Long-Term Operation – Draft Environmental Impact Statement

# Appendix AA – Evaluation of Sites Reservoir Project Operations

July 2024

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# Appendix AA Evaluation of Sites Reservoir Project Operations

## AA.1 Purpose of the Appendix

The 2021 Long-term Operation (LTO) of the CVP and SWP environmental compliance includes Alternative 2 – Multi Agency Collaboration, which was developed by Reclamation, NMFS, USFWS, DWR and CDFW. Alternative 2 includes two programmatic components: (1) operations for the Delta Conveyance Project; and (2) operations of the Sites Reservoir Project.

In November 2023, the Sites Project Authority (Authority) approved the Sites Reservoir Project, a new 1.5-million-acre-foot offstream water storage reservoir and associated facilities located near Maxwell, California (see Table AA-1, Table AA-2, and Table AA-3). The Authority is the lead agency under the California Environmental Quality Act (CEQA). The Final Environmental Impact Report (EIR) is a joint Final EIR/EIS with Reclamation as the lead federal agency. The Sites Reservoir Project Final EIR/EIS evaluates and describes the environmental effects and proposed mitigation measures associated with construction and operation of the Sites Reservoir Project. The CEQA EIR, which was certified by the Authority prior to project approval, and a CEQA Notice of Determination (NOD) was filed in December 2023. It is anticipated that Reclamation will sign the Record of Decision (ROD) in 2025.

The purpose of this appendix is to provide information, to the extent possible given the information available today, to assess how the Sites Reservoir Project would operate in the context of Alternative 2. This appendix discloses the environmental effects of the operation of Sites Reservoir Project, as described under Alternative 3 in the Sites Reservoir Project Final EIR/EIS, along with the environmental effects of Alternative 2 as described in the LTO Draft EIS. This analysis provides supporting evidence as to why or why not the magnitude and severity of environmental effects disclosed in the LTO EIS for Alternative 2 may change with consideration of the Sites Reservoir Project. This appendix qualitatively summarizes effects on multiple resources associated with Alternative 2 operations as described in this EIS. The appendix also qualitatively summarizes effects associated with the Sites Reservoir Project operations as evaluated and disclosed in the approved and certified Final EIR/EIS. The summaries of effects use information from, and cross-referencing to, the published Final EIR/EIS on the Sites Reservoir Authority's website: Sites Reservoir Project Final EIR/EIS.


Figure AA-1. Sites Reservoir Project Action Area

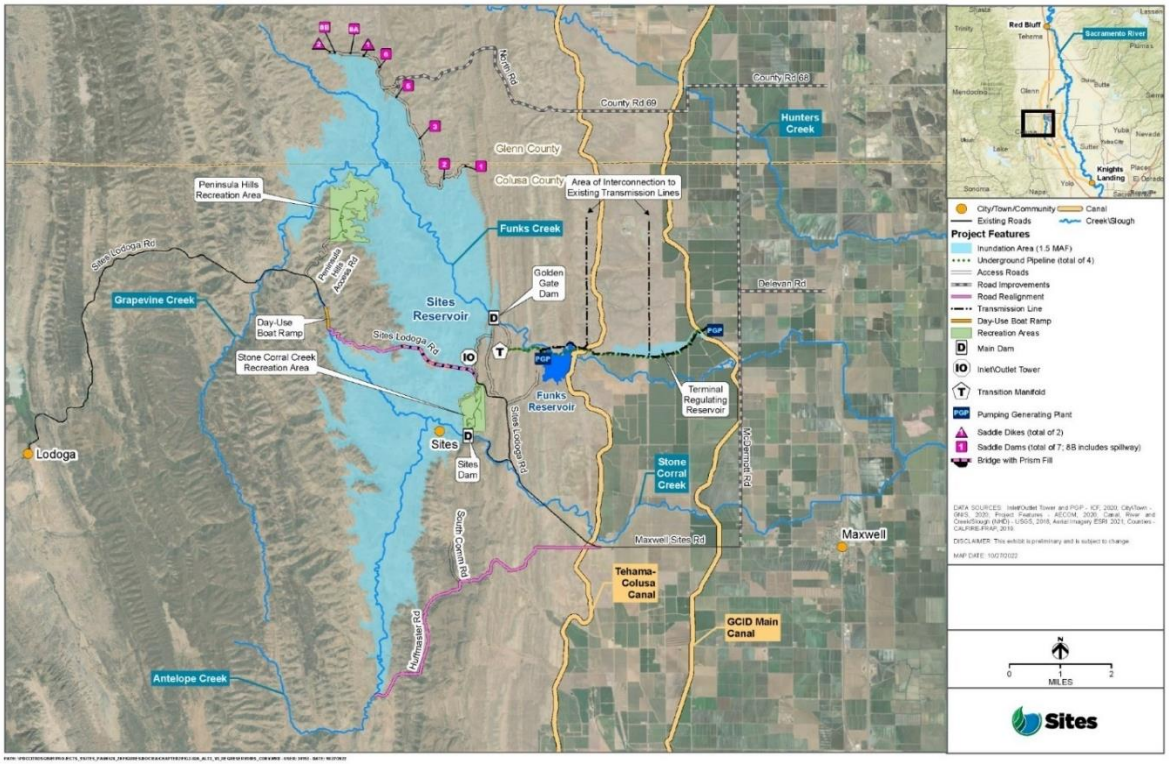


Figure AA-2. Sites Reservoir Facilities 1.

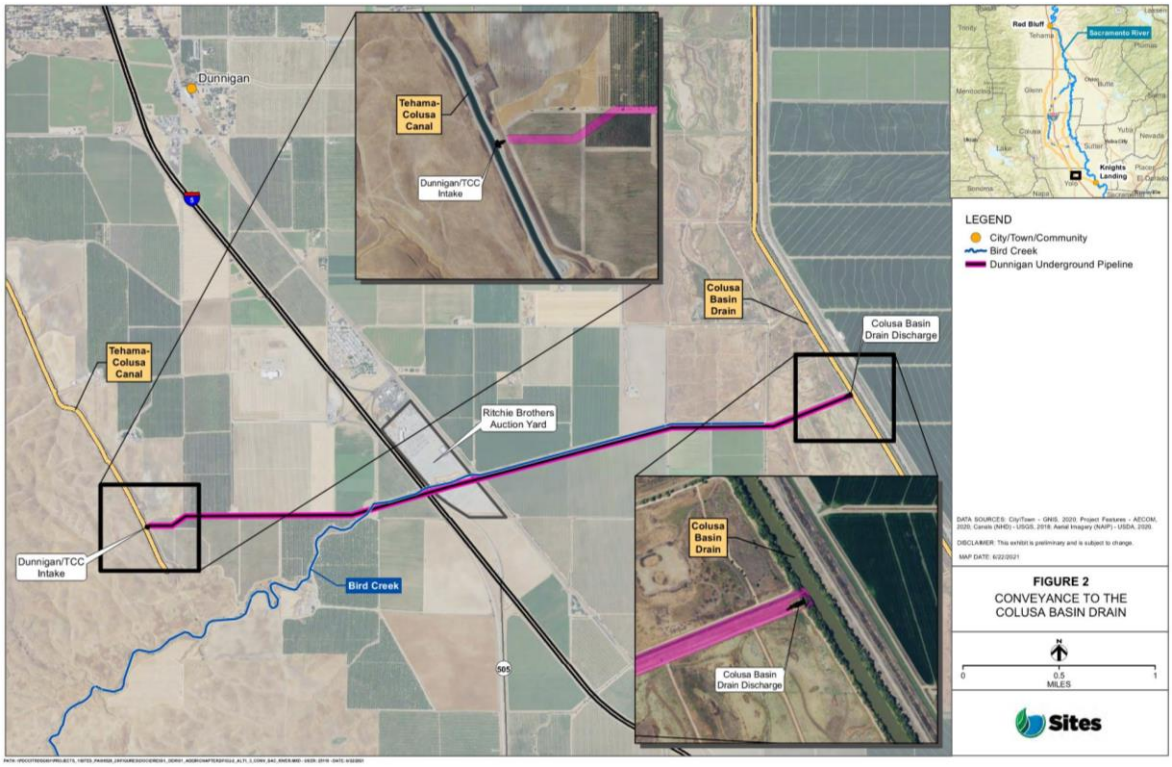


Figure AA-3. Sites Reservoir Facilities 2.

### AA.1.1 Future Project Considerations and Regulatory Processes

Among the numerous permit requirements (see Sites Reservoir Project Final EIR/EIS, Chapter 4, *Regulatory and Environmental Compliance: Project Permits, Approvals, and Consultation Requirements*), operation of the Sites Reservoir Project will require new or modified water rights, water supply, and operating agreements to accommodate the supplies identified by the modeled simulations. Implementation of the Sites Project will require authorization from the State Water Resources Control Board (SWRCB), Division of Water Rights in the form of a permit to divert and store water that would eventually be perfected to a license. Any permit issued by the SWRCB would include terms and conditions, as determined appropriate by the SWRCB in authorizing the Sites Project. Any right(s) and agreement(s) as part of the Sites Project would be formulated to protect existing beneficial uses associated with existing water rights.

## AA.2 LTO and Sites Reservoir Project Descriptions

### AA.2.1 Long Term Operation Alternative 2

Alternative 2 represents actions developed with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, DWR and California Department of Fish and Wildlife. It includes actions and approaches for the CVP and SWP identified by the state and federal fish agencies, in addition to the objectives of Reclamation and DWR. Alternative 2 includes authorizing legislation, contracts, and agreements as described by common components. These include Water Quality Control Plans, the Coordinated Operation Agreement (COA), CVP and SWP Water Contracts, Settlement and Exchange Contracts, and Record of Decisions on independent related programs not proposed for modification and reinitiation of consultation under this effort.

