3 estimated the reduction in net system electricity generation from incorporation of Alternatives 1 and 3 into the CVP/SWP system (Table 17-10 and 17-13 in Chapter 17). This modeling accounted for the effects of operation of Alternatives 1 and 3 on the operation of other CVP/SWP facilities, including electricity consumption and electricity generation. As described in Chapter 17, Alternative 1 or 3 would be subject to a System Impact Study that would be conducted by either PG&E and CAISO or WAPA (depending upon the electricity service provider selected for the Project) prior to the interconnection of the Project with the grid. Based on current information operation of the Project is not expected to result in the need for construction of additional electric generation capacity or substantially increase peak and base period electricity demand. Consumption of petroleum products for operations and maintenance activities under Alternatives 1 and 3, as well for other projects in the cumulative geographic scope for petroleum products, would be highly localized. Fuel needed for project construction, including operation of off-road construction vehicles and equipment) would be procured from local fuel distributors and generally delivered to construction sites for on-site fueling. Because for these highly localized impacts, even when combined with other past, present, and reasonably foreseeable future projects, there would be no cumulative impact related to petroleum products supply and distribution.

Cumulative projects would consume electricity for operations, and some cumulative project operations would overlap in time with operation of Alternatives 1 and 3. The Delta Conveyance Project and other cumulative water storage and water conveyance projects would consume

electricity for operation of intake structures, control systems, and pumping facilities. Cumulative projects involving maintenance, modifications, or upgrades to hydroelectric generation facilities (e.g., Folsom Reservoir) could affect the electric generation capacity of the facilities and the timing and amounts of electricity generated from these facilities, and also could affect the electricity consumption for water conveyance and water transfers from operation of these facilities. The Diablo Canyon Nuclear Power Plant, California's last nuclear powered generating station, is scheduled to close and then commence decommissioning on or about 2024. CAISO is in the process of modeling the system impacts of the scheduled closure of the Diablo Canyon Power Plant. This modeling process is not complete (as of mid-2021). In February 2021 the California Public Utilities Commission (CPUC) recommended procuring 7,500 MW of electricity generation resources from 2023 through 2025. The CPUC is contemplating partially meeting the need for additional electricity generation capacity through 1 GW of new geothermal energy development and 1 GW of new long-duration storage, with a minimum storage duration of eight hours, and deployment of these new resources no later than 2025 (CPUC 2021).

Reduction in net generation from introduction of the Alternative 1 or 3 into the CVP/SWP system would decrease electricity supply; this decrease would be in addition to the decrease in supply that would result from the closure of the Diablo Canyon Nuclear Power Plant. Cumulative impacts on energy supply and the need for additional capacity would depend on implementation of CPUC recommendations for procurement of additional capacity to replace capacity that would be lost from closure of the Diablo Canyon Nuclear Power Plant. Assessment of the cumulative impacts of CPUC decisions and procurement of additional electric generating capacity to replace Diablo Canyon generation capacity would be speculative considering that the CPUC and CAISO have not completed their analysis of the potential effects of Diablo Canyon closure and procurement of replacement electric generation capacity.

Alternative 1 or 3 would not result in a cumulative contribution on energy resources by placing a substantial demand on regional energy supply or requiring substantial additional capacity or substantially increased peak and based period electric demand. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on energy resources by placing a substantial demand on regional energy supply or requiring substantial additional capacity from other past, present, and reasonably foreseeable future actions.

31.3.12.2. Alternative 2

Electricity and petroleum product energy consumption for Alternative 2 would be lower than for Alternatives 1 and 3 because of differences in the types and extent of facilities constructed. Because Alternative 2 construction energy consumption would be slightly less than for Alternative 1 and 3, cumulative impact conclusions for construction for Alternative 2 are the generally the same, although slightly less in magnitude, as described above for Alternatives 1 and 3.

Operation of Alternative 2 including electricity generation, electricity consumption, and water transfers and releases would result in a lower percentage reduction in CVP/SWP system net electricity generation than would operation of Alternative 1 (Table 17-11 in Chapter 17). Because the reduction in system net electricity generation would be lower for Alternative 2 than

for Alternatives 1 and 3, cumulative impact conclusions for operation for Alternative 2 are the same as for Alternatives 1 and 3.

Alternative 2 would not result in a cumulative contribution to energy because it would not:

- contribute to the wasteful and inefficient use of energy resources;
- conflict with state and local plans and policies for energy efficiency and renewable energy or interfere with projects to conform with applicable renewable energy requirements
- placing a substantial demand on regional energy supply or require substantial additional capacity or substantially increase peak and base period electricity demand

Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on energy resources from other past, present, and reasonably foreseeable future actions.

31.3.13. Navigation, Transportation and Traffic

The cumulative geographic scope for navigation, transportation, and traffic is the location of all construction and operation of Project facilities in Tehama, Glenn, Colusa, and Yolo Counties. For navigation, the cumulative impact evaluation is focused around the RBPP, the GCID Main Canal head gate, and the Dunnigan Pipeline during construction. For transportation and traffic, the cumulative impact evaluation is focused on the roadway segments that were part of the transportation system operational analysis for construction and operations of the Project. The projects in Table 31-1 that have been identified in the cumulative geographic scope and in proximity to Project facilities are: Colusa Generating Station, Maxwell Intertie Project, City of Willows Walmart, South Willows Residential Development, Davis Woodland Water Supply Project, Hamilton City Flood Damage Reduction and Ecosystem Restoration Project, and Red Bluff Diversion Dam Fish Passage Project.

31.3.13.1. Alternatives 1 and 3

A review of the current status and construction footprint of the projects listed in Section 31.3.13 was conducted to determine if there was a potential for cumulative impacts to the navigable portions of the Sacramento River near the Project facilities during construction. All the projects that were determined to be in current construction or in a planned construction phase are located away from any potential conflicts or cumulative effects of the RBPP, GCID Main Canal head gate. Therefore, construction activities for Alternative 1 or 3 are unlikely to coincide with similar activities for other projects in the cumulative geographic scope because of the remote nature of the area for navigation, the limited number of projects in proximity, and the construction for Alternative 1 and 3 that would occur off the Sacramento River. Alternative 1 or 3 would not result in an incremental contribution to recreational and commercial navigation. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on navigation from other past, present, and reasonably foreseeable future actions.

For transportation and traffic, potential cumulative impacts are dependent on:

- the phase of the projects (construction or operations phase)

- any overlap of the construction schedule with the Project, and
- the distance to the Project.

Potential cumulative impacts for projects that will be in construction were evaluated first. A review of the projects listed in Section 31.3.13 was conducted to determine if any of the identified projects has an anticipated construction schedule that coincides with the estimated construction schedule of Sites Reservoir. From the review it was concluded that only the Maxwell Intertie Project and the South Willows Residential Development have not yet been built and are planned for future construction. Both projects were assessed and it was determined that they would not have cumulative impacts:

- The Maxwell Intertie Project includes facilities that are the same as Alternative 1 or 3 and therefore would not result in an effects on navigation, transportation, and traffic beyond those already disclosed for Alternative 1 or 3.
- The South Willows Residential Development project is not expected to have overlapping construction routes with the Project.

Next, potential cumulative impacts related to overall project operations were evaluated. The permanent transportation and traffic effects of the projects listed in Table 31-1 would be localized around each projects' access routes and roadway connectivity. While information on the number of trips associated with the other projects is not readily available, the number is expected to be low based on typical operations for these types of projects, especially on the local roads near Sites Reservoir. Other roads associated with Sites Reservoir will have a negligible increase in traffic associated with the other local projects.

Interstate 5 (I-5) is the only potential roadway identified that would accommodate substantial operational trips from both Sites Reservoir and the other local projects. I-5 is projected to operate at level of service (LOS) C or better, with a maximum daily capacity utilization of only 53%, including Site Reservoir trips. Based on the available capacity and the relatively low number of trips associated with the other local projects on the segments closest to Sites Reservoir, operations of I-5 will remain acceptable.

As discussed in Chapter 18, the Alternatives 1 and 3 are estimated to result in a net decrease in vehicle miles traveled (VMT), due to the displacement of existing recreational trips to other reservoirs going instead to Sites Reservoir. This decrease in VMT will reduce the cumulative contribution in VMT when considering other projects in proximity to Alternatives 1 and 3 facilities.

Alternative 1 or 3 would not result in a meaningful incremental contribution to effects on transportation and traffic during construction and operations. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on transportation and traffic from other past, present, and reasonably foreseeable future actions.

31.3.13.2. Alternative 2

Impacts associated with navigation under Alternative 2 would be the same as described above for RBPP and GCID Main Canal head gate. Construction of the Sacramento River discharge would

involve some limited in-water work to install a coffer dam and build the discharge structure. However, there are no projects in proximity to this location. Furthermore, in-water work would be signed and notified as described in Chapter 18 and Appendix 2D. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on navigation from other past, present, and reasonably foreseeable future actions.

The cumulative traffic and transportation impacts associated with the construction and operation of Alternative 2 would be the same as those described above for Alternative 1 or 3 because the Project facilities and footprints would be located in the same study area and would generally be the same size. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on transportation and traffic from other past, present, and reasonably foreseeable future actions.

31.3.14. Noise

The cumulative geographic scope for noise consists of the locations in Tehama, Glenn, Colusa, and Yolo Counties where Project construction and operations would occur. Projects in Table 31-1 that are in the cumulative geographic scope and in proximity to Project facilities include on Colusa Generating Station, Maxwell Intertie Project, South Willows Residential Development, Wal-Mart in the city of Willows, and Hamilton City Flood Damage Reduction and Ecosystem Restoration Project.

31.3.14.1. Alternatives 1 and 3

Noise levels from construction activities for Alternative 1 or 3 are unlikely to coincide with noise from heavy equipment used for other projects because the study area consists primarily of agricultural use and undeveloped areas where no future use is planned. Levee and flood control projects and development projects could include use of haul trucks and earthmoving equipment in the vicinity of Alternatives 1 and 3, but those projects are either complete (i.e., temporary disturbance is done and temporary noise generation is completed), or noise levels from the associated equipment are unlikely to combine except potentially for a brief amount of time. The Maxwell Intertie Project included facilities that are the same as Alternative 1 or 3 and therefore would not result in an additional impact beyond those already disclosed for Alternative 1 or 3. The South Willows Residential Development could overlap with GCID Main Canal improvements at the railroad siphon location if construction occurs between 2021 and 2028. However, the South Willows Residential Development and the GCID Main Canal improvements would follow required noise controlling measures, including construction during appropriate times. As such, there would be no meaningful incremental contribution from Alternative 1 or 3 and no cumulative effect.