See Chapter 3 in the LTO EIS for more detailed information regarding the operational changes associated with Alternative 2.

### AA.2.2 Sites Reservoir Project

The Sites Reservoir Project, identified as Alternative 3 in the Sites Reservoir Project Final EIR/EIS, will involve the construction, operation, and maintenance of an 1.5 million acre-foot offstream surface water reservoir to provide direct and real benefits to instream flows, the Sacramento-San Joaquin Delta (Delta) ecosystem, and water supply reliability. The reservoir inundation area would be in rural, unincorporated areas of Glenn and Colusa counties, and project components would be located in Tehama, Glenn, Colusa, and Yolo counties.

The project will use existing infrastructure to divert unregulated and unappropriated flow from the Sacramento River at Red Bluff and Hamilton City and convey the water to a new offstream reservoir west of the community of Maxwell, California. New and existing facilities would move water into and out of the reservoir. Releases from Sites Reservoir will be used locally, be conveyed to the Yolo Bypass for ecosystem benefits, or ultimately return to the Sacramento River system via existing canals and a new pipeline located near Dunnigan. Water released from the reservoir will be used to benefit local, state, and federal water use needs, including public water agencies, anadromous fish species in the Sacramento River watershed, wildlife refuges and habitats, and the Yolo Bypass to help supply food for delta smelt (*Hypomesus transpacificus*).

The Authority will own and operate all newly constructed project facilities that are not already owned by another entity. There are currently 22 Storage Partners representing local and regional water delivery agencies that serve over 24.5 million people and over 500,000 acres of farmland that are paying for the project and would receive the resulting water supply benefits. In addition, the State of California, through the California Water Commission, and the Bureau of Reclamation are also envisioned to be Storage Partners and receive water supply benefits.

The objectives of the project are as follows:

- Improve water supply reliability and resiliency to meet Storage Partners' agricultural and municipal long-term average annual water demand in a cost-effective manner for all Storage Partners, including those that are the most cost-sensitive.
- Provide public benefits consistent with Proposition 1 of 2014 and use WSIP funds to improve statewide surface water supply reliability and flexibility to enhance opportunities for habitat and fisheries management for the public benefit through a designated long-term average annual water supply.
- Provide public benefits consistent with the WIIN Act by using federal funds, if available, provided by Reclamation to improve CVP operational flexibility in meeting CVP environmental and contractual water supply needs and improving coldwater pool management in Shasta Reservoir to benefit anadromous fish.
- Provide surface water to convey biomass from the floodplain to the Delta to enhance the Delta ecosystem for the benefit of pelagic fishes in the north Delta (e.g., Cache Slough).
- Provide local and regional amenities, such as developing recreational facilities, reducing local flood damage, and maintaining transportation connectivity through roadway modifications.

Reclamation's role in the Sites Reservoir Project is as a funding partner. Reclamation will acquire a water storage account in Sites Reservoir and an additional water supply it may use to supplement its existing supplies. Reclamation's purposes for the project include the following:

- Increased water supply and improved reliability of water deliveries
- Increased CVP operational flexibility
- Benefits to anadromous fish by improving CVP operations consistent with the laws, regulations, and requirements in effect at the time of operation
- Incremental Level 4 water supply for CVP Improvement Act refuges
- Delta ecosystem enhancement by providing water to convey food resources

### *AA.2.2.1 Sites Reservoir Project and Operations Criteria*

Project facilities will include the 1.5 million acre-feet Sites Reservoir, inundating an area of approximately 13,200 acres. Construction of new and/or improvements to existing storage and conveyance facilities will also include:

- Improvements to and use of the existing Red Bluff Pumping Plant ("RBPP"), Tehama-Colusa Canal ("TC Canal"), Hamilton City Pump Station, and Glenn-Colusa Irrigation District ("GCID") Main Canal for the diversion and conveyance of water from the Sacramento River.
- Construction of regulating reservoirs and a conveyance complex to control the conveyance of water between Sites Reservoir, TC Canal, and GCID Main Canal. These facilities would include the regulating reservoirs, pipelines, pumping generating plants ("PGPs"), electrical substations, and maintenance buildings.
- Construction of two main dams, the Golden Gate Dam on Funks Creek and the Sites Dam on Stone Corral Creek, to impound water in the new reservoir. A series of saddle dams and saddle dikes along the northern and eastern rims of the reservoir will also be constructed to close off topographic saddles in the surrounding ridges. The Inlet/Outlet (I/O) Works for the reservoir would be located near the Golden Gate Dam.
- Upgrades to the TC Canal and construction of a new pipeline (the Dunnigan Pipeline) to convey water from the new reservoir to the Colusa Basin Drain (CBD) and ultimately, to the Sacramento River.

Ancillary features include:

- Incidental power generation up to 40 megawatts each at the Funks PGP and the TRR PGP.
- Construction of an administration and operations building and a maintenance and storage building near the existing Funks Reservoir.
- Development of two primary recreation areas and a day-use boat ramp. The recreation areas would also require a network of new roads and upgrades to existing roads for maintenance and local access. The Peninsula Hills Recreation Area would be located on up to 373 acres along the northwest shore of the new reservoir and the Stone Corral Creek Recreation Area would be located on up to 235 acres along the eastern shore of the new reservoir. These areas would provide multiple recreational amenities, including campsites, boat access, horse trails, hiking trails, and vista points. Both of the primary recreation areas would have a kiosk, access to electricity and potable water, picnic sites, hiking trails, vault toilets, and campsites. The day-use boat ramp and parking area would be located on up to 10 acres on the western side of the new reservoir.
- Construction of a bridge and approximately 46 miles of new paved and unpaved roads to provide construction and maintenance access to the new facilities, as well as public access to the recreation areas.
- Acquisition and maintenance of an approximate 100-foot buffer around the new reservoir and all related facilities, buildings, and recreation areas.

Table AA-1, below, provides an overview of Sites Project operations.

Table AA-1. Operational Programmatic Components of Proposed Sites Project

| Sites Project Activity | Description |
|---|---|
| Diversions to Sites Reservoir, Operating Criteria, and Diversion Criteria | All aspects of diversion of water at Red Bluff Pumping Plant, Hamilton City Pump Station, Stone Corral Creek, and Funks Creek, including the use of excess capacity in the Tehama-Colusa Canal and Glenn-Colusa Irrigation District Main Canal to convey water to the reservoir and storage of water in Sites Reservoir. Specific descriptions of pulse protection at Bend Bridge, bypass flows at Red Bluff, Hamilton City and Wilkins Slough, and other diversion criteria are specified in Chapter 2, Section 2.5.2.1, page 2-78 through page 2-86 of the Sites Project Final EIR/EIS. |
| Water Conveyance and Releases from Sites Reservoir | Releases of water from Sites Reservoir into the Tehama-Colusa Canal, Glenn-Colusa Irrigation District Main Canal, Stone Corral Creek, and Funks Creek. Conveyance of water from the Tehama-Colusa Canal into the Dunnigan Pipeline and subsequent release into the Colusa Basin Drain and ultimately into the Sacramento River or Yolo Bypass. Releases from Sites Reservoir are described in Chapter 2, Section 2.5.2.1, page 2-86 through 2-88 and page 2-90 through 2-91 of the Sites Project Final EIR/EIS. |
| Coordination with CVP and SWP | Exchanges with Shasta Reservoir and Lake Oroville, including Reclamation's investment in Sites Reservoir as described in Chapter 2, Section 2.5.2.1, page 2-88 through 2-90 of the Sites Project Final EIR/EIS. |
| Flood Control | Flood control benefits to the communities of Maxwell and Colusa, local agricultural lands, rural residences, and Interstate 5 by impounding Funks Creek and Stone Corral Creeks as described in Chapter 2, Section 2.5.2.1, page 2-91 through 2-92 of the Sites Project Final EIR/EIS |
| Emergency Releases | Operation of facilities to meet Division of Safety of Dams criteria and requirements for emergency reservoir drawdown as described in Chapter 2, Section 2.5.2.1, page 2-92 of the Sites Project Final EIR/EIS |
| Energy Generation and Energy Use | The as described in Chapter 2, Section 2.5.2.2, page 2-92 through 2-93 of the Sites Project Final EIR/EIS generation of energy in operations and use of energy for operations |
| Aquatic Monitoring and Adaptive Management | Implementation of an aquatics monitoring and adaptive management plan to: (1) integrate the Project's adaptive management program with existing monitoring and science programs; (2) provide the proposed framework and governance; and (3) include the process for adaptive management, including operational criteria and conservation measures as described in various spots in Chapter 2 and Appendix 2D (2D.4, 2D.5, 2D.6) of the Sites Project Final EIR/EIS |
| Compensatory Mitigation for Temporary and Permanent Impacts | Species-specific compensatory mitigation actions that will be completed prior to operations as may be required in the projects permits and approvals |

# AA.3 Overall Approach

As discussed in Section AA.1, *Purpose of the Appendix*, this appendix qualitatively summarizes operational effects on resources that may occur under operation of Alternative 2 and the Sites Reservoir Project, and qualitatively evaluates the direction and magnitude of effects on resource areas relative to the Sites Reservoir Project contributions to effects as identified in the LTO EIS. Resource topics in this appendix were identified based on the resource topics evaluated in the LTO EIS to be consistent with Reclamation's evaluation of the LTO. Effects, or effect mechanisms, under each resource topic were identified based on the effect mechanisms identified in the associated LTO EIS resource-specific appendices.