With regard to the potential for cumulative vibration-related impacts, impacts from ground-borne vibration are generally determined by the individual piece of equipment generating the highest vibration levels. Vibration is only noticeable within a localized area around the vibration-generating equipment. Because of the localized effects of vibration, instantaneous peak vibration levels would not cumulatively combine to a level higher than the maximum peak particle velocity level from Alternative 1 or 3. As described in Chapter 19, according to modeling, vibration from the Project would not be noticeable at the nearest receptors.

Alternative 1 or 3 would not result in a cumulative effect regarding noise or vibration. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on noise and vibration from other past, present, and reasonably foreseeable future actions.

31.3.14.2. Alternative 2

The cumulative impacts associated with the construction and operation of Alternative 2 would be the same as those described above for Alternative 1 or 3 because the facilities and footprints would be located in the same study area and would generally be the same size. The South Road and Sacramento River discharge, which are part of Alternative 2 only, would not result in an incremental contribution. The South Road is located in an area with limited or no sensitive noise receptors. The Sacramento River discharge would include construction of a temporary coffer dam in the Sacramento River that would produce noise and vibration above ambient levels for a limited amount of time, but this would not combine with other projects. Alternative 2 would not result in a cumulative contribution to noise. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on noise and vibration from other past, present, and reasonably foreseeable future actions.

31.3.15. Air Quality

The cumulative geographic scope for air quality consists of multiple geographic scales, depending on the type of pollutant that is analyzed. Cumulative impacts from regional ozone precursors and criteria pollutants, localized concentrations of criteria pollutants, and toxic air contaminants are discussed in the sections below. The geographic scopes for these categories of pollutants are discussed below as well.

31.3.15.1. Alternatives 1 and 3

Regional Ozone Precursors and Criteria Pollutants

For regional ozone precursors and criteria pollutants, the cumulative geographic scope for Alternatives 1 and 3 regional air quality consists of the Sacramento Valley Air Basin (SVAB), specifically, the Colusa County Air Pollution Control District (CCAPCD), Glenn County Air Pollution Control District (GCAPCD), Yolo-Solano Air Quality Management District (YSAQMD), and Tehama County Air Pollution Control District (TCAPCD). The discussion of impacts for regional air quality at the air basin and air district level is an inherently cumulative approach, because criteria pollutant emissions mix into the atmosphere and affect a larger area than any individual project site. As such, the cumulative regional air quality analysis does not consider individual projects near the affected areas for Alternatives 1 and 3. It uses the same thresholds that are used in the project-level analysis, developed by TCAPCD[1] and YSAQMD, because these thresholds are considered to be cumulative thresholds (Tona pers. comm., Yolo-Solano Air Quality Management District 2007). Criteria pollutant emissions that exceed air quality thresholds for Alternatives 1 and 3 are considered to result in both project-level and cumulative impacts.

[1] CCAPCD and GCAPCD have not developed quantitative emissions thresholds for CEQA evaluations.

Construction

As discussed in Chapter 20, *Air Quality* (Tables 20-4a and 20-4b), the counties in the study area are in nonattainment for the CAAQS and NAAQS for multiple pollutants because of the emissions from past and present projects. Future projects, including Alternatives 1 and 3, may also contribute to regional nonattainment of the CAAQS and NAAQS. As discussed for Impact AQ-1 in Chapter 20, construction emissions would result in daily ROG, NOx and PM10 emissions above the thresholds used for CCAPCD and GCAPCD. BMPs would minimize air quality impacts through implementation of measures to reduce construction emissions. Specifically, impacts associated with fugitive dust emissions would be minimized through a dust control plan, while exhaust-related emissions would be reduced through the use of Tier 4 diesel engines in most equipment, and other BMPs. However, even with these BMPs, exceedances of the thresholds would occur during construction for Alternatives 1 and 3 in CCAPCD and GCAPCD for NOx and PM10.

With implementation of Mitigation Measures AQ-1.1 and AQ-1.2, emissions would be reduced through the use of zero emissions and near zero emission vehicles and off-road equipment and then further mitigated to as close to the applicable thresholds as possible through the purchase of offsets. The air district thresholds have been developed to prevent further deterioration of ambient air quality, and consider relevant past, present, and reasonably foreseeable future projects in the vicinity of Alternatives 1 and 3. However, there is uncertainty in the feasibility of obtaining offsets, and emissions may still be above the applicable thresholds. Mitigation Measures AQ-1.1 and AQ-1.2 will reduce emissions, first through on-site measures, and then through the purchase of offsets; however, there is no further feasible mitigation available to reduce the emissions for Alternative 1 or 3 to be below the thresholds.

Because NO_X and PM10 emissions would be above the thresholds even with the purchase of offsets, Alternatives 1 and 3 would result in a cumulative effect regarding regional ozone precursor and criteria pollutant emissions during construction. Therefore, construction of Alternative 1 or 3 would cause an incremental impact that would be significant when added to the impacts on regional air quality from other past, present, and reasonably foreseeable future actions.

Operation

As discussed for Impact AQ-2 in Chapter 20, operation emissions would result in daily ROG emissions above the thresholds used for CCAPCD and GCAPCD from the use of recreational boats on the reservoir. Emissions from maintenance activities at the reservoir would not result in emissions exceedances. With implementation of Mitigation Measures AQ-2.1 and AQ-2.2, emissions would be reduced through a recreational boating emissions minimization plan and then further mitigated to as close to the applicable thresholds as possible through the purchase of offsets. However, there is uncertainty in the feasibility of obtaining offsets, and emissions may still be above the applicable thresholds. Mitigation Measures AQ-2.1 and AQ-2.2 will reduce emissions, first through on-site measures, and then through the purchase of offsets. There is no further feasible mitigation available to ensure Alternative 1 or 3 emissions will be below the thresholds.

Because ROG emissions would be above the thresholds, Alternatives 1 and 3 would result in a cumulative effect regarding regional ozone precursor and criteria pollutant emissions during operation. Therefore, operation of Alternative 1 or 3 would cause an incremental impact that would be significant when added to the impacts on regional air quality from other past, present, and reasonably foreseeable future actions.

Localized Criteria Pollutants

Construction

For cumulative impacts for localized criteria pollutant concentrations, the background concentrations of pollutants can be reviewed to determine if there are existing impacts in the absence of the Project. As noted in Chapter 20, there are areas in the study area where background concentrations of PM10 and PM2.5 exceed the CAAQS and NAAQS. The construction activities for Alternatives 1 and 3, in addition to activities associated with planned future projects, would contribute additional PM10 and PM2.5 emissions, which would further contribute to existing violations of the CAAQS and NAAQS. This cumulative effect could potentially lead to new violations in areas currently in attainment.

As noted in Chapter 20, Alternatives 1 and 3 would implement Fugitive Dust Control and Construction Equipment Exhaust Reduction Plan BMPs to reduce dust and exhaust emissions. However, with implementation of these BMPs, Alternative 1 or 3 would contribute to existing and create new violations of the PM10 and PM2.5 CAAQS and/or NAAQS, as shown in Chapter 20. Consequently, Alternative 1 or 3 would result in localized cumulative impacts. Alternatives 1 and 3 would thus result in a significant cumulative effect regarding existing pollutant concentrations, because there would be new exceedances of the CAAQS and NAAQS. Additionally, the contribution of Alternative 1 or 3 to existing cumulative effects (i.e. existing exceedances of the CAAQS and NAAQS) would also be significant. Mitigation Measures AQ-1.1 and AQ-1.2 will reduce emissions, first through on-site measures, and then through the purchase of offsets; however, there is no further feasible mitigation available to reduce Alternative's 1 or 3 emissions will be below the thresholds. Therefore, construction of Alternative 1 or 3 would cause an incremental impact that would be significant when added to the impacts on existing pollutant concentrations from other past, present, and reasonably foreseeable future actions.

Operation and Maintenance

As discussed in Chapter 20, Alternative 1 or 3 would result in substantially less emissions during the operation period than construction, because maintenance activities would be minor, infrequent, and/or brief. The most frequent maintenance activity would be inspections involving pick-up trucks. Recreational activities would also contribute emissions, through the use of on-road vehicles traveling to the recreation areas and boats on the reservoir. As discussed in Chapter 20, emissions of criteria pollutants that are considered local pollutants would be below the air district thresholds for operation and maintenance activities.[2]

[2] Although ROG emissions would exceed the applicable threshold, ROG is not considered a local pollutant, and there is no CAAQS or NAAQS.

As such, the operation and maintenance activities for Alternative 1 or 3 would not result in an exceedance of the NAAQS or CAAQS or contribute significantly to an existing violation. Alternative 1 or 3 would not result in a cumulative contribution to localized criteria pollutants. Therefore, operation of Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on localized criteria pollutants from other past, present, and reasonably foreseeable future actions.

Localized Toxic Air Contaminants

Construction

In the study area, there is a relatively low number of sources of toxic air contaminants, compared to more urban or developed areas, because of the largely rural and undeveloped character of the study area. Isolated occurrences of agricultural pumps or other equipment may generate emissions of TACs if the equipment is diesel-fueled. Transportation sources of TACs in the study area are limited to rural roadways, because Alternatives 1 and 3 are, for the most part, not located in proximity to major highways or railroad tracks. In the future, there is also likely to be limited potential for new sources of TAC emissions, because the character of the study area is not anticipated to change substantially. Consequently, the contribution of TAC emissions from existing and future background sources in the study area is likely low.

To assess cumulative impacts from TAC emissions, the project-level health risk thresholds from Chapter 20 would apply, because the air districts in the study area either do not have applicable guidance (CCAPCD, GCAPCD) or separate cumulative thresholds for health risk impacts (TCAPCD). For activities in YSAQMD, current guidance indicates that cumulative impacts should be evaluated by considering the potential risks from all of a project's emission sources. For YSAQMD, if the project-level assessment demonstrates that potential health impacts are less than significant, then that project would have a less than cumulatively significant impact (Yolo-Solano Air Quality Management District 2007). As discussed in Impact AQ-4a in Chapter 20, health risks from Project construction would be well below the applicable health risk thresholds. Given the low level of risk to sensitive receptors from construction, Alternative 1 or 3 would not result in a cumulative contribution to TACs. Further, given the relatively low contribution of TAC emissions from background sources in the study area, Alternative 1 or 3 when combined with other past, present, and reasonably foreseeable future projects would not have a significant cumulative impact on TACs. Therefore, construction of Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on TAC emissions from other past, present, and reasonably foreseeable future actions.

Operation and Maintenance

As discussed in Chapter 20, Alternatives 1 and 3 would not result in substantial sources of TACs, because maintenance activities would be minor, infrequent, and/or brief. The most frequent maintenance activity would be inspections involving pick-up trucks, which could be either gasoline or diesel-fueled. More intensive activities that would be infrequent, such as replacement of instrumentation every 25 years, would occur for a relatively short amount of time (i.e. 25 days). In general, the maintenance activities would occur at far distances from sensitive receptors and would most often involve a low number of trucks and equipment.

Recreational activities for Alternatives 1 and 3 are not anticipated to be substantial sources of diesel-fueled vehicles, because people traveling to the recreation areas would use light-duty on-road vehicles, which are predominantly gasoline-fueled. Boats used on the reservoir are also likely to be gasoline-fueled and thus not a substantial source of TAC emissions. As such, because a substantial use of diesel-emitting vehicles would not occur during operation, Alternative 1 or 3 would not result in a cumulative contribution to TACs. As noted above, there is a relatively low contribution of TAC emissions from background sources in the study area. Therefore, operation of Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on TAC emissions from other past, present, and reasonably foreseeable future actions.

31.3.15.2. Alternative 2

Regional Ozone Precursors and Criteria Pollutants

For regional ozone precursors and criteria pollutants, the cumulative geographic scope for Alternatives 2 regional air quality would be the same as Alternatives 1 and 3, and the cumulative regional air quality analysis for Alternative 2 does not consider individual planned projects in the vicinity.

Construction

The cumulative regional air quality impacts associated with construction of Alternative 2 would be similar as those described above for Alternative 1 or 3, because the facilities and footprints would be located in the same study area and would generally involve similar activities. Overall, construction emissions for Alternative 2 would be less than Alternatives 1 and 3, because Alternative 2 would generally require less construction activity. Alternative 2 construction emissions would also result in daily ROG, NOx, and PM10 emissions above the thresholds used for CCAPCD and GCAPCD, and BMPs would minimize air quality impacts through implementation of measures to reduce construction emissions. As with Alternatives 1 and 3, exceedances of the thresholds would remain after BMP implementation in CCAPCD and GCAPCD for NOx and PM10.

Alternative 2 would require the same mitigation measures as Alternatives 1 and 3 to reduce emissions. NO_X and PM10 emissions that are still above the thresholds will be mitigated through the purchase of offsets; however, because there is uncertainty in the feasibility of obtaining offsets, emissions may still be above the applicable thresholds. As noted above, Mitigation Measures AQ-1.1 and AQ-1.2 will reduce emissions through on-site measures and offsets, but there is no further feasible mitigation available that ensures that the Alternative 2 emissions will be below the thresholds.

Alternative 2 would thus result in a cumulative effect regarding regional ozone precursor and criteria pollutant emissions during construction. Therefore, construction of Alternative 2 would cause an incremental impact that would be significant when added to the impacts on regional air quality from other past, present, and reasonably foreseeable future.

Operation

The cumulative regional air quality impacts associated with maintenance activities for Alternative 2 would be similar as those described above for Alternative 1 or 3, because the facilities and footprints would be located in the same study area and would generally involve similar activities. Alternative 2 would result in slightly higher emissions from recreational visitor trips, because the absence of the bridge over the reservoir would result in longer travel distances. Operation of Alternative 2 would also result in daily ROG emissions above the thresholds used for CCAPCD and GCAPCD. With implementation of Mitigation Measures AQ-2.1 and AQ-2.2, emissions would be reduced through a recreational boating emissions minimization plan and then mitigated as close to the applicable thresholds as possible through the purchase of offsets; however, because there is uncertainty in the feasibility of obtaining offsets, emissions may still be above the applicable thresholds. As noted above, Mitigation Measures AQ-2.1 and AQ-2.2 will reduce emissions through on-site measures and offsets, but there is no further feasible mitigation available that ensures that the Alternative 2 emissions will be below the thresholds.

Because ROG emissions that are still above the thresholds will be mitigated to below the thresholds through the purchase of offsets, Alternatives 2 would not result in a cumulative effect regarding regional ozone precursor and criteria pollutant emissions during operation. Therefore, operation of Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on regional air quality from other past, present, and reasonably foreseeable future actions.

Localized Criteria Pollutants

Construction

The cumulative impact of localized criteria pollutants associated with construction of Alternative 2 would be similar to the impact described above for Alternative 1 or 3. Chapter 20 shows that Alternative 2 would also contribute to existing and create new exceedances of the CAAQS and NAAQS. This cumulative effect could potentially lead to new violations in areas currently in attainment. Alternative 2 would implement Fugitive Dust Control and Construction Equipment Exhaust Reduction Plan BMPs to reduce dust and exhaust emissions. However, Alternative 2 would still contribute to existing and create new violations of the CAAQS and NAAQS, as shown in Chapter 20. Therefore, construction of Alternative 2 would cause an incremental impact that would be significant when added to the impacts on existing pollutant concentrations from other past, present, and reasonably foreseeable future actions.

Operation and Maintenance

Operation and maintenance emissions for Alternative 2 would be very similar to those emissions for Alternative 1 or 3. As discussed in Chapter 20, emissions of criteria pollutants that are considered local pollutants would be below the air district thresholds for operation and maintenance activities for Alternative 2.[3] As such, the operation and maintenance activities for Alternative 2 would not result in an exceedance of the NAAQS or CAAQS or contribute significantly to an existing violation. Therefore, operation and maintenance of Alternative 2

[3] Although ROG emissions would exceed the applicable threshold, ROG is not considered a local pollutant, and there is no CAAQS or NAAQS.

would not cause an incremental impact that would be significant when added to the impacts on localized criteria pollutants from other past, present, and reasonably foreseeable future actions.

Localized Toxic Air Contaminants

Construction

The cumulative impact of TACs associated with construction of Alternative 2 would be similar to the impact described above for Alternative 1 or 3. Chapter 20 shows the contribution of health risks from Alternative 2, which is higher than the contribution of Alternative 1 or 3 but still well below the applicable thresholds. As with Alternative 1 or 3, the background sources of TACs in the study area would be low. Therefore, construction of Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on TAC emissions from other past, present, and reasonably foreseeable future actions.

Operation and Maintenance

Operation and maintenance activities for Alternative 2 would be similar to Alternative 1 or 3, and, as discussed above, would have low potential to generate TAC emissions. Therefore, operation and maintenance of Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on TAC emissions from other past, present, and reasonably foreseeable future actions.

31.3.16. Greenhouse Gas Emissions

GHGs are global pollutants and climate change is a global issue. GHGs are different from criteria air pollutants (such as ozone precursors), which are primarily pollutants of regional and local concern. Because of long atmospheric lifetimes, GHGs emitted by sources globally accumulate in the atmosphere. No single emitter of GHGs is large enough to produce global climate change on its own. Rather, climate change is the result of the individual contributions of countless past, present, and future sources. Therefore, GHG impacts are inherently cumulative. Global GHG emissions continue to increase from population and economic growth, and this is worsening the effects of global climate change. Efforts to reduce GHG emissions are occurring at the local, state, national, and international levels; however, current projections indicate that emissions will still increase for the next decades and increase the current GHG concentrations in the atmosphere.

31.3.16.1. Alternatives 1 and 3

Construction of Alternatives 1 and 3 would result in a temporary increase in GHG emissions. After construction, maintenance activities, water conveyance energy, and recreational activities would result in GHG emissions over the life of Alternatives 1 and 3. These annual emissions will decline over time, because improvements in engine technology and regulations to reduce combustion-related emissions will reduce the carbon intensity of equipment, vehicles, and electricity.

As noted in Chapter 21, total net emissions generated by construction of Alternatives 1 and 3 are estimated to be 348,648 or 348,796 metric tons CO2e (Table 21-4). For operation, Alternatives 1 and 3 are estimated to result in 22,722 to 48,352 metric tons CO2e, with Alternative 3 generating lower emissions than Alternative 1 (Table 21-4). The Authority will implement Mitigation Measure GHG-1.1 to mitigate these emissions to net zero through a GHG reduction plan. This

measure ensures that construction and operation emissions would not result in a significant cumulative contribution to impacts on global climate change, because the net emissions from construction and operation would be net zero with Mitigation Measure GHG-1.1. Therefore, Alternatives 1 and 3 would not cause an incremental impact that would be significant when added to the impacts of GHGs from other past, present, and reasonably foreseeable future actions.

31.3.16.2. Alternative 2

Construction of Alternative 2 would also result in a temporary increase in GHG emissions, and in on-going emissions from maintenance activities, water conveyance energy, and recreational activities.

As noted in Chapter 21, total net emissions generated by construction of Alternative 2 are estimated to be 351,317 or 351,362 metric tons CO2e, which is less than the estimated amount for Alternatives 1 and 3 (Table 21-4). For operation, Alternative 2 is estimated to result in 26,970 to 48,644 metric tons CO2e, which is between the level of emissions generated by Alternatives 1 and 3. With Mitigation Measure GHG-1.1, Alternative 2 emissions would be mitigated to net zero through a GHG reduction plan. Therefore, Alternative 2, would not cause an incremental impact that would be significant when added to the impacts of GHGs from other past, present, and reasonably foreseeable future actions.

31.3.17. Cultural Resources

The cumulative geographic scope for cultural resources consists of the Project footprint and adjacent areas that could be directly affected by construction and operation of Project components, as described in Chapter 22. The projects from Table 31-1 that could involve ground-disturbing excavation or changes to or removal of structures (such as buildings, canals, or levees) and have the potential to affect cultural resources or human remains are ongoing projects that involve flood control, restoration, and infrastructure improvement and development. However, most of these projects from Table 31-1 are not in proximity to the Project footprint, with the exception of the South Willows Residential Development project adjacent to the GCID Main Canal and Maxwell Intertie Project, as well as some projects adjacent to the Sacramento River levee (e.g., Hamilton City Flood Damage Reduction and Ecosystem Restoration Project).