All technical content relative to the operation of Alternative 2 was obtained from resource-specific appendices to the LTO EIS. All technical content relative to the operation of the Sites Reservoir Project was obtained from the November 2023 Sites Reservoir Project Final EIR/EIS. No new technical analyses were conducted for preparation of this appendix. Where LTO appendices concluded that implementation of Alternative 2 could result in variable effects – for instance, effects ranging from beneficial to no change to adverse – summary conclusions are provided regarding effects of operating both projects consider the variability of LTO Alternative 2 effects. Given Alternative 2 is comprised of different potential phases, all phases are considered within this appendix. If appropriate, the appendix differentiates between phases and discloses effects. Otherwise, the terms Alternative 2 or Alternative 2 (all phases) are used throughout the appendix interchangeably to describe effects attributable to all phases.

Summaries of Alternative 2 resource information compared to the No Action Alternative as a point of reference for the potential effects on specific resources under Alternative 2. Similarly, the No Project Alternative under CEQA and the No Action Alternative under NEPA are used in the Sites Reservoir Project Final EIR/EIS to compare conditions without the Project to conditions with the Project. As described in the Sites Reservoir Project Final EIR/EIS, Section 3.2.1, *Existing Conditions and No Project Alternative/No Action Alternative*, the term No Project Alternative is primarily used in the EIR/EIS to represent both the CEQA No Project Alternative and NEPA No Action Alternative unless otherwise noted. The term NAA (No Action Alternative) is specifically used in Chapter 11, *Aquatic Biological Resources*, and corresponding appendices of the Sites Reservoir Final EIR/EIS in the presentation of modeled results and represent no material difference from the No Project Alternative as discussed in Chapter 3, *Environmental Analysis*.

## AA.3.1 Study Area

The study area for the LTO EIS is described in Chapter 2, *Purpose and Need*, Section 2.2, *Study Area Location and Description*, and includes areas that could be affected directly or indirectly by LTO of the CVP and SWP. The study area includes CVP service areas and CVP dams, power plants, diversions, canals, gates, and related federal facilities located on Clear Creek, the Trinity, Sacramento, American, Stanislaus, and San Joaquin rivers, and in the Sacramento–San Joaquin Delta (Delta). The study area includes SWP service areas downstream of the Feather River and SWP facilities in the Delta, Cache Slough Complex, and Suisun Marsh. Operations of the Oroville Reservoir and Oroville Dam are not addressed as part study area.

The Sites Reservoir Project Final EIR/EIS, *Executive Summary*, provides an overview of the project and project participation. The project would capture excess water from the Sacramento River and tributaries during major storms and store the water until it is most needed during dry periods. Water released from Sites Reservoir would be used to benefit local, state, and federal water use needs, including public water agencies, anadromous fish species in the Sacramento River watershed, wildlife refuges and habitats, and the Yolo Bypass to help supply food for delta smelt (*Hypomesus transpacificus*).

Project participation includes approximately 22 Storage Partners representing local and regional water delivery agencies that serve over 24.5 million people and over 500,000 acres of farmland. In addition, the State of California and Reclamation are also participating in the project as Storage Partners. Therefore, as described in Chapter 5, *Surface Water*, Section 5.1, *Introduction*, the broad study area consists of those areas with the potential to be significantly affected by the project and associated changes in operations. This area includes drainages in the Sites Reservoir footprint, conveyance and storage facilities for moving water to and from Sites Reservoir, Shasta Reservoir and the Sacramento River, Lake Oroville and the Feather River, Folsom Reservoir and the American River, Yolo Bypass, and the Delta. Water supply service areas and the delivery system of the CVP and SWP, including San Luis Reservoir, are also included. As described in the Sites Reservoir Project Final EIR/EIS, Chapter 2, *Project Description and Alternatives*, the Sites Project would not affect or result in changes in the operation of the CVP Trinity River Division facilities (including Clear Creek) and thus Trinity River resources are not addressed in the Sites Reservoir Project Final EIR/EIS analysis. Specific study areas, the equivalent of the affected environment, are identified for each resource topic analyzed in the Sites Reservoir Project Final EIR/EIS, in Chapters 5 through 30.

Where appropriate, this appendix describes why certain areas or geographies are not further evaluated or why operation of the Sites Reservoir Project would not result in a change to effects described in the LTO EIS.

### AA.3.2 Resources Not Analyzed Further

LTO Alternatives are comprised primarily of operational changes. Resources determined to have primarily construction-related effects are not further analyzed in this appendix. Given the focus of this appendix is on potential Sites Reservoir Project contributions to LTO operational effects, effects associated with the construction of Sites Reservoir facilities are also not discussed in this appendix unless construction is closely related to operations or maintenance. Also, Section AA.5, *Resources Not Analyzed Within the Appendix*, briefly describes resources that would only be affected by the Sites Reservoir Project operations and are not addressed in the LTO EIS.

## AA.4 Affected Environment and Environmental Consequences

### AA.4.1 Water Quality

### *AA.4.1.1 Potential Changes in Surface Water Quality Conditions (Upstream)*

**Alternative 2**

As discussed in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, because Alternative 2 would have limited changes in flows in the Trinity River, Sacramento River, Stanislaus River, and San Joaquin River, flow decreases that may occur in these rivers are not expected to be large enough to negatively impact water quality or increase the frequency of exceedances of water quality thresholds in these rivers. However, reductions in Clear Creek flows due to changes in the operations of CVP and SWP under Alternative 2 could result in less dilution causing increased concentrations of mercury within Clear Creek in certain months and year types and increased concentrations of constituents of concern within the American River.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, Section 6.3.2, *Operation*, hydrologic changes in Shasta Reservoir and the upper Sacramento River (upstream of Red Bluff), Folsom Reservoir and the American River resulting from Sites Reservoir Project operations are unlikely to affect most water quality constituents because the modeled changes are small and within the normal operating parameters of these locations. Potential effects on water temperature, salinity, nutrients, organic carbon, and dissolved oxygen (DO) in applicable waterbodies upstream of the Delta, including in Sites Reservoir, are discussed below.

The Sites Reservoir Project would not affect or result in changes in the operation of the CVP Trinity River Division facilities (including Clear Creek) and thus Trinity River resources are not addressed in the Sites Reservoir Project Final EIR/EIS.

*Temperature*

Operation of Sites Reservoir would have relatively small effects on Sacramento River water temperatures with Sites Reservoir releases generally tending to cause a slight reduction or negligible change in water temperature relative to the No Project Alternative. Releases would not increase Sacramento River water temperature at discharge locations more than the temperature objectives for COLD or WARM intrastate waters (less than 5°F increase ) identified in the Sacramento River Basin and San Joaquin River Basin Water Quality Control Plan. The Sites Reservoir Project could include releases of Sites Reservoir water to the CBD that would then pass through the Yolo Bypass with the goal of transporting nutrients and food sources for fish species in the Delta. These habitat releases would discharge into the Cache Slough Complex then into the Sacramento River upstream of Rio Vista. When Yolo Bypass temperatures are warmer than the Sacramento River, it is possible that increased Yolo Bypass flows could extend the influence of the Yolo Bypass temperatures slightly downstream relative to the No Project Alternative, and this is more likely to occur when Project flow pulses are higher and occur during August when the temperature differential tends to be greater. However, tidal mixing with cooler water from the Sacramento River near Rio Vista is likely to quickly dissipate this effect as the Yolo Bypass water moves downstream.

*Salinity*

Salinity in Sites Reservoir could increase due to evapoconcentration and local inputs from Salt Pond and Funks and Stone Corral Creeks. However, increases would not cause substantial degradation of surface water quality because the reservoir would be filled with Sacramento River water, which has relatively low electrical conductivity (EC) and evapoconcentration and local inputs would not substantially increase reservoir salinity. Salinity in Sites Reservoir may be affected over time by the salt springs that feed Salt Pond, but the Sites Reservoir Management Plan (RMP) includes water quality monitoring before and after construction to verify that the Salt Pond water would have little to no effect on salinity in the reservoir. The RMP also includes measures that could be taken to prevent any temporary substantial increases in salinity in the reservoir releases should monitoring indicate reason for concern (e.g., controlled blending of any accumulated high salinity water at the bottom of the reservoir with low salinity water from the rest of the reservoir).

*Methylmercury*

Initial water column methylmercury concentrations of Sites Reservoir are expected to be twice the long-term concentrations for up to 10 years after the initial filling and water column concentrations would be reflected in reservoir fish tissue. Water column methylmercury contributions from Sites Reservoir to Funks and Stone Corral Creeks could result in exceedances of the methylmercury sport fish water quality objective in these creeks. Mitigation Measure WQ-1.1, *Methylmercury Management*, would be implemented at Sites Reservoir to potentially reduce the magnitude of this adverse effect through reservoir monitoring and implementation of methylmercury reduction measures. In the short-term, given the greater mercury and methylmercury concentrations in reservoir releases relative to long-term concentrations, releases may temporarily increase water column and fish tissue methylmercury concentrations in the CBD. This temporary increase could cause exceedances of the sport fish water quality objective. Estimated long-term expected water column methylmercury concentrations (0.08 ng/L) in Sites Reservoir releases would be lower than concentrations in the CBD under the No Project Alternative and therefore releases would not be expected to increase bioaccumulation of methylmercury in CBD fish. Releases could increase water column and fish tissue methylmercury concentrations in the CBD, particularly during Dry and Critically Dry Water Years at estimated long-term reasonable worst-case methylmercury concentrations in releases (0.12 ng/L). However, fish tissue methylmercury levels in the CBD would likely return to baseline levels within months following the May–November release period. Water column and fish tissue methylmercury concentrations in the Yolo Bypass would not increase substantially in the short term or long term relative to the No Project Alternative due to Sites Reservoir releases because the mean water column methylmercury concentrations in Yolo Bypass are greater than the estimated worst-case short- and long-term reservoir concentrations and reservoir releases would be diluted in the Sacramento River prior to entering the Yolo Bypass via the Fremont Weir, unless flows were conveyed directly into the bypass via Knights Landing Ridge Cut. Yolo Bypass habitat releases would result in minimal inundation of land relative to the No Project Alternative because these flows would generally be contained within the Yolo Bypass channels.

*Nutrients, Organic Carbon and Dissolved Oxygen*

The initial filling of Sites Reservoir would result in the release of nutrients and dissolved organic carbon to the water column from newly inundated soil and other organic matter in the inundation

area, but these releases would decrease over time. Given the dominance of Sacramento River inflows to Sites Reservoir during winter and spring, and the relatively low concentration of nutrients in those inflows, nutrient levels in Sites Reservoir would not violate water quality objectives or substantially degrade reservoir water quality. Sites Reservoir releases to the CBD would likely have minimal effects on, or would potentially reduce, nutrient concentrations in the CBD because of the expected volume of those releases. Releases from the CBD to the Sacramento River would be diluted in the river and there would be no downstream adverse water quality effects prior to reaching the Delta. Sites Reservoir habitat releases to Yolo Bypass may or may not result in an increase in nutrients, as intended. However, the goal of habitat releases from Sites Reservoir through the CBD to Yolo Bypass is biostimulatory in nature; that is, the purpose of the enhanced flow to Yolo Bypass is to increase nutrient inputs to the north Delta to stimulate phytoplankton production to benefit north Delta fish species so this would not be considered an adverse water quality effect.

Sites Reservoir organic carbon concentrations may increase in the fall with die-off and decomposition of cyanobacteria and algae. This would not result in adverse water quality effects in the reservoir because increases would be temporary. Organic carbon levels would be diluted in the wet season and organic carbon is a critical part of the aquatic food web. Releases from Sites Reservoir would not be expected to contribute substantially to organic carbon levels in the CBD, which has relatively high levels of dissolved organic carbon due, in large part, to the agricultural drainage water received by the canal under the No Project Alternative. Further downstream in the Sacramento River, the organic carbon load in Sites Reservoir releases would be greatly diluted and thus would not substantially degrade water quality such that beneficial uses would be affected.

Sites Reservoir is expected to thermally stratify in late spring to early fall. This would likely result in a reduction of oxygen in the hypolimnion which would not affect beneficial uses. Further reduction of DO levels in the reservoir may be expected in late fall, generally, due to die-off of cyanobacteria and/or algae; the magnitude of the reduction would depend on the magnitude of the die-off. Water with low DO may sometimes be released from the bottom of the reservoir to Stone Corral Creek, but this water would become oxygenated quickly due to reaeration at the water-air interface. The dominance of Sacramento River inflows to the reservoir during the winter and spring (i.e., when diversions would occur) would bring relatively cool and oxygenated surface water to the reservoir. Yolo Bypass habitat releases may cause a temporary reduction in DO (below the 5.0 mg/L water quality objective) in the Toe Drain, Tule Canal, and other Yolo Bypass channels, but this would not be substantially different than what occurs during non-managed flow pulses under the No Project Alternative.

*Trace Metals*

The Sites Reservoir Project would not cause adverse effects on water quality from trace metals (including aluminum, copper, iron, arsenic, and lead) in the CBD, Funks Creek, water used for local agriculture, or the Sacramento River. Release of Sites Reservoir water to the CBD would likely reduce metals concentrations in the CBD because metal concentrations in the CBD are generally higher than in the Sacramento River regardless of time of year. Water quality effects on Funks Creek would not be adverse because: (1) exceedances likely already occur under 2020 baseline conditions and the No Project Alternative in the reach of the creek where existing flows would be replaced by reservoir releases; (2) the limited channel length that would be maximally

affected by reservoir releases; (3) reductions in total metal concentrations due to settling of suspended sediment; and (4) water would be released to the creek from the I/O tower (i.e., higher in the reservoir away from the bed sediment). The Sites Reservoir Project could cause elevated concentrations of some metals in Stone Corral Creek relative to the No Project Alternative because reservoir releases to the creek would generally come from the reservoir bottom, where metal concentrations may be greater than in other parts of the water column. Mitigation Measure WQ-2.1, *Prevent Metal Impacts in Stone Corral Creek Associated with Sites Reservoir Discharge*, would be implemented if metal concentrations in Stone Corral Creek exceed water quality standards for the protection of aquatic life during the drier parts of the year when exceedances would not be expected. Water quality, including metals concentrations, will be monitored in the creeks and adaptive management will occur as necessary to maintain fish in the creeks in good condition in compliance with California Fish and Game Code Section 5937. Sites Reservoir releases to the Sacramento River would occur after reductions in total metal concentrations due to settling with suspended sediment. These releases would not cause substantial increases in concentration or exceedances or exacerbation of exceedances of water quality standards for metals in the Sacramento River. Sites Reservoir habitat releases would be expected to redirect some of the CBD metals load to the Yolo Bypass. Few measurements currently exist for metals concentrations in the Yolo Bypass, so it is unclear whether discharge of the CBD water to the bypass would cause exceedances of water quality standards. Mitigation Measure WQ-2.2, *Prevent Net Detrimental Metal and Pesticide Effects Associated with Moving Colusa Basin Drain Water Through the Yolo Bypass*, would be implemented to reduce the magnitude of potential effects; this measure includes evaluation of metals concentrations in Yolo Bypass to ensure net benefits for aquatic communities and discontinuing flows if shown otherwise.

*Pesticides*

Pesticide concentrations in Sites Reservoir and in releases are expected to be low because source water concentrations are low. However, the Sites Reservoir Project could cause elevated concentrations of some pesticides in Yolo Bypass as a result of redirection of some of the CBD water from the Sacramento River to the Yolo Bypass. Mitigation Measure WQ-2.2, *Prevent Net Detrimental Metal and Pesticide Effects Associated with Moving Colusa Basin Drain Water Through the Yolo Bypass*, would be implemented to reduce the magnitude of this potential adverse effect; this measure includes evaluation pesticide concentrations in Yolo Bypass to ensure net benefits for aquatic communities and discontinuing flows if shown otherwise.

*Harmful Algal Blooms*

Site Reservoir operation would result in reservoir drawdown, reduced storage volume, and higher water temperatures from late spring through fall, particularly in Dry and Critically Dry Water Years. This would create favorable conditions for the initiation of cyanobacteria harmful algal blooms (CHABs). If cyanobacteria and cyanotoxins were present in Sites Reservoir releases, potential downstream effects on water quality and beneficial uses would not be expected because concentrations of cyanobacteria and cyanotoxins would be greatly diluted when eventually discharged into the Sacramento River, and cyanotoxins would undergo biodegradation and, to some degree, photodegradation and adsorption to sediment. In Tehama-Colusa (TC) Canal, Glenn Colusa Irrigation District (GCID) Main Canal, and the CBD, where there would be less dilution of Sites Reservoir releases, cyanobacteria and cyanotoxins are

expected to have limited adverse effects due to controlled releases from the I/O tower, aquatic algaecides routinely used by TC Canal Authority and GCID, lack of CHAB-conducive conditions in the CBD, and the effect of biotic and abiotic processes to reduce the concentration of cyanotoxins in the water column. Releases to Funks and Stone Corral Creeks would be adaptively managed to ensure compliance with California Fish and Game Code Section 5937. Sites Reservoir releases to the creeks will likely occur in late fall, winter, and early spring at times when CHABs are less likely to occur in the reservoir. Based on results from the North Delta Food Subsidy studies and hydrologic processes (increased flow in the Yolo Bypass canals and tidal mixing), habitat flows through the Yolo Bypass would not be expected to cause substantial increases in CHABs in the canals of the Yolo Bypass. RMP measures including monitoring and restricting in-water recreation based on the presence of cyanobacteria and cyanotoxins in Sites Reservoir, and releasing water from lower in the reservoir if cyanobacteria and cyanotoxins are confirmed near the I/O tower would further reduce any potential for adverse water quality effects.

**Summary**

Changes in flows in rivers upstream of the Delta attributable to the Alternative 2 would not result in measurable changes in water quality constituents in the Trinity River, Sacramento River, Stanislaus River, or San Joaquin River, but could cause increased concentrations of mercury within Clear Creek in certain months and year types and increased concentrations of constituents of concern within the American River in critical years. Hydrologic changes in Shasta Reservoir and the upper Sacramento River (upstream of Red Bluff), Folsom Reservoir and the American River resulting from Sites Reservoir Project operations are unlikely to affect most water quality constituents because the modeled changes are small and within the normal operating parameters of these locations.

The Sites Reservoir Project would not result in adverse effects on water temperature at discharge locations, i.e., in the Sacramento River or Yolo Bypass, and would not adversely affect water quality with respect to pesticides, nutrients, organic carbon or DO in the CBD, or Sacramento River. The Sites Reservoir Project could cause elevated concentrations of pesticides and metals in Yolo Bypass as a result of redirection of some of the CBD water from the Sacramento River to the Yolo Bypass. Implementation of Mitigation Measure WQ-2.2 would reduce the magnitude of this adverse effect on water quality. The Sites Reservoir Project could also cause elevated concentrations of some metals in Stone Corral Creek and Mitigation Measure WQ-2.1 would be implemented to reduce the magnitude of this adverse effect on water quality. The Sites Reservoir Project would not cause adverse effects on water quality from traces in the CBD, Funks Creek, water used for local agriculture, or the Sacramento River. Operations under the Sites Reservoir Project would not result in a substantial increase in salinity or violations of water quality objectives due to the relatively low EC of the Sacramento River water used to fill the reservoir, the small volume of local inflows (Salt Pond and Stone Corral and Funks creeks), the requirements for salinity monitoring and I/O tower operation, and dilution of the Sites Reservoir discharge by the Sacramento River. Initial water column methylmercury concentrations of Sites Reservoir release are expected to be twice the long-term concentrations for up to 10 years after the initial filling and this high concentration would be reflected in reservoir fish tissue as well. Lastly, conditions in Sites Reservoir would likely be conducive to CHABs. If cyanobacteria and cyanotoxins were present in Sites Reservoir releases, potential downstream effects on water quality and beneficial uses would not be expected because concentrations of cyanobacteria and

cyanotoxins would be greatly diluted when eventually discharged into the Sacramento River, and cyanotoxins would undergo biodegradation and, to some degree, photodegradation and adsorption to sediment. Monitoring, restricting in-water reservoir recreation, and other measures would also be implemented as part of the RMP to reduce potential CHABs effects on beneficial uses in applicable waterbodies upstream of the Delta.