31.3.17.1. Alternatives 1 and 3

Alternatives 1 and 3 would result in changes to structures during Project construction in areas with architectural resources. Alternatives 1 and 3 construction would involve ground-disturbing excavation and the modification or removal of structures (such as buildings and canals). In some locations, changes to existing structures have the potential to modify historic built resources. Mitigation Measures CUL-1.1–CUL-1.4 would reduce impacts on architectural resources to a less-than-significant level for areas outside of the inundation areas for Sites Reservoir and TRR East. However, for the Sites Reservoir and TRR East, where construction and inundation would occur, the impact would remain significant and unavoidable because inundation would permanently destroy historic built resources at those locations even after implementation of the mitigation measures. The Sites Reservoir and TRR East inundation areas are not in proximity to projects listed in Table 31-1 and impacts to resources in those areas would not overlap with the impacts from those projects. The Maxwell Intertie Project included facilities that are the same as

Alternative 1 or 3 and therefore would not result in additional impacts beyond those already disclosed for Alternative 1 or 3. Project construction footprints outside of inundation areas are either not in proximity to projects listed in Table 31-1 or they occur at existing Sacramento River or GCID facilities where construction impacts would be reduced to less than significant with mitigation. For example, the South Willows Residential Development would be located near the GCID Main Canal but would not result in a significant impact because it would not affect the historical qualities of the existing canal and would not spatially overlap with Alternative 1 or 3. There would be no overlap in impacts from other projects on cultural resources, and Alternative 1 or 3 would not result in a meaningful incremental contribution to effects on historic built resources.

Alternatives 1 and 3 would result in ground-disturbing activities during construction and operations in areas with known and previously unidentified archaeological resources and locations of cemeteries and human remains. Therefore, implementation of Mitigation Measures CUL-2.1–CUL-2.4 is required to reduce impacts on archaeological resources. Although these mitigation measures would reduce impacts on archaeological resources identified to be significant, it is not known whether avoidance is feasible in all cases. In addition, implementation of these mitigation measures would not fully reduce or avoid impacts for significant known and unknown archaeological resources in the reservoir inundation areas because they would be altered or destroyed due to inundation and fluctuating WSE. Because mitigation may not be feasible in areas outside the inundation area and because resources in the inundation would be permanently destroyed, the impact would remain significant and unavoidable for known and unknown archaeological resources. In areas of ground disturbance associated with construction and operation there is the potential to disturb human remains, and therefore implementation of Mitigation Measures CUL-3.1–CUL-3.3 is required to reduce impacts on human remains to a less-than-significant level. The Sites Reservoir and TRR East would involve inundation of existing and previously unidentified burials. In these areas, the impact would remain significant and unavoidable because construction of these components of Alternatives 1 and 3 would permanently destroy the known and unknown burials.

Project components outside the reservoir inundation areas are not in proximity to projects listed in Table 31-1 and impacts to archeological resources, cemeteries, and human remains in those areas would not overlap with the impacts from those projects. The Maxwell Intertie Project included facilities that are the same as Alternative 1 or 3 and therefore would not result in additional impacts beyond those already disclosed for Alternative 1 or 3. Project construction footprints outside of inundation areas are either not in proximity to projects listed in Table 31-1 or they occur adjacent to existing GCID facilities where no ground disturbance would occur and there would be no overlap in impacts by other projects. For example, the South Willows Residential Development project is in proximity to the GCID Main Canal but does not overlap with the Alternative 1 or 3. In addition, this project also includes mitigation measures to address discovery of unknown archaeological resources and buried human remains. Alternatives 1 or 3 would not result in a meaningful incremental contribution to effects on archaeological resources, cemeteries, or human remains.

Alternative 1 or 3 would not result in an incremental contribution to effects on cultural resources because impacts would be limited to the construction footprint and mitigation measures would be

avoid, protect, or implement resource-specific treatments for cultural resources. The construction and operation of most Project components would affect the construction footprint and a limited area around the footprint, and there would be no spatial overlap with the projects in Table 31-1. Alternative 1 or 3 would not result in a meaningful incremental contribution to effects on cultural resources. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on cultural resources from other past, present, and reasonably foreseeable future actions.

31.3.17.2. Alternative 2

The cumulative impacts on historic built resources, archaeological resources, and human remains associated with the construction and operation of Alternative 2 would be the same as those described above for Alternatives 1 and 3, with the exception of TRR West, the South Road, and the Sacramento River levee at the Dunnigan Pipeline discharge, because facilities and construction footprints would be mostly located in the same study area and would generally be the same size as those compared to Alternatives 1 and 3. The South Road and TRR West would also be in the same general location and cultural resources setting and there are no projects on Table 31-1 that would spatially overlap with these two components of Alternative 2. The construction of the Sacramento River discharge would alter the existing river levee. The impact of this alteration to a historic built resource would be less than significant with mitigation. Other projects along the Sacramento River either do not spatially overlap with this feature. Alternative 2 would not result in a meaningful incremental contribution to effects on cultural resources. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on cultural resources from other past, present, and reasonably foreseeable future actions.

31.3.18. Tribal Cultural Resources

The cumulative geographic scope for tribal cultural resources consists of areas of Colusa, Glenn, Tehama, Yolo, Shasta, Butte, Sutter, Yuba, and Sacramento Counties, including waterbodies, that could be affected by Project construction or operations. The projects from Table 31-1 are not in proximity to Project facilities that would be constructed; most of the projects from Table 31-1 are in proximity to the Sacramento River and its tributaries, which are areas related to Project operations.

31.3.18.1. Alternatives 1, 2, and 3

Construction of the reservoir and new facilities under Alternatives 1, 2, and 3 would result in disturbance or destruction of tribal cultural resources. Tribal cultural resources located in areas with new project construction, including new reservoir inundation areas, would be affected, but because these Project construction elements are not in proximity to projects listed in Table 31-1, there would be no overlap in impacts from other projects and Alternatives 1, 2, and 3 would not result in a meaningful incremental contribution to effects on tribal cultural resources. Construction modifications to existing Sacramento River diversion facilities and conveyances to regulating reservoirs would have no impact because these facilities are already in place.

Operation of Alternative 1, 2, or 3 generally would not result in substantial changes in river flows. Flows generally would be within the historical range experienced by the rivers and changes in flows would not have substantial adverse effects on fish that could be considered

tribal cultural resources. Impacts related to juvenile salmonid rearing and/or migration habitat would be limited through pulse flow protection measures applied to precipitation-generated pulse flow events from October through May, a fish monitoring program to inform real-time operational adjustments, and Mitigation Measure FISH-2.1 as discussed in Chapter 11 and above in Section 31.3.6, *Aquatic Biological Resources*. These actions will limit the potential for negative flow-survival effects to winter-run Chinook salmon, spring-run Chinook salmon, fall-run/late fall–run Chinook salmon, and Central Valley steelhead during dispersal to rearing habitat and/or migration downstream toward the Delta. Modeled changes in flood flows during operations are minor when considered in the context of the larger system and would not represent a substantial increase in the amount or rate of runoff that would substantially change erosion or quality of land or sites of religious or cultural importance to a California Native American Tribe. Operations within the new reservoir inundation areas would result in exposure and deterioration of tribal cultural resources because erosion during operations drawdown and reservoir level fluctuation would result in erosion of the resources. However, because these Project operations are not in proximity to projects listed in Table 31-1, there would be no overlap with impacts from other projects and Alternatives 1, 2, or 3 would not result in a meaningful incremental contribution to effects on tribal cultural resources.

There would be significant and unavoidable impacts under Alternatives 1, 2, and 3; however, no projects identified in Table 31-1 are identified as affecting related tribal cultural resources. Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to the impacts on tribal cultural resources from other past, present, and reasonably foreseeable future actions.

31.3.19. Visual Resources

The cumulative geographic scope for visual resources consists of Colusa, Glenn, and Yolo Counties because aboveground Project facilities would be located in these counties. Tehama County is not included because the sole Project activity occurring in that county is the installation of two new pumps in an existing facility, which would not affect visual resources. Projects in Table 31-1 would not be located in the same vicinity as aboveground facilities at the Sites Reservoir and conveyance complex and therefore could not be seen together with aboveground facilities. The South Willows Residential Development in Glenn County would be in proximity to GCID system upgrades and is considered. Restoration and flood control projects along the Sacramento River are also considered because the Sacramento River discharge would be constructed and operated under Alternative 2.

31.3.19.1. Alternatives 1 and 3

The construction of Alternatives 1 and 3 would result in a significant and unavoidable impact to the visual character and quality of Antelope Valley as a result of the inundation of the valley. This effect would be highly localized to the valley itself. Once the reservoir is operational it would create new visual character and quality associated with a surface reservoir in a rural foothill setting. The views would be typical of other California reservoirs, with surface water meeting land surface and the presence of “bath tub rings” of exposed soil when the reservoir is drawn down. Projects identified Table 31-1 would not be located in the same vicinity as Antelope Valley and therefore would have no ability to contribute to a cumulative effect. Although there would be significant and unavoidable impacts under Alternatives 1 and 3,

because there are no projects identified in Table 31-1 as affecting related visual resources, there would be no cumulatively considerable impact on visual character and quality and impacts would be less than significant. Similarly, there are no projects in Table 31-1 in the vicinity of Antelope Valley that would contribute to light and glare. Therefore, Alternatives 1 and 3 would not result in a cumulatively considerable impact as a result of creating light and glare and impacts would be less than significant.

Alternatives 1 and 3 would result in less than significant impacts on the visual character and quality of existing areas around the GCID system upgrades in Glenn County. These upgrades would occur in the GCID Main Canal and would result in temporary disturbance of agricultural areas around the canal due to construction laydown areas and bypasses. Once construction is over, temporary areas would be restored. The GCID system upgrades, specifically those at the railroad siphon, would occur both temporally and spatially close to the South Willows Residential Development. However, because the GCID system upgrades would take place in the existing canal and the visual effects associated with construction would be temporary, Alternatives 1 and 3, in conjunction with the South Willows Residential Development would not result in an incremental contribution on visual resources.

Alternative 1 or 3 would not result in a cumulative contribution to visual resources. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on visual resources from other past, present, and reasonably foreseeable future actions.

31.3.19.2. Alternative 2

The cumulative impacts associated with the construction and operation of all common facilities for Alternative 2, including those associated with the Sites Reservoir and conveyance complex and GCID system upgrades, would be the same as described above for Alternative 1 or 3.

The Sacramento River discharge would be located in the Colusa to Verona reach of the river between River Miles 100 and 101. This reach is mostly confined by levees and the location of the Sacramento River discharge shows no evidence of historical meandering. The river channel in this general area is closely bordered by levees with extensive revetment, and lateral channel evolution is limited. Related past, present, and reasonably foreseeable future flood and restoration projects along the Sacramento River have altered the visual character and quality of the river. Levee projects sometimes necessitate the removal of mature vegetation to construct projects and require that levee slopes be maintained free of woody vegetation in perpetuity, resulting in the loss of a highly valued regional aesthetic landscape component. The mature vegetation along the levees is characteristic of the region and is a striking, distinctive element in the landscape. The existing vegetation that is removed is most often be replaced with herbaceous vegetation. Maintaining the levees devoid of the characteristic riparian vegetation and mature landscaping and replacing it with grass and potentially rock would highly degrade the visual character and quality of the area and increase glare. Restoration projects (e.g., Restoring Ecosystem Integrity in the Northwest Delta, Upper Sacramento River Anadromous Fish Habitat Restoration Project[s]) and some levee projects (e.g., Hamilton City Flood Damage Reduction and Ecosystem Restoration Project) involve replanting trees, restoring habitat, and installing setback levees to return the Sacramento River to a more natural meander setting. These types of

projects serve to reduce visual impacts of levee projects. Alternative 2 would result in significant impacts to the visual character and quality of the Sacramento River due to the Sacramento River discharge structure. This would not be an incremental contribution to a cumulative effect on the visual character and quality because this stretch of the river has not experienced historical meander and is primarily levees. In addition, much of the eastern levee does not have riparian vegetation and is currently vegetated with grasses. Therefore, the removal of riparian vegetation along this small segment along the western bank of the river would not appear out of context.

Alternative 2 would not result in a cumulative contribution to visual resources. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on visual resources from other past, present, and reasonably foreseeable future actions.

31.3.20. Population and Housing

The cumulative geographic scope for population and housing consists of Colusa, Glenn, and Yolo Counties because Project facilities would be located in these counties. Tehama County is not included in the study area because the sole Project activity occurring in that county is the installation of two new pumps in an existing facility, which would not affect population or housing in that county. Projects from Table 31-1 that are included in the cumulative geographic scope are those that involve construction or development because they have the potential to bring additional workers into the counties and create a need for additional housing. These projects include flood control projects, such as the DWR Small Communities Flood Risk Reduction Program; restoration projects, such as Cypress Avenue Bridge North, Hamilton City Flood Damage Reduction and Ecosystem Restoration Project, and the Knights Landing Outfall Gates (KLOG) Fish Barrier Project; and infrastructure and development projects, such as the Colusa Generating Station, and South Willows Residential Development.

31.3.20.1. Alternatives 1 and 3

Construction and operation of Alternative 1 or 3 would not result in an incremental contribution to cumulative impacts on population and housing because construction and operation of Alternative 1 or 3 would not result in unplanned population growth. The estimated construction labor force would be relatively small because most workers are anticipated to commute from the surrounding areas and are not expected to permanently relocate to the study area. Operation of Alternative 1 or 3 would not result in substantial unplanned population growth because existing roads are being realigned to continue current connectivity. Similarly, the projects identified in Table 31-1 that would occur in the cumulative geographic scope would not increase its population because overall they would require a relatively small work force. Those projects would not cause unplanned population growth because they would not create new major roads or other infrastructure that would induce population growth, and the new residential development would help to meet existing housing needs.

Construction of the Sites Reservoir for Alternatives 1 and 3 would permanently displace the residents of the unincorporated community of Sites. The projects identified in Table 31-1 would not permanently displace the residents of Antelope Valley or any other location and therefore would not combine with Alternative 1 or 3 to contribute to a cumulative impact.

Alternative 1 or 3 would not result in a cumulative contribution to population and housing. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on population and housing from other past, present, and reasonably foreseeable future actions.

31.3.20.2. Alternative 2

Construction and operation impacts under Alternative 2 would be the same as described above for Alternatives 1 and 3. The number of construction workers would be approximately the same between Alternative 1 or 3 and Alternative 2, even considering construction and operation of TRR West in place of TRR East and the Huffmaster Road realignment/South Road alignment rather than construction of a new bridge across the reservoir. Alternative 2 would not result in a cumulative contribution to population and housing. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on population and housing from other past, present, and reasonably foreseeable future actions.

31.3.21. Public Services and Utilities

The cumulative geographic scope for public services and utilities consists of areas of Glenn and Colusa Counties that could be affected by Project construction or operations. Tehama and Yolo Counties are not included in the study area because the areas where Project construction and operation would occur lack existing public services and utilities (i.e., the Project is unlikely to affect them). Projects from Table 31-1 that are considered in the cumulative impact analysis include the Sacramento River Flood Control System Evaluation (Phase III Mid-Valley Sites), Cypress Avenue Bridge North, Hamilton City Flood Damage Reduction and Ecosystem Restoration Project, KLOG Fish Barrier Project, Colusa Generating Station, and South Willows Residential Development. General plan goals and policies identified in Appendix 4A could also affect public services and utilities in the cumulative geographic scope.

31.3.21.1. Alternatives 1 and 3

Construction and operation of Alternative 1 or 3 would not result in an incremental contribution to cumulative impacts on requiring the construction of new governmental facilities or on acceptable service ratios, response times, or other performance objectives for fire protection, police services, or schools. Emergency services and response times, as well as school bus routes, would be maintained during construction through the use of existing roads and BMPs (e.g., TMPs), and onsite emergency facilities (e.g., medical trailer and identified area for helipad landing) would be provided to support emergency response during construction. No new or altered governmental facilities would be required for public services during construction. Through the use of mutual aid and support between emergency service providers; new onsite facilities, such as the helipads and prefabricated equipment sheds; and current facilities, it is not anticipated that operations would result in the need for new or altered governmental facilities. The projects in Table 31-1 would be required to adhere to regulations and requirements during construction and operation regarding emergency services and coordinate with the county and local emergency service providers. The South Willows Residential Development project was found to have no impact or a less-than-significant impact on all services except water mains to maintain adequate fire flows, for which mitigation measures were developed to reduce the impact to less than significant. Most projects identified in Table 31-1 are primarily construction

projects and would not affect schools. The South Willows Residential Development would not occur within the Maxwell School District.

Construction and operation of Alternatives 1 or 3 would result in new or expanded stormwater drainage or electric power utilities and may result in relocation of existing utilities. As described in the Drainage Evaluations, Design, and Implementation BMP and the Utility and Infrastructure Verification and/or Relocation BMP, potential relocation of existing infrastructure and drainage would be resolved prior to the commencement of construction activities. Features such as Comm Road South would allow for the continued access to existing utilities. During operation and maintenance activities under Alternative 1 or 3, new high-voltage transmission lines and a point of interconnection (POI) to the existing transmission system would be required. It is not known whether the Authority would be required to invest in additional electric transmission infrastructure, but it is not expected that substantial additional electric generation capacity would be required. Any new or expanded stormwater drainage, or relocation of utilities, as well as the transmission lines and substation, would be constructed within proposed disturbance areas. Once operational, the transmission lines and stormwater drainage would serve the Project, and the relocated utilities would provide service to those who that currently use them. The projects identified in Table 31-1 could require new infrastructure or the relocation of infrastructure, depending on their location and construction means and methods. Any new or relocated infrastructure would serve those projects and be part of them such that any significant environmental impacts identified as part of a particular project would require mitigation. The South Willows Residential Development would require new connections to water lines, wastewater lines, and other utilities, as well as the installation of a new 500,000-gallon water tank south of the project site, but these facilities were not anticipated to result in significant environmental effects, and mitigation measures were developed to reduce the impacts of utility line excavation on cultural and tribal resources.

Water supply would be required for both construction and operation of Alternatives 1 and 3. Sufficient water supplies would be available through existing groundwater and surface water sources to support the construction of Alternatives 1 and 3, although new groundwater wells would likely be required. There is sufficient groundwater to support the nominal amount of water needed for the operation of the administration and maintenance buildings, and the reservoir would provide sufficient water to meet the recreation area needs. Impacts on water supply availability from Alternatives 1 and 3 would be less than significant. Most projects identified in Table 31-1 are construction projects that would not require long-term water use or generate a long-term water demand. The South Willows Residential Development was found to have sufficient water supplies from Cal Water and there would be no impact.

Construction and operation of Alternatives 1 and 3 would not result in a determination by a wastewater treatment provider that it has inadequate capacity to serve projected demand. There would be no need for wastewater generated during construction to be trucked to offsite treatment plants and portable toilets serviced by an appropriate provider off site would be used at construction sites. Wastewater treatment agencies in Glenn and Colusa Counties have adequate capacity to treat wastewater generated during operations and no expansion of existing treatment facilities would be required. Impacts related to the adequacy of wastewater treatment would be less than significant. Most projects identified in Table 31-1 are construction projects that would

not require long-term wastewater treatment use or generate long-term wastewater. The South Willows Residential Development project would provide for adequate wastewater disposal and treatment.

Construction and operation of Alternatives 1 and 3 would not generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. Construction contractors would be required to dispose of construction waste in accordance with federal, state, and local regulations as a requirement of construction contract specifications for Alternatives 1 and 3. Solid waste generated during operation of Alternative 1 or 3 is not anticipated to be substantial. Solid waste-related impacts from the construction and operation of Alternatives 1 and 3 would be less than significant. The projects in Table 31-1 would conform to similar regulations.

Alternative 1 or 3 would not result in a cumulative contribution to public services and utilities. Therefore, Alternative 1 or 3 would not cause an incremental impact that would be significant when added to the impacts on public services and utilities from other past, present, and reasonably foreseeable future actions.

31.3.21.2. Alternative 2

Similar to Alternatives 1 and 3, impacts on public services and utilities under Alternative 2 would be less than significant. Alternative 2 would not result in a cumulative contribution to public services and utilities. Therefore, Alternative 2 would not cause an incremental impact that would be significant when added to the impacts on public services and utilities from other past, present, and reasonably foreseeable future actions.

31.3.22. Public Health and Environmental Hazards

The cumulative geographic scope for hazards and hazardous materials as it relates to potential impacts from the use and release of hazards and hazardous materials includes areas where ground disturbance would occur as defined by the study area in Chapter 27.

The cumulative geographic scope for wildfires is the areas surrounding the reservoir facilities located or in proximity to a State Responsibility Area (SRA) or Very High Fire Hazard Severity Zone (VHFHSZ) as identified in Figures 27-1 and 27-2 and described in Chapter 27. The cumulative projects identified on Table 31-1 located in proximity to these facilities and the SRA or VHFHSZ include Colusa Generating Station and the Maxwell Intertied Project.