While water quality at multiple locations upstream of the Delta could be adversely affected by operation of the Sites Reservoir Project, operation of Sites Reservoir Project in combination with the operation of Alternative 2 would not increase the severity of this adverse effect because potentially affected waterbodies would differ between the two projects.

#### *AA.4.1.2 Potential Effects on Bay-Delta Electrical Conductivity*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, and the modeling results contained in Appendix G, Attachment 1, *Electrical Conductivity Modeling Results*, Alternative 2 would not contribute to agricultural or fish and wildlife beneficial use impairments in the Delta, Suisun Marsh, Suisun Bay or San Francisco Bay. Modeling results show slightly higher monthly average EC levels at various Delta locations in September and October under Alternative 2 compared to the No Action Alternative, and monthly average EC levels similar to or less than those for the No Action Alternative in all other months. The modeled average EC increases are small in magnitude and decreases in EC levels also occur during the irrigation season at many Delta locations. Such EC changes would not make existing Delta EC impairments discernibly worse. Alternative 2 would not result in changes in overall salinity conditions within Suisun Bay and San Francisco Bay.

**Sites Reservoir Project**

As discussed in Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, Section 6.4, *Impact Analysis and Mitigation Measures* (Impact WQ-2), and the modeling results in Appendix 6B, *Sacramento-San Joaquin Delta Modeling*, slight changes in Delta salinity are anticipated to result from small differences in Delta inflow and exports associated with operation of the Sites Reservoir Project. However, model results indicate that the number of instances of non-compliance in the Delta would not increase relative to the No Project Alternative. The average results for Critically Dry and Above Normal Water Years for the SWP exports, show that the changes in EC would be small, with percent change at Clifton Court Forebay ranging from -2% to 1% relative to the No Project Alternative, with all values remaining well below the water quality standard of 1,000 µS/cm. Similarly, there would be small changes in salinity for CVP exports (i.e., Jones Pumping Plant) ranging from -2% to 1% relative to the No Project Alternative.

**Summary**

The LTO EIS and Sites Reservoir Project Final EIR/EIS determined that while there may be minor increases in Delta EC in some months, in other months there would be no change or a decrease in EC relative to the No Action Alternative and No Project Alternative, respectively. As such, it is anticipated that operation of the Sites Reservoir Project in combination with operation of Alternative 2 would not worsen or overall change Delta EC. Delta EC is expected to remain

below levels that would make Clean Water Act (CWA) Section 303(d) EC impairments discernably worse or cause adverse effects to designated beneficial uses with the operation of both projects. Effects of operating both projects on EC levels in Suisun Marsh, Suisun Bay, and San Francisco Bay would be lesser than those that would occur in the Delta. As such, it is anticipated that operation of Sites Reservoir Project in combination with Alternative 2 would not worsen or change the overall EC in these areas.

#### *AA.4.1.3 Potential Effects on Bay-Delta Chloride*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, and the modeling results contained in Appendix G, Attachment 2, *Chloride Modeling Results*, Alternative 2 would not contribute substantially, if at all, to impairment of municipal and industrial beneficial uses of Delta waters due to chloride concentrations. Modeling results show that monthly average changes in chloride concentrations in the Delta from LTO Alternative 2 would be small in magnitude, and would include both increases and decreases, depending upon month and location. Because Suisun Marsh, Suisun Bay and San Francisco Bay are not designated for municipal and domestic supply use, and seawater is the primary source of chloride in the western Delta, changes in chloride concentrations in Delta outflow to the marsh and bays are not of concern in these waterbodies relative to drinking water supplies or other beneficial uses.

**Sites Reservoir Project**

Chloride results presented in the Sites Reservoir Project Final EIR/EIS, Appendix 6B2 and Appendix 6B5, indicate that operation of Sites Reservoir Project would not result in substantial changes to Delta chloride concentrations such that there would be impairments of beneficial uses. Small increases in seawater intrusion and chloride could occur, but these increases would occur during the time of year when chloride concentrations are lower because more water is moving through the Delta. Due to the timing and small magnitude of these increases, they do not represent a substantial degradation of water quality.

**Summary**

Effects of Alternative 2 or Sites Reservoir Project operations on chloride concentrations in the Delta, Suisun Marsh, Suisun Bay, and San Francisco Bay would be small in magnitude. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not meaningfully worsen chloride concentrations or change overall chloride concentrations in these waterbodies. Operation of both projects would not s cause increased exceedance of the chloride water quality objective and would not adversely affect beneficial uses of these waterbodies.

#### *AA.4.1.4 Potential Effects on Bay-Delta Bromide*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, and the modeled results contained in Appendix G, Attachment 3, *Bromide Modeling Results*, Alternative 2 could cause small magnitude increases and decreases in bromide

concentrations at Delta locations. Water Supply treatment plants that use the Delta as a source for drinking water already experience highly variable bromide concentrations and, thus, must implement appropriate treatment technologies to ensure compliance with drinking water regulations for disinfection byproducts. It is not expected that Alternative 2 would adversely affect drinking water treatment and compliance with drinking water regulations for disinfection byproducts. Because Suisun Marsh, Suisun Bay, and San Francisco Bay are not designated for municipal and domestic supply use, and seawater is the primary source of bromide, small magnitude changes in bromide concentrations in the Delta outflow that initially enters Suisun Marsh, Suisun Bay, and San Francisco Bay are not of concern relative to drinking water supplies or other beneficial uses in the marsh or bays.

**Sites Reservoir Project**

Because the Sites Reservoir Project would not affect bromide concentrations in the Delta, an evaluation of changes in bromide in the Delta was not included in Sites Reservoir Project Final EIR/EIS.

**Summary**

Operations of Alternative 2 and the Sites Reservoir Project are not expected to worsen bromide concentrations in the Delta.

#### *AA.4.1.5 Potential Effects on Bay-Delta Methylmercury*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, and the modeled results contained in Appendix G, Attachment 4, *Methylmercury Modeling Results*, modeled long-term average total methylmercury concentrations in the water column and largemouth bass in the Delta and Suisun Marsh for Alternative 2 would be about the same as those that would occur for the No Action Alternative at all Delta assessment locations. Hence, Alternative 2 would not contribute to additional water quality degradation with respect to water column methylmercury concentrations or increased methylmercury bioaccumulation in biota in the Delta or in Suisun Marsh. Alternative 2 also would result in Delta outflow rates similar to those under the No Action Alternative. Thus, Alternative 2 would not contribute to measurable water quality degradation with respect to water column methylmercury concentrations or increased methylmercury bioaccumulation in biota in Suisun Bay and San Francisco Bay.

**Sites Reservoir Project**

As discussed in Sites Reservoir Project Final EIR/EIS Chapter 6, *Water Quality*, Section 6.4, *Impact Analysis and Mitigation Measures* (Impact WQ-2), and Appendix 6F, *Mercury and Methylmercury*, modeled long-term average water column methylmercury concentrations in the Sacramento River at Freeport for Sites Reservoir Project are estimated to increase by no more than 4% on a long-term average basis relative to the No Project Alternative due to Sites Reservoir releases. The resulting long-term average fish tissue methylmercury concentrations would not increase by more than approximately 6%. These potential changes do not differ substantially from the No Project Alternative and, as such, are not expected to result in long-term

differences in water column or fish tissue methylmercury concentrations at Freeport that would be measurable by a typical field monitoring program.

Under Sites Reservoir Project, potential increases in fish tissue methylmercury concentrations in the north Delta (Sacramento River at Freeport) based on annual average flows would be greatest in the short term during the initial filling period and for potentially 10 years after the reservoir is full. In addition, Sites Reservoir releases may cause measurable long-term degradation of water quality downstream in the north Delta by causing increases in aqueous and fish tissue methylmercury concentrations, relative to the No Project Alternative, in Dry and Critical Water Years, and causing exceedances of the methylmercury TMDL fish tissue objectives to occur more frequently and/or by greater magnitudes during these years and release period. Mercury and methylmercury in reservoir releases to Funks and Stone Corral Creeks would be reflected in the tissue of fish in these creeks and could cause exceedances of the methylmercury sport fish water quality objective. Mitigation Measure WQ-1.1, *Methylmercury Management*, would be implemented to reduce the methylation of mercury in Sites Reservoir.

**Summary**

Alternative 2 would have negligible effects on water column and fish tissue methylmercury concentrations in the Delta. Sites Reservoir Project long-term average water column and fish tissue methylmercury concentrations are not expected to result in long-term differences in water column or fish tissue methylmercury concentrations in the north Delta that would be measurable by a typical field monitoring program. However, surface water concentrations of methylmercury in the north Delta under Sites Reservoir Project may increase in Dry and Critical Water Years during periods of peak releases. Such increases may result in measurable increases in methylmercury in fish causing exceedances of the methylmercury TMDL fish tissue objectives to occur more frequently and/or by greater magnitudes during these water year types and release period but operation of Alternative 2 would not add to these adverse effects. Mitigation Measure WQ-1.1 would be implemented to reduce the methylation of mercury in Sites Reservoir.