The cumulative geographic scope for public health as it relates to potential impacts from HABs and bioaccumulation of methylmercury in fish consists of Lake Oroville, Shasta Lake, Folsom Lake, San Luis Reservoir, Sites Reservoir, Yolo Bypass, and the Delta. Projects from Table 31-1 considered in the cumulative impact analysis are those that occur or would occur within the same geographic area and/or could have impacts on public health by increasing HABs and/or bioaccumulation of methylmercury in fish in the same geographic area. Such projects would include reservoir-related flood control projects (e.g., Oroville Facilities Relicensing, Folsom Dam Safety and Flood Damage Reduction Project); aquatic habitat creation and restoration projects (e.g., Cache Slough Complex Restoration, North Delta Flood Control and Ecosystem Restoration Project, and Ecosystem Restoration Program); and projects that could contribute to

water quality conditions in the study area that are conducive to HABs (e.g., increased hydraulic residence times and water temperatures), such as the Delta Conveyance Project.

31.3.22.1. Alternatives 1, 2, and 3

Hazards and Hazardous Materials

Construction and operation of Alternatives 1, 2, or 3 would not result in an incremental contribution to cumulative impacts on hazards and hazardous materials. There is a lack of known hazardous material locations within the study area and the public would be excluded from Project construction areas and operational facilities where hazardous materials would be used, stored, or disposed, therefore reducing the potential for exposure. In addition, required BMPs would limit the potential for, and consequences of, accidental releases and spills during construction. Environmental contamination liabilities would be assessed prior to parcel acquisition. A Phase I environmental site assessment would be prepared for Alternative 1, 2, or 3 and would include conducting preconstruction surveys to assess the potential for hazardous substance contamination. If the Phase I environmental site assessment indicates likely site contamination, a Phase II environmental site assessment would be performed and would include soil and groundwater testing at known or suspected contaminated areas. If contamination is uncovered, remediation and/or containment of contamination would be required, through a subsequent remediation investigation under oversight regulatory agencies. Because of the potential work performed during construction, if a Phase I, II or remediation investigation is required, any unknown contamination would be remediated and would cease to exist under operation. Therefore, Project operations would not expose workers or the environment to previously unknown hazardous materials sites.

Projects identified Table 31-1 would not be located in the study area for hazardous materials and therefore would have no ability to contribute to a cumulative effect. Alternative 1, 2, or 3 would not result in a cumulative contribution to hazards and hazardous materials. Therefore, Alternative 1, 2, or 3 would not cause an incremental impact that would be significant when added to the impacts on hazards and hazardous materials from other past, present, and reasonably foreseeable future actions.

Wildfires

Construction and operation of Alternatives 1, 2, and 3 would not result in an incremental contribution to cumulative impacts on wildfires. As described in Chapter 27, Alternatives 1, 2, or 3 would not substantially exacerbate wildfire risks and expose Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire during construction. Either project facilities are not located in or near SRAs and VHFHSZs (e.g., RBPP or Dunnigan Pipeline) or there are no other projects in proximity to Alternative 1, 2, or 3 facilities that would also be located in or near SRAs or VHFHSZ that together could contribute to a cumulative effect regarding wildfires. Furthermore, implementation of BMPs, including Develop and Implement Fire Safety and Suppression Techniques and a Fire Prevention and Control Plan, as well as the Recreation Management Plan, would reduce the potential risk of wildfires during construction and operation. Once operational, permanent occupants would not be present and, therefore, operations would not expose occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Employees would use the administration building and the

public would use the recreation areas and day-use boat ramp on a temporary or transient basis. Alternatives 1, 2, and 3 would not substantially impair an adopted emergency response plan or emergency evacuation plan because there are either no plans in place or because existing routes for emergency purposes would be maintained throughout construction (i.e., with the TMP[s] to maintain safe road conditions and shoo-fly to maintain access to Lodoga) and continue to be available during operations. In addition, Alternatives 1, 2, and 3 would not require infrastructure that would not substantially exacerbate wildfire risk. Construction of some of these facilities (i.e., substations and transmission lines) would take place in flat terrain with limited vegetation. Standard practices would reduce the risk, or prevent, ignition and expedite the immediate control of an accidental fire. Finally, Alternatives 1, 2, and 3 would not expose people or structures to significant risks as a result of runoff, post-fire slope instability, or drainage changes because people would not be permanently located in or near the study area as a result of construction or operation of Alternatives 1, 2, and 3.

The Maxwell Intertie Project would include facilities that are the same as for Alternatives 1, 2, and 3 and therefore would not result in additional impacts related to wildfires. The Colusa Generating Station is an existing facility that undergoes regular maintenance, which would limit the potential risk associated with wildfires.

Alternative 1, 2, or 3 would not result in a cumulative contribution to wildfires. Therefore, Alternative 1, 2, or 3 would not cause an incremental impact that would be significant when added to the impacts of wildfires from other past, present, and reasonably foreseeable future.

Methylmercury Bioaccumulation in Fish

Construction and operation of Alternatives 1, 2, and 3 would not result in an incremental contribution to cumulative impacts on public health related to mercury and methylmercury from consumption of fish in surface waters in the cumulative geographic scope. Mercury and methylmercury in surface waters is a statewide concern, and both of these water quality constituents are present in surface waters in the study area. Some projects identified in Table 31-1 could result in construction- and/or operations-related increases in mercury and methylmercury in surface waters in the cumulative geographic scope. For example, the environmental analysis of the Folsom Dam Safety and Flood Damage Reduction Project indicated that spillway modifications and in-reservoir dredging could suspend sediment containing mercury in the water column and expose fish to higher levels of mercury, potentially resulting in increased mercury bioaccumulation (U.S. Bureau of Reclamation et al. 2006:3.1-19, 3.1-29). Certain types of aquatic habitat restoration, such as floodplain and wetland habitat, can create conditions conducive to mercury methylation, thereby making mercury more bioavailable to fish. Thus, past, present, and reasonably foreseeable projects that include floodplain, wetland, and marsh habitat creation, restoration, or enhancement (e.g., Cache Slough Complex Restoration Project, North Delta Flood Control and Ecosystem Restoration Project, and Ecosystem Restoration Program) could result in increases in mercury bioaccumulation in fish in the study area.

Construction and operation of Alternatives 1, 2, and 3 would potentially result in conditions conducive to mercury methylation in Sites Reservoir and therefore methylmercury bioaccumulation in reservoir fish, as well as measurable increases in methylmercury concentrations in fish in the north Delta, particularly during the initial filling of the reservoir and

for up to 10 years after, and in Dry and Critically Dry Water Years. OEHHA standards and fish consumption advisories would be implemented as required under applicable laws for the consumption of study area fish, which would serve to protect people against the overconsumption of fish with increased body burdens of mercury. The overall potential intake of mercury-tainted fish by the public would be reduced. Furthermore, implementation of methylmercury reduction measures under Mitigation Measure WQ-1.1 (described in Chapter 6) would minimize the magnitude of this effect, thereby potentially further reducing the magnitude of the Project's incremental contribution to cumulatively considerable impacts on public health related to methylmercury. Implementation of regulatory programs described in Section 31.3.1 (e.g., Statewide Mercury Control Program for Reservoirs) is expected to reduce the transport of mercury and the production and transport methylmercury to the Delta over time because the primary purpose of these regulations is to reduce mercury. In addition, existing Office of Environmental Health Hazard Assessment fish consumption advisories for the Delta would reduce the public's exposure to mercury-contaminated fish. Therefore, implementation of Alternatives 1, 2, and 3 would not result in an incremental contribution to the cumulative effect on public health related exposure to methylmercury via consumption of fish in the study area. Therefore, Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to the impacts on public health related to methylmercury from other past, present, and reasonably foreseeable future actions.

Harmful Algal Blooms

Construction and operation of Alternatives 1, 2, and 3 would not result in an incremental contribution to cumulative impacts on public health related to exposure to HABs. Past, present, and reasonably foreseeable future projects which currently contribute or may contribute to HABs in the cumulative geographic scope include Oroville Facilities Relicensing and Delta Conveyance Project. HABs occur in areas of Lake Oroville on a regular, seasonal basis, and the Clean Water Act 401 water quality certification for the lake includes a requirement for implementation of a water quality monitoring plan that includes actions to protect the public from cyanotoxins in the lake. Operation of the Delta Conveyance Project could result in hydrodynamic changes in the Delta (i.e., increased residence times) conducive to HABs. Construction and operation of Alternatives 1, 2, and 3 may result in water quality conditions within Sites Reservoir that are conducive to HABs during the late spring through fall (particularly in Dry and Critically Dry Water Years). Construction and operation of Sites Reservoir would not affect areas downstream of the reservoir within the study area due to releases or hydrodynamic changes, as discussed in Chapter 6 and Chapter 27. Actions implemented as part of the RMP, including visual monitoring for suspected HABs, cyanobacteria density assessment and testing for cyanotoxins (as necessary), and posting public warnings when the presence of cyanobacteria and cyanotoxins has been confirmed, would minimize the risk to public health from potential exposure to cyanotoxins. Therefore, Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to the impacts on public health related to the potential increase in HABs from other past, present, and reasonably foreseeable future actions.

31.3.23. Indian Trust Assets

The cumulative geographic scope for Indian Trust Assets consists of areas that would experience ground disturbance (i.e., Project inundation area and construction footprint of the appurtenant

facilities). The study area also encompasses areas where Project operations could affect ITAs that are along rivers and reservoirs that could be affected by SWP or CVP operational changes. The projects from Table 31-1 that occur in the cumulative geographic scope are not identified as affecting related Indian Trust Assets or are not in proximity to the facilities.

31.3.23.1. Alternatives 1, 2, and 3

Construction of the reservoir and new facilities under Alternatives 1, 2, and 3 would not result in effects on Indian Trust Assets due to the lack of Indian Trust Assets in proximity to areas where construction would occur. Operation of the Project generally would not result in substantial modifications to existing river systems (i.e., flow). Impacts related to juvenile salmonid rearing and/or migration habitat would be limited through pulse flow protection measures applied to precipitation-generated pulse flow events from October through May, a fish monitoring program to inform real-time operational adjustments, and Mitigation Measure FISH-2.1 as discussed in Chapter 11 and above in Section 31.3.6, *Aquatic Biological Resources*. These actions will limit the potential for negative flow-survival effects to winter-run Chinook salmon, spring-run Chinook salmon, fall-run/late fall–run Chinook salmon, and Central Valley steelhead during dispersal to rearing habitat and/or migration downstream toward the Delta. As a result of the lack of Indian Trust Assets or lack of substantial modifications to existing river systems and actions that will be implemented with respect to juvenile salmonids there would be no incremental contribution to a cumulative effect as a result of construction or operation of Alternatives 1, 2, and 3. Therefore, Alternatives 1, 2, and 3 would not cause an incremental impact that would be significant when added to the impacts on Indian Trust Assets from other past, present, and reasonably foreseeable future actions.