#### *AA.4.1.6 Potential Effects on Bay-Delta Selenium*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, and the modeled results contained in Appendix G, Attachment 5, *Selenium Modeling Results*, modeled long-term average water column concentrations of selenium and concentrations in whole-body fish, fish fillets, and bird eggs in the Delta for Alternative 2 would be about the same as those that would occur for the No Action Alternative at all Delta assessment locations. Thus, Alternative 2 would not result in increased health risks to wildlife or humans consuming wildlife associated with whole-body fish, fish fillets, and bird eggs. Thus, Alternative 2 would not contribute to additional water quality degradation with respect to selenium concentrations or increased selenium bioaccumulation in biota in Suisun Bay and San Francisco Bay.

**Sites Reservoir Project**

As discussed in Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, Section 6.3.2.1, *Selection of Water Quality Constituents to Evaluate*, selenium was not included in the

evaluation because the Sites Reservoir Project would not affect the major sources of Delta selenium, i.e., natural sources, San Joaquin River flow, and industries in the San Francisco Bay Area.

**Summary**

It is anticipated that operation of Sites Reservoir Project in combination with LTO Alternative 2 would not substantially change selenium concentrations, as identified in the LTO EIS.

#### *AA.4.1.7 Potential Effects on Bay-Delta Organic Carbon*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, and the modeled results contained in Appendix G, Attachment 6, *Dissolved Organic Carbon Modeling Results*, show that monthly average dissolved organic carbon concentrations at Delta assessment locations under Alternative 2 would be similar to concentrations under the No Action Alternative. A California Urban Water Agencies expert panel convened to review Delta water quality and disinfection formation potential found that total organic carbon concentrations ranging from 4 to 7 mg/L would allow continued flexibility in treatment technology necessary to achieve existing drinking water criteria for disinfection. Based on the modeling results, any increases in average dissolved organic carbon concentrations that may occur with Alternative 2 would be of sufficiently small magnitude that modifications to existing drinking water treatment plants to employ additional organic carbon removals would not be necessary. The small changes in total organic carbon concentrations in the Delta and in Delta outflow to Suisun Marsh, Suisun Bay, and San Fransico Bay under Alternative 2 would not degrade water quality with respect to dissolved organic carbon, cause increased frequency of exceeding water quality objectives (because none exist), contribute to adverse effects on organic enrichment conditions, or adversely affect beneficial uses within these waterbodies.

**Sites Reservoir Project**

As discussed in Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, Section 6.4, *Impact Analysis and Mitigation Measures* (Impact WQ-2), organic carbon concentrations in Sites Reservoir may increase in the fall with die-off of cyanobacteria and algae. Initially, concentrations would likely be higher toward the water's surface where cyanobacteria and algae would be concentrated in areas of the reservoir where CHABs and algae may be concentrated but eventually, the decaying organic matter would settle to the reservoir bottom. Because the organic carbon load in Sites Reservoir releases would be diluted further downstream in the Sacramento River near the Delta, reservoir releases would not substantially degrade Delta water quality such that beneficial uses would be affected.

**Summary**

Alternative 2 would not degrade water quality with respect to dissolved organic carbon, cause increased frequency of exceeding water quality objectives (because none exist), contribute to adverse effects on organic enrichment conditions, or adversely affect beneficial uses within these waterbodies. Operation of both projects would not cause increased exceedance of applicable objectives or criteria (because none currently exist for organic carbon) and would not adversely affect beneficial uses of these waterbodies.

### *AA.4.1.8 Potential Effects on Bay-Delta Trace Metals*

**Alternative 2**

Trace metals, including aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, silver, and zinc, occur naturally in the river inflows to the Delta. Metals concentrations in Delta inflows are typically below applicable water quality objectives/criteria for these trace metals. Also, typical concentrations of trace metals within the Delta are at levels that do not cause beneficial use impairments. The Delta inflows that would occur under Alternative 2 would not make the existing impairments discernably worse in the Delta, or any impairments in Suisun Bay and Marsh, or San Francisco Bay discernably worse relative to the No Action Alternative.

**Sites Reservoir Project**

As discussed in Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, Section 6.4, *Impact Analysis and Mitigation Measures* (Impact WQ-2), operation of Sites Reservoir Project would have negligible effects on trace metal concentrations in Delta waters because although trace metal concentrations in the Sites Reservoir releases may be higher than concentrations in the Sacramento River receiving water due to differences in Sacramento River concentrations at the time of diversion to storage and the time of release from storage, as well as from evapoconcentration, substantial dilution of Sites Reservoir water would occur within the Sacramento River before reaching the Delta. Thus, operations would not substantially degrade the quality of water in the Delta with respect to trace metals, and resulting concentrations would not cause adverse effects to aquatic life or other beneficial uses of the Delta. Because Sites Reservoir Project would not result in substantial increases in trace metal concentrations in Delta waters or in Delta outflows, there would not be a substantial change in trace metal concentrations in Suisun Marsh, Suisun Bay, or San Francisco Bay relative to existing conditions.

**Summary**

As described above, effects of Alternative 2 or Sites Reservoir Project operations on trace metal concentrations in the Delta, Suisun Marsh, Suisun Bay, and San Francisco Bay would be small in magnitude. As such, it is anticipated that operation of Sites Reservoir Project in combination with the operation of Alternative 2 would not substantially worsen trace metal concentrations or substantially change trace metal concentrations in these waterbodies. Consequently, operation of both projects would not substantially degrade the quality of these waterbodies with respect to trace metals, would not cause increased exceedance of applicable objectives or criteria, would not make any trace metal impairments that exist in these waterbodies discernably worse, and would not adversely affect beneficial uses of these waterbodies.

### *AA.4.1.9 Potential Effects on Bay-Delta Nutrients*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, Alternative 2 would not contribute to differences in Delta nutrient concentrations or in nutrient distributions that would substantially degrade water quality with respect to nutrients or result in adverse effects to beneficial uses in the Delta, because the small differences in Delta inflows would result in minimal changes in nutrient concentrations. Because nutrient concentrations in the Delta and under Alternative 2 are not expected to be substantially different

from those that would occur under the No Action Alternative, Alternative 2 would not cause substantial differences in nutrient concentrations in Delta outflow to Suisun Marsh, Suisun Bay, and San Francisco Bay. Small differences in Delta outflow volume may occur between Alternative 2 and the No Action Alternative. Resulting differences in total nitrogen and phosphorus loading that would occur in Suisun Bay and Marsh, and San Francisco Bay due to differences in Delta outflow would be minor. These potential differences in Delta outflow would not result in water quality degradation to a degree which would adversely affect beneficial uses of Suisun Bay and Marsh, or San Francisco Bay.

**Sites Reservoir Project**

As discussed in Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, Section 6.4, *Impact Analysis and Mitigation Measures* (Impact WQ-2), Sites Reservoir water would be diluted once discharged into the Sacramento River under Sites Reservoir Project because releases would generally contribute less than 15% of the flow in the Sacramento River. Accordingly, there would be no adverse water quality effects in the Delta from the Sacramento River related to nutrients from Sites Reservoir. Any potential small changes in nutrient concentrations due to Yolo Bypass habitat releases would be of magnitude that would not adversely affect any beneficial uses or substantially degrade Delta water quality.

**Summary**

The Delta inflows that would occur under Alternative 2 would not make the existing impairments discernably worse in the Delta, or any impairments in Suisun Bay and Marsh, or San Francisco Bay discernably worse relative to the No Action Alternative. Sites Reservoir water would be diluted once discharged into the Sacramento River under Sites Reservoir Project because releases would generally contribute less than 15% of the flow in the Sacramento River. Accordingly, there would be no adverse water quality effects in the Delta from the Sacramento River related to nutrients from Sites Reservoir. Any potential small changes in nutrient concentrations due to Yolo Bypass habitat releases would be of magnitude that would not adversely affect any beneficial uses or substantially degrade Delta water quality.

As such, it is anticipated that operation of Sites Reservoir Project in combination with the operation of Alternative 2 would not substantially worsen nutrient concentrations or substantially change nutrient concentrations in these waterbodies.

#### *AA.4.1.10 Potential Effects on Bay-Delta Dissolved Oxygen*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, DO levels in Delta, Suisun Bay and Marsh, and San Francisco Bay waters are primarily affected by water temperature, flow velocities, nutrients (e.g., phosphorus and nitrogen), and the photosynthesis, respiration, and decomposition of aquatic organisms. The sediment oxygen demand of organic material deposited in the low velocity channels also affects DO levels in Delta waters. The differences in Delta inflows that would occur under Alternative 2, relative to the No Action Alternative, would not result in water temperature differences of magnitudes what would lead to lower DO levels in the Delta, Suisun Marsh, Suisun Bay, or San Francisco Bay. The relative degree of tidal exchange, flows, and turbulence that contributes to

exposure of Delta, Suisun Bay and Marsh, and San Francisco Bay waters to the atmosphere for reaeration would not be meaningfully different from the No Action Alternative. Finally, Alternative 2 would have not affect nutrient levels sufficiently to change aquatic plant or algae growth, organic material accumulation, or sediment oxygen demand within the Delta, Suisun Marsh, Suisun Bay, or San Francisco Bay sufficiently to affect DO levels. Some waterways in the eastern, southern, and western Delta are listed as impaired by low oxygen levels. Alternative 2 would not make these DO impairments in the Delta worse. Operations of the managed wetlands and associated discharges cause the current Suisun Marsh DO impairments. Changes in Delta flows into the marsh that could occur under Alternative 2 would not make this impairment worse.

**Sites Reservoir Project**

As discussed in Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, Section 6.4, *Impact Analysis and Mitigation Measures* (Impact WQ-2), although Sites Reservoir is expected to thermally stratify during the late spring through early fall, and thermal stratification would likely result in a reduction of oxygen toward the bottom of the reservoir in the hypolimnion, water released from the reservoir would become oxygenated quickly due to reaeration at the water-air interface prior to reaching the Delta. Sites Reservoir releases made to Yolo Bypass to benefit listed fish species may temporarily affect DO levels in the Yolo Bypass based on results from past North Delta Flow Action studies (Davis et al. 2022). However, while DO in Yolo Bypass may temporarily drop below the water quality objective as a result of these habitat releases, this would not be substantially different than what occurs historically during non-managed flow pulses in the north Delta due to local agricultural activities (e.g., rice field drainage). Therefore, because project operations would not cause substantial changes in Delta DO concentrations within the Delta or in Delta outflow, it would not affect factors that contribute to low DO conditions in Suisun Marsh, Suisun Bay, or San Francisco Bay. Sites Reservoir Project operations would not cause substantial changes in DO concentrations in these waterbodies, substantially increase the frequency with which applicable water quality objectives for DO would be exceeded in these waterbodies, substantially degrade the quality of these waterbodies with respect to DO or result in DO levels that adversely affect beneficial uses.

**Summary**

The differences in Delta inflows that would occur under Alternative 2, relative to the No Action Alternative, would not result in water temperature differences of magnitudes what would lead to lower DO levels in the Delta, Suisun Marsh, Suisun Bay, or San Francisco Bay. Sites Reservoir Project operations would not cause substantial changes in DO concentrations in these waterbodies, substantially increase the frequency with which applicable water quality objectives for DO would be exceeded in these waterbodies, substantially degrade the quality of these waterbodies with respect to DO or result in DO levels that adversely affect beneficial uses. Operation of both projects would not substantially degrade the quality of these waterbodies with respect to DO, would not cause increased exceedance of applicable objectives or criteria, would not make the Suisun Marsh impairment discernably worse, and would not adversely affect beneficial uses of these waterbodies.

### *AA.4.1.11 Potential Effects on Bay-Delta Legacy Contaminants*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, the Delta is on the SWRCB's CWA Section 303(d) list for impaired by dioxin and furan compounds, PCBs, and PAHs. Suisun Bay and San Francisco Bay are included on the CWA Section 303(d) list for dioxin and furan compounds, and PCBs. Dioxin and furan compounds, PCBs, and PAHs are identified as "legacy contaminants" because of their persistence in the environment long after use. The Delta's primary source of dioxin and furan compounds and PAHs is from stormwater runoff. The Delta's primary source of PCBs is the suspension and transport of Bay suspended sediment into the western Delta on flood tides. These mechanisms of deposition and transport of dioxins and furans, PCBs, and PAHs are independent of CVP/SWP operations. Thus, changes in river inflows to the Delta due to Alternative 2 implementation would not meaningfully affect concentrations of dioxin and furan compounds, PCBs, and PAHs in the Delta. For these same reasons, concentrations of dioxin and furan compounds and PCBs in Suisun Bay and San Francisco Bay would not be meaningfully affected by Alternative 2.

**Sites Reservoir Project**

As discussed in Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, Section 6.3.2.1, *Selection of Water Quality Constituents to Evaluate*, legacy contaminants associated with sediment like PCBs, DDT, chlordane and dieldrin were dismissed from detailed evaluation because these contaminants would mostly remain adsorbed to sediment and would not be any more concentrated in Sites Reservoir releases than in the Sacramento River because Sites Reservoir source water would come predominantly from the Sacramento River.

**Summary**

Concentrations of dioxin and furan compounds and PCBs in Suisun Bay and San Francisco Bay would not be meaningfully affected by Alternative 2. Under Sites Reservoir Project, these contaminants would mostly remain adsorbed to sediment and would not be any more concentrated in Sites Reservoir releases than in the Sacramento River Operation of both projects would not be expected to cause more frequent exceedances of applicable objectives or criteria, substantially degrade water quality with respect to these legacy contaminants or result in contaminant levels that would adversely affect beneficial uses in the Delta, Suisun Marsh, Suisun Bay, and San Francisco Bay.

### *AA.4.1.12 Potential Effects on Bay-Delta Pesticides*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, pesticide concentrations in the Delta, Suisun Bay and Marsh, and San Francisco Bay waters are primarily affected by surface water and stormwater discharges from agricultural and urban land use areas. Alternative 2 would not result in meaningfully higher pesticide concentrations in the Delta that would cause water quality degradation or increase the risk of pesticide-related toxicity to aquatic life as compared to conditions. Several primary factors external to CVP and SWP operation (e.g., land use and pesticide use factors) affect pesticide

presence and concentrations in Delta inflows, throughout the Delta, and thus in Delta outflows. This coupled with state regulatory actions to control pesticide loading to surface waters mean that pesticide conditions in the Delta under Alternative 2 and the No Action Alternative would likely be similar. For the same reasons, it is expected that pesticide conditions in Suisun Bay and Marsh, and San Francisco Bay under Alternative 2 would be similar to that for the No Action Alternative.

**Sites Reservoir Project**

As discussed in Chapter 6, *Surface Water Quality*, Section 6.6, *Impact Analysis and Mitigation Measures* (Impact WQ-2), pesticide concentrations in Sites Reservoir releases under Sites Reservoir Project are expected to be low because source water, i.e., Sacramento River, concentrations are low. Operations would not change the overall pesticide load to the Delta as pesticides are already present in the Yolo Bypass and potential increase in pesticide concentrations in the north Delta resulting from Sites Reservoir habitat releases into Yolo Bypass would be reduced by net and tidal flows from the Sacramento River. In addition, the California Department of Fish and Wildlife would use habitat flows in the manner most advantageous to ecosystem benefits identified in the Water Storage Investment Program. As such, pesticide concentrations in Delta inflows would differ negligibly from existing conditions and beneficial uses would not be adversely affected.

**Summary**

Pesticide conditions in the Delta under Alternative 2 and the No Action Alternative would likely be similar. It is expected that pesticide conditions in Suisun Bay and Marsh, and San Francisco Bay under Alternative 2 would be similar to that for the No Action Alternative. Pesticide concentrations in Sites Reservoir releases under Sites Reservoir Project are expected to be low because source water, i.e., Sacramento River, concentrations are low. Operations would not change the overall pesticide load to the Delta as pesticides are already present in the Yolo Bypass and potential increase in pesticide concentrations in the north Delta resulting from Sites Reservoir habitat releases into Yolo Bypass would be reduced by net and tidal flows from the Sacramento River. Operation of both projects would not be expected to cause more frequent exceedances of pesticide objectives/criteria or result in pesticide levels that would adversely affect beneficial uses in the Delta, Suisun Marsh, Suisun Bay, and San Francisco Bay.

### *AA.4.1.13 Potential Effects on Bay-Delta CHABs*

**Alternative 2**

As described in LTO EIS Appendix G, *Water Quality Technical Appendix*, Section G.2.4, *Alternative 2*, Alternative 2 is not expected to have meaningful effects on irradiance, nutrients, water column turbulence and mixing, and temperature within Delta channels. The effects that Alternative 2 may have on residence time within the Delta throughout the June through November bloom season for cyanobacteria would generally be small in magnitude and thus not likely to cause an increase in the frequency or magnitude of Delta CHABs relative to the No Action Alternative. Alternative 2 would not affect residence time, water temperature, channel turbulence and mixing, nutrients, water clarity, or salinity at levels that would create conditions more conducive to CHAB formation in Suisun Marsh, Suisun Bay, or San Francisco Bay. Small changes in these conditions that may potentially occur under Alternative 2 would not be of

sufficient frequency and magnitude to cause CHABs to form more frequently, or grow to larger levels, than would occur in these waterbodies for the No Action Alternative.

**Sites Reservoir Project**

As discussed in Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, Section 6.4, *Impact Analysis and Mitigation Measures* (Impact WQ-2), any cyanobacteria potentially present in releases from Sites Reservoir would not be expected to contribute substantially to the cyanobacteria seed supply in the Delta or substantially increase the magnitude or spatial occurrence of CHABs in the Delta relative to existing conditions because concentrations of cyanobacteria (as well as cyanotoxins) would be greatly diluted before reaching the Delta, with the dilution effect dependent on the ratio of Sites Reservoir water to Sacramento River water. Sites Reservoir releases would also not make conditions in the Delta, particularly water temperature and residence time, more conducive to CHABs in the future. Furthermore, based on results from previous North Delta Flow Action studies and hydrologic processes (increased flow in the Yolo Bypass canals and tidal mixing), habitat flows through the Yolo Bypass from Sites Reservoir releases would not be expected to cause substantial increases in CHABs in the north Delta. Finally, water diversions from the Sacramento River to Sites Reservoir would not be expected to result in an increase in the frequency of CHABs in the Delta as a result of flow reductions because diversions to the reservoir would occur primarily during storm events in winter when conditions are less conducive to bloom formation and maintenance. Hence, CHABs and their associated cyanotoxins levels in the Delta, Suisun Marsh, Suisun Bay, and San Francisco Bay under Sites Reservoir Project would not adversely affect beneficial uses or degrade water quality.

**Summary**

As described above, the five primary environmental factors (i.e., water temperature, residence time, water column turbulence and mixing, nutrient levels, and water column irradiance and clarity) that affect CHABs in the Delta, Suisun Marsh, Suisun Bay, and San Francisco Bay would be affected little, if at all, by operation of Alternative 2. In addition, Sites Reservoir Project releases, including Yolo Bypass habitat releases, would not contribute substantially to the cyanobacteria seed supply to the Delta, or substantially increase the magnitude or spatial occurrence of CHABs in the Delta, and would not result in changes to Delta water temperature and residence time more conducive to CHABs, and diversions from the Sacramento River to Sites Reservoir would not make conditions in the Delta more conducive to CHABs. Consequently, operation of both projects would not be expected to have a meaningful effect on the frequency and magnitude of CHABs in these waterbodies or cyanotoxin levels and would not adversely affect beneficial uses or degrade water quality.