31.3.24. Environmental Justice and Socioeconomics

The cumulative geographic scope for environmental justice is the study area described in Chapter 30 and those projects that may occur within the block groups with environmental justice populations where Project construction or activities would occur. These projects are identified on Table 31-1 and are Colusa Generating Station and Maxwell Intertied Project. There are no projects on Table 31-1 identified within the block groups for Yolo County. Socioeconomics is not evaluated further because, as described in Chapter 30, Alternatives 1, 2, or 3 would not result in adverse effects and therefore could not result in an incremental contribution to a cumulative effect.

31.3.24.1. Alternatives 1, 2, and 3

Construction of Alternatives 1, 2, and 3 would result in disproportionate adverse effects on environmental justice populations associated with air quality and aesthetics. Operation of Alternative 2 would result in disproportionate effects on traffic and land use associated with the South Road. The primary population areas within this block group are Maxwell, Lodoga, and Stonyford, and none of the projects on Table 31-1 are in proximity to these population areas, with the exception of the Maxwell Intertie Project. The Maxwell Intertie Project would include facilities that are the same as for Alternatives 1, 2, and 3 and therefore would not result in additional impacts to environmental justice populations. The Colusa Generating Station is already constructed and operating and is not located within proximity of the population areas. Therefore, Alternative 1, 2, or 3 would not cause an incremental impact that would be significant

when added to the impacts on environmental justice populations from other past, present, and reasonably foreseeable future actions.

31.4 References

31.4.1. Printed References

Bay Delta Live. 2020. *North Delta Flow Action 2019 Food Web Study Fact Sheet*. Available: https://www.baydeltalive.com/assets/5c92b61032e1bfd2c6a30d4ee74773aa/application/pdf/North_Delta_Food_Web_Study_Fact_Sheet_06272019.pdf. Accessed: October 8, 2020.

CALFED Bay-Delta Program. 2000. *Levee System Integrity Program Plan*. Available: http://s3-us-west-2.amazonaws.com/ucldc-nuxeo-ref-media/677f7439-2b07-4494-a627-4a96260226fa. Accessed: October 12, 2020.

California Department of Fish and Wildlife. 2020a. *Cache Slough Complex*. Public Draft. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=149819&inline. Accessed: October 7, 2020.

California Department of Fish and Wildlife. 2020b. *Long-Term Operation of the State Water Project in the Sacramento San Joaquin Delta*. March 31, 2020. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Files/ITP-for-Long-Term-SWP-Operations.pdf?la=en&hash=AE5FF28E0CB9FA5DC67EF1D6367C66C5FF1B8B55. Accessed: May 27, 2021.

California Department of Fish and Wildlife. 2021. *Ecosystem Restoration Program (ERP)*. Available: https://nrm.dfg.ca.gov/ERP/Default.aspx. Accessed: June 7, 2021.

California Department of Natural Resources. 2020. *Knights Landing Outfall Gate Fish Barrier Project*. Available: https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Knights_Landing_Outfall_Gate.pdf. Accessed: October 12, 2020.

California Department of Water Resources. 2011. Delta Risk Management Strategy Phase 2 Executive Summary. June.

California Department of Water Resources. 2016. *System Reoperation: A Resource Management Strategy of the California Water Plan*. July 29, 2016. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/RMS/2016/06_System_Reoperation_July2016.pdf. Accessed: October 11, 2020.

California Department of Water Resources. 2020a. *Delta Levees Maintenance Subventions*. Available: https://water.ca.gov/Work-With-Us/Grants-And-Loans/Delta-Levees-Maintenance-Subventions. Accessed: October 8, 2020.

California Department of Water Resources. 2020b. *Delta Levees Special Flood Control Projects*. Available: https://water.ca.gov/Work-With-Us/Grants-And-Loans/Delta-Levees-Special-Flood-Control-Projects#:~:text=The%20Delta%20Levees%20Special%20Flood,cultural%20resources%20in%20the%20Delta. Accessed: October 8, 2020.

California Department of Water Resources. 2020c. *Oroville Facilities (P-2100)*. Available: https://water.ca.gov/Programs/State-Water-Project/SWP-Facilities/Oroville/HLPCO-Oroville-Facilities-Project-2100. Accessed: October 11, 2020.

California Department of Water Resources. 2020d. *North Delta Program*. Available: https://water.ca.gov/Programs/Flood-Management/Delta-Conveyance-And-Flood-Protection/North-Delta-Program. Accessed: October 7, 2020.

California Department of Water Resources. 2020e. *Delta Conveyance*. Available: https://water.ca.gov/deltaconveyance. Accessed: October 8, 2020.

California Department of Water Resources. 2020f. *South Delta Temporary Barriers Project*. Available: https://water.ca.gov/Programs/Bay-Delta/Water-Quality-And-Supply/South-Delta-Temporary-Barriers-Project. Accessed: October 8, 2020.

California Department of Water Resources. 2021a. *Small Communities Flood Risk Reduction*. Available: https://water.ca.gov/Work-With-Us/Grants-And-Loans/Small-Communities-Flood-Risk-Reduction. Accessed: April 2, 2021.

California Department of Water Resources. 2021b. *Yolo Bypass Habitat Restoration Projects*. Available: https://water.ca.gov/Programs/Environmental-Services/Restoration-Mitigation-Compliance/Yolo-Bypass-Projects. Accessed: April 2, 2021.

California Energy Commission. 2021. *Colusa Generating Station*. Available: https://ww2.energy.ca.gov/sitingcases/colusa/. Accessed: March 29, 2021.

California Natural Resources Agency. 2020a. *Levee Evaluations Program*. Available: https://bondaccountability.resources.ca.gov/Program.aspx?ProgramPK=86&Program=Levee%20Evaluations%20Program&PropositionPK=5. Accessed: October 8, 2020.

California Natural Resources Agency. 2020b. *Lower Yolo Restoration Project*. Available: https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Lower_Yolo_Restoration.pdf. Accessed: October 8, 2020.

California Natural Resources Agency. 2020c. *Project: North Delta Flood Control and Ecosystem Restoration Project*. Available:

https://bondaccountability.resources.ca.gov/Project.aspx?ProjectPK=8461&PropositionPK=5. Accessed: October 8, 2020.

California Natural Resources Agency. 2020d. *Project: Rock Slough Water Quality Improvements: Contra Costa Canal Replacement Project*. Available: http://bondaccountability.resources.ca.gov/Project.aspx?ProjectPK=9461&PropositionPK=4. Accessed: October 8, 2020.

California Natural Resources Agency. 2021. *Wallace Weir Fish Rescue Facility Project*. Available: https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Wallace_Weir_Modification.pdf. Accessed: April 2, 2021.

California Office of Planning and Research. 2008. CEQA Net: American Basin Fish Screen and Habitat Improvement Project. Available: https://ceqanet.opr.ca.gov/2003092006/2 Accessed: September 7, 2021.

California Public Utilities Commission 2021. *Before The Public Utilities Commission of the State of California -- Order Instituting Rulemaking to Continue Electric Integrated Resource Planning and Related Procurement Processes*. Rulemaking 20-05-003 Administrative Law Judge's Ruling Seeking Feedback On Mid-Term Reliability Analysis and Proposed Procurement Requirements February 22, 2021. https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M367/K037/367037415.PDF

California Water Boards. 2020. *San Francisco Bay/Sacramento – San Joaquin Delta Estuary (Bay-Delta) Watershed Efforts: Bay-Delta Plan Update*. Available: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/. Accessed: October 8, 2020.

Central Valley Joint Venture. 2020. *Conserving Migratory Birds and Their Habitats in the Central Valley Area of California*. Available: http://www.centralvalleyjointventure.org/. Accessed: October 8, 2020.

City of Willows. 2006. *Final Environmental Impact Report: Willows Wal-Mart Project*. January 2006. Available: https://www.cityofwillows.org/assets/resources/Willows-Walmart-Project-FEIR-Final-Environmental-Impact-Report.pdf. Accessed: May 28, 2021.

City of Willows. 2020. *Initial Study/Subsequent Mitigated Negative Declaration for the South Willows Residential Neighborhood Project*. December 1, 2020. Prepared by Willdan Engineering. Available: https://www.cityofwillows.org/assets/resources/South-Willows-Residential-2020-Initial-Study-FINAL-dec-1-2020-BASIN-Amended-Project.pdf. Accessed: May 28, 2021.

City of Woodland. 2021a. *Lower Cache Creek Feasibility Study (LCCFS)*. Available: https://www.cityofwoodland.org/1196/Lower-Cache-Creek-Feasibility-Study-LCCF. Accessed: April 2, 2021.

City of Woodland. 2021b. *Woodland Flood Risk Management Project Final Environmental Impact Report*. Available: https://www.cityofwoodland.org/DocumentCenter/View/6628/Woodland_FRMP_Final_EIR_January2021_WEB. Accessed: April 2, 2021.

Contra Costa Water District. 2020. *Los Vaqueros Reservoir Expansion Project: Project Documents*. Available: https://www.ccwater.com/993/Project-Documents. Accessed: October 7, 2020.

Del Puerto Canyon Reservoir. 2021. Del Puerto Canyon Reservoir website. Available: https://www.delpuertocanyonreservoir.com. Accessed: July 1, 2021.

Delta Stewardship Council. 2020. *North Bay Aqueduct*. Available: https://viewperformance.deltacouncil.ca.gov/pm/north-bay-aqueduct#:~:text=The%20North%20Bay%20Aqueduct%20Alternate%20Intake%20Project%20(NBA%20AIP)%20will,Slough%20(existing%20intake%20location). Accessed: October 7, 2020.

EcoAtlas. 2020. *Restoring Ecosystem Integrity in the Northwest Delta: Phase II*. Available: https://www.ecoatlas.org/regions/adminregion/delta/projects/5876. Accessed: October 11, 2020.

El Dorado Irrigation District. 2020. *Folsom Lake Intake Project*. Available: https://www.eid.org/about-us/project-updates/folsom-lake-intake-project. Accessed: October 7, 2020.