## AA.4.2 Water Supply

The shared affected environment of the two projects consists of Shasta Reservoir and the Sacramento River, Folsom Reservoir and the American River, Yolo Bypass and the Delta, and the water supply service areas and the delivery system of the CVP and SWP, including San Luis Reservoir.

### *AA.4.2.1 Potential Changes in Water Supply Deliveries*

**Alternative 2**

As discussed in Appendix H, *Water Supply Technical Appendix*, Section H.2.5.1, *Potential Changes in Water Supply Deliveries*, all phases of Alternative 2 for the Trinity River, Sacramento River, Clear Creek, and American River Regions would remain the same or decrease all contract delivery types with exception of deliveries to CVP Municipal and Industrial (M&I) water users (both of these would increase). The maximum reductions in average annual deliveries generally average less than 5% and are considered similar to conditions under the No Action Alternative. In dry and critical water year types, some of the largest reductions in average deliveries would exceed this 5% level with CVP agricultural deliveries reduced by 12% under Alternative 2 Without TUCP Without VA. Under Alternative 2 Without TUCP Delta VA, average annual deliveries to CVP Settlement Contractors would be reduced by 6%.

The maximum and minimum CVP and SWP deliveries to contractors in the Stanislaus and San Joaquin River Regions under all phases of Alternative 2 and for all contract delivery types, with exception of deliveries to CVP agricultural water users, would remain the same or increase. Under Alternative 2 Without TUCP Delta VA, the largest decrease identified, average annual deliveries to CVP agricultural water users would be reduced by 9%. In dry and critical water year types, deliveries to CVP agricultural water users would be reduced by 16% under Alternative 2 Without TUCP Delta VA.

The maximum and minimum CVP and SWP contract deliveries in the Bay-Delta Region for all phases under Alternative 2 would increase or decrease slightly for CVP M&I water users, would decrease for CVP agricultural water users, and would increase for SWP M&I water users. The maximum reductions in average annual deliveries would average less than 5%. In dry and critical water year types, some maximum reductions in average deliveries would exceed this 5% level with CVP agricultural deliveries reduced by 17% under Alternative 2 Without TUCP Without VA.

For the CVP and SWP service area, SWP M&I deliveries would increase on average up to approximately 5% for the Central Coast region under all phases of Alternative 2. In the Tulare Lake region, all average annual contract delivery types, with exception of deliveries to CVP agricultural water users, would remain the same or increase under all phases of Alternative 2. Under Alternative 2 Without TUCP Delta VA, the largest decrease identified, average annual deliveries to CVP agricultural water users would be reduced by 11%. In dry and critical water year types, deliveries to CVP agricultural water users would be reduced by 19% under Alternative 2 Without TUCP Delta VA. The maximum and minimum SWP contract deliveries in the South Lahontan region would increase on average up to approximately 5% for SWP M&I deliveries under all phases of Alternative 2. In the South Coast region for all phases under Alternative 2, the maximum and minimum SWP contract deliveries would remain the same for SWP agricultural deliveries and would increase on average up to approximately 4% for SWP M&I deliveries.

**Sites Reservoir Project**

Water supply is addressed in Chapter 5, *Surface Water*, of the Sites Reservoir Project Final EIR/EIS. Potential water supply effects associated with the Sites Project were evaluated using

results from CalSim II, which are described in Section 5.4, *Hydrologic Modeling Results*. The analysis in Chapter 5 is supported by CalSim methods and results described in detail in Appendix 5A, *Surface Water Resources Modeling of Alternatives*, and Appendix 5B, *Water Resources System Modeling System*, along with its sub-appendices. USRDOM modeling was also used to simulate daily flow and storage conditions in the Sacramento River from Shasta Lake to Knights Landing and CBD including the project conveyance and storage features. Appendix 5C, *Upper Sacramento River Daily River Flow and Operations Model*, contains a description of the USRDOM model and summary of results. CalSim and USRDOM were used iteratively to develop a set of monthly CalSim results that would be compatible with daily operations for Sites Reservoir diversions. Section 5.4.1.1., *Summary of General Changes in Hydrology*, and Tables 5-11 through 5-29 of the Sites Reservoir Project Final EIR/EIS provide a summary of the changes in hydrology expected to occur as a result of the Sites Project (Alternatives 3) relative to the No Project Alternative as evaluated by CalSim.

CalSim results were used to estimate Sites water deliveries to Storage Partners, as well as regular system deliveries to CVP and SWP contractors. Summaries of these water supply deliveries are provided in Table AA-2 and Table AA-3, below (adapted from Tables 5-30 and 5-31 in the Sites Reservoir Project Final EIR/EIS).

Table AA-2. Simulated Sites Water Supply Deliveries

| **Deliveries (TAF/year) (change from No Project Alternative conditions)** | **Alternative 3: 1.5 MAF Reservoir Dunnigan Pipeline (outlet to CBD)** | |
|---|---|---|
| | **All** | **Mean of Dry and Critically Dry Water Years** |
| Total Sites Deliveries to Storage Partners | 90 | 205 |
| North of Delta | 21 | 37 |
| South of Delta | 70 | 168 |
| CVP Operational Flexibility | 22 | 60 |
| Sub-Total Supplemental Deliveries for Water Supply | 112 | 266 |
| Refuge Water Supply | 16 | 28 |
| North of Delta | 4 | 5 |
| South of Delta | 12 | 23 |
| Yolo Bypass Habitat Water Supply | 32 | 10 |
| Total Sites Deliveries | 161 | 303 |
| Deliveries to Storage Partners - North of Delta | 13% | 12% |
| Deliveries to Storage Partners - South of Delta | 43% | 55% |
| CVP Deliveries - Operational Flexibility (Op Flex) | 14% | 20% |
| Refuge Water Supply | 10% | 9% |
| Yolo Bypass Habitat Water Supply | 20% | 3% |
| Incidental Change to SWP Deliveries | -4 | 12 |

| Deliveries (TAF/year) (change from No Project Alternative conditions) | Alternative 3: 1.5 MAF Reservoir Dunnigan Pipeline (outlet to CBD) | |
|---|---|---|
| | All | Mean of Dry and Critically Dry Water Years |
| Total Authority, CVP Op Flex, and Incidental Changes in SWP Deliveries | 157 | 315 |

Source: Authority and Reclamation 2023; Notes: CBD = Colusa Basin Drain, CVP = Central Valley Project, MAF = million acre-feet, SWP = State Water Project, TAF = thousand acre-feet

All decreases in water supply would be negligible relative to total deliveries and in consideration of model limitations. On average, CVP and SWP deliveries are expected to increase with the Sites Project, particularly in association with CVP participation (see Table AA-3).

Table AA-3. Simulated CVP and SWP Water Supply Deliveries: No Project Alternative (TAF) and Alternative 3 Minus No Project (TAF)

| Alternative | North of Delta Total SWP | North of Delta Total CVP | South of Delta Total SWP | South of Delta Total CVP |
|---|---|---|---|---|
| **AVERAGE OF DRY AND CRITICALLY DRY WATER YEARS** | | | | |
| NPA | 82 | 515 | 1,405 | 708 |
| Alternative 3 | 0 | 10 | 12 | 52 |
| **AVERAGE OF ALL WATER YEAR TYPES** | | | | |
| NPA | 100 | 626 | 2,431 | 1304 |
| Alternative 3 | 0 | 3 | -4 | 21 |

Source: Authority and Reclamation 2023; CVP = Central Valley Project; NPA = No Project Alternative; SWP = State Water Project; TAF = thousand acre-feet

Operation of the Sites Project would not substantially reduce water supply to other water users as compared to the No Project Alternative.

**Summary**

The Alternative 2 would result in changes to deliveries north of the Delta that range from no measurable change for CVP M&I and SWP M&I water users, to less than 5% reductions to CVP Refuge Level 2 and CVP agricultural water users and a maximum reduction of approximately 6% for CVP Settlement Contractor water users. Similarly, in the Bay-Delta, maximum reductions in average deliveries would be less than 5% for CVP M&I and agricultural water users, with slight improvements for SWP M&I water users. With the exception of the Tulare Lake CVP water users, where there would be a maximum reduction of 11%, water users south of the Delta would have no measurable change or slightly improved deliveries.

Operation of Sites Reservoir would be integrated with existing CVP water operations and regulations. The Sites Reservoir Project is expected to result in increased CVP and SWP deliveries. CVP and SWP water service contractors who are not settlement, exchange, or FRSA contractors are the most likely water users to be affected by changes in operations and changes in the movement of Sites Project water through the Delta. However, the purpose of Sites Reservoir would be to increase water supply and the movement of water from Sites Reservoir through the Delta would only be allowed if regulatory conditions permitted and other conditions (e.g., pumping and storage capacity) allowed increased exports. Sites exports would be junior to exports for CVP and SWP contract purposes. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not change or further reduce the CVP or SWP water deliveries identified in the LTO EIS.

## AA.4.3 Groundwater

### *AA.4.3.1 Potential Changes in Groundwater Pumping*

**Alternative 2**

In the Central Valley groundwater basin under Alternative 2 there could be an average annual increase in groundwater pumping ranging from 24 TAF to 67 TAF, with a maximum single year increase in groundwater pumping ranging from 209 TAF to 253 TAF and a maximum single year decrease in groundwater pumping ranging from 131 TAF to 146 TAF. Overall, the predicted change in groundwater table elevation ranges from a decrease of 30.6 feet to an increase of 3.5 feet.

In the Southern California groundwater basin under Alternative 2 changes in surface water supply delivered could result in changes in the amount of groundwater pumped. A conservative estimate would be that any decrease in surface water supply delivered to the Southern California Region would result in an equal increase in groundwater pumping. Increases in groundwater pumping have the potential to reduce groundwater table elevations. The decreases in surface water supply delivered are not expected to result in large increases in groundwater pumping