Glenn-Colusa Irrigation District. 2021. *Painter's Riffle Anadromes Fish Habitat Enhancement*. Available: https://www.gcid.net/painters-riffle-project. Accessed: March 29, 2021.

Northern California Water Association. 2018. Federal Agencies Advance Rural Water Infrastructure for Multi-Benefits in the Sacramento Valley. November. Available: http://www.norcalwater.org. Accessed: September 7, 2021.

Northern California Water Association. 2019. *Sacramento Valley Salmon Recovery Program*. September 2019. Available: https://norcalwater.org/wp-content/uploads/SacValleySalmonRecoveryProgram.fulloct2018.pdf. Accessed: March 29, 2021.

Reclamation District 108. 2021. *Market Street Gravel Project*. Available: https://www.rd108.org/market-street-gravel-project/. Accessed: March 29, 2021.

Sacramento River Forum. 2021a. *Hamilton City Flood Damage Reduction & Ecosystem Restoration Project*. Available: https://www.sacramentoriver.org/forum/index.php?id=hamilton_city. Accessed: March 29, 2021.

Sacramento River Forum. 2021b. *Upper Sacramento River Anadromous Fish Habitat Restoration Program*. Available: https://www.sacramentoriver.org/forum/index.php?id=channels. Accessed: March 29, 2021.

Sacramento Valley Ecological Restoration. 2021. *Sand Slough Side Channel Enhancement Project*. Available: http://www.saverfoundation.org/sand-slough/#:~:text=The%20Sand%20Slough%20Side%20Channel,River%20in%20Tehama%20County%2C%20California. Accessed: March 29, 2021.

Sacramento Water Forum. 2015. *The Lower American River Modified Flow Management Standard: A Drought Buffer for the Environment and Local Water Supplies*. Available: http://www.waterforum.org/wp-content/uploads/2017/08/WF-Modified-FMS-10_8_final_Single.pdf. Accessed: April 2, 2021.

Sonoma County Water Agency. 2020. *North Bay Aqueduct Alternate Intake Project*. Available: https://www.scwa2.com/wp-content/uploads/2020/01/NBA-Funding-Flyer.pdf. Accessed: October 7, 2020.

State of California. 2020a. *Supplemental Water Rights Project*. Available: https://ceqanet.opr.ca.gov/2008102090. Accessed: October 7, 2020.

State of California. 2020b. *South Delta Temporary Barriers Project (California Endangered Species Act Incidental Take Permit No. 2081-2011-019-03 (ITP) Amendment No. 3)*. Available: https://ceqanet.opr.ca.gov/2000112054/12. Accessed: October 9, 2020.

State of California. 2021. *Willows Wal-Mart Project*. Available: https://ceqanet.opr.ca.gov/2004062128/4. Accessed: May 28, 2021.

State Water Resources Control Board. 2017. *Draft Staff Report for Scientific Peer Review for the Amendment to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, Mercury Reservoir Provisions - Mercury TMDL and Implementation Program for Reservoirs*. April. Available: https://www.waterboards.ca.gov/water_issues/programs/mercury/reservoirs/docs/peer_review/02_staff_report_scientific_peer_review.pdf. Accessed: February 9, 2021.

Tehama-Colusa Canal Authority. 2013. *Fish Passage Improvement Project at the Red Bluff Diversion Dam*. Available: https://www.tccanal.com/RBDD-Bro-Spring2013_pages.pdf. Accessed: October 12, 2020.

U.S. Army Corps of Engineers. 2021a. *Sacramento River Bank Protection Project*. Available: https://www.spk.usace.army.mil/Missions/Civil-Works/Sacramento-River-Bank-Protection/. Accessed: April 2, 2021.

U.S. Army Corps of Engineers. 2021b. *Hamilton City Flood Damage Reduction & Ecosystem Restoration*. Available: https://www.spk.usace.army.mil/Missions/Civil-Works/Hamilton-City/. Accessed: March 29, 2021.

U.S. Army Corps of Engineers and Central Valley Flood Protection Board. 2013. *Final Environmental Assessment/Initial Study Sacramento River Flood Control System Evaluation, Phase III, Mid-Valley, Contract Area 3, Yolo County, California*. April 2013. Available: https://www.spk.usace.army.mil/Portals/12/documents/usace_project_public_notices/MidValley_FINALEAIS.pdf. Accessed: April 2, 2021.

U.S. Department of the Interior, Bureau of Reclamation. 2007. *Temperature Modeling of Folsom Lake, Lake Natoma, and the Lower American River*. April 2007. Available: https://www.flow3d.com/wp-content/uploads/2014/08/Temperature-Modeling-of-Folsom-Lake-Lake-Natoma-and-the-Lower-American-River.pdf. Accessed: October 7, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2009. *Finding of No Significant Impact, Water Year 2010 Interim Flows Project, San Joaquin River Restoration Program*. FONSI-09-09-MP. December 2009. Available: https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=4403. Accessed: October 12, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2012. *Rock Slough Fish Screen Hydraulic Evaluation*. Hydraulic Laboratory Technical Memorandum PAP-1067. September 2012. Available: https://www.usbr.gov/tsc/techreferences/hydraulics_lab/pubs/PAP/PAP-1067.pdf. Accessed: October 12, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2013. *San Luis Reservoir Expansion, Draft Appraisal Report*. December 2013. Available: https://www.usbr.gov/mp/sllpp/docs/2013-11-19-draft-san-luis-expansion-appraisal-report.pdf. Accessed: October 9, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2015. *Reclamation Releases Finding of No Significant Impact for Knights Landing Outfall Gates Fish Passage Project*. September 22, 2015. Available: https://www.usbr.gov/newsroom/newsroomold/newsrelease/detail.cfm?RecordID=50440. Accessed: March 29, 2021.

U.S. Department of the Interior, Bureau of Reclamation. 2019. *Upper San Joaquin River Basin Storage Investigation*. Last updated: December 31, 2019. Available: https://www.usbr.gov/mp/sccao/storage/. Accessed: October 7, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2020a. *Joint Federal Project*. Last updated: July 29, 2020. Available: https://www.usbr.gov/mp/jfp/index.html. Accessed: October 12, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2020b. *Project Details for Folsom Dam Safety and Flood Damage Reduction EIS/EIR, Folsom Dam Safety and Flood Damage Reduction Supplemental Environmental Assessment/Initial Study, and Folsom Dam*

Safety and Flood Damage Reduction Project Right Bank Stabilization FONSI. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=1808. Accessed: October 8, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2020c. *Willows Construction Office, Franks Tract Project*. Last updated: July 29, 2020. Available: https://www.usbr.gov/mp/frankstract/. Accessed: October 8, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2020d. *Contra Costa Water District Alternative Intake Project EIR/EIS*. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=1818. Accessed: October 12, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2020e. *Reclamation and Contra Costa Water District Advance Plan To Increase Water Reliability*. February 28, 2020. Available: https://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=69643. Accessed: October 7, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2020f. *San Luis Reservoir Low Point Improvement Project (SLLPIP)*. Available: https://www.usbr.gov/mp/sllpp/. Accessed: October 7, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2020g. *Trump Administration Advances Plan to Increase San Luis Reservoir Water Storage.* December 30, 2020. Available: https://www.usbr.gov/newsroom/newsroomold/newsrelease/detail.cfm?RecordID=73366. Accessed: April 13, 2021.

U.S. Department of the Interior, Bureau of Reclamation. 2020h. *Shasta Lake Water Resources Investigation*. Available: https://www.usbr.gov/mp/ncao/shasta-lake.html. Accessed: October 7, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2020i. *Shasta Lake Water Resources Investigation EIS*. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=1915. Accessed: October 11, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2020j. *Record of Decision: Reinitiation of Consultation on the Coordinated Long-Term Modified Operations of the Central Valley Project and State Water Project*. February 2020. Available: https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=42324. Accessed: October 27, 2020.

U.S. Department of the Interior, Bureau of Reclamation. 2021a. *Fremont Weir Adult Fish Passage Modification Project*. Last updated: March 8, 2021. Available: https://www.usbr.gov/mp/bdo/fremont-weir.html. Accessed: March 29, 2021.

U.S. Department of the Interior, Bureau of Reclamation. 2021b. *Yolo Bypass Salmonid Habitat Restoration and Fish Passage*. Last updated: March 8, 2021. Available: https://www.usbr.gov/mp/bdo/yolo-bypass.html. Accessed: April 2, 2021.

U.S. Department of the Interior, Bureau of Reclamation. 2021c. *Upper Sacramento River Anadromous Fish Habitat Restoration Program*. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=23758. Accessed: March 29. 2021.

U.S. Department of the Interior, Bureau of Reclamation. 2021d. *Project Details: B.F. Sisk Dam Raise and Reservoir Expansion Project*. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=44425. Accessed: April 13, 2021.

U.S. Department of the Interior, Bureau of Reclamation, U.S. Army Corps of Engineers, California Department of Water Resources, State of California Reclamation Board, and Sacramento Area Flood Control Agency. 2006. *Folsom Dam Safety and Flood Damage Reduction Draft Environmental Impact Statement/Environmental Impact Report*. Chapter 3, *Affected Environment, Impacts Analyses, and Mitigation Measures*.

U.S. Fish and Wildlife Service. 2015. *Central Valley Project Improvement Act (CVPIA) Project Implementation Division, The Anadromous Fish Screen Program (AFSP)*. Last updated: December 22, 2015. Available: https://www.fws.gov/cno/fisheries/cvpia/AnadromFishScreen.cfm. Accessed: October 8, 2020.

Wildlands. 2020. *Liberty Island Conservation Bank*. Available: https://www.wildlandsinc.com/banks/liberty-island-conservation-bank-salm/. Accessed: October 12, 2020.

Woodland-Davis Clean Water Agency. 2020. *Project Overview*. Available: https://www.wdcwa.com/project-overview. Accessed: October 12, 2020.

Yolo-Solano Air Quality Management District. 2007. *Handbook for Assessing and Mitigating Air Quality Impacts*. July 11. Available: http://www.ysaqmd.org/wp-content/uploads/Planning/CEQAHandbook2007.pdf. Accessed: May 23, 2021.

31.4.2. Personal Communications

Tona, Joseph. Tehama County Air Pollution Control Officer. Tehama County Air Pollution Control District. June 30, 2021—Phone call with Cory Matsui, Air Quality and Climate Change Technical Specialist, ICF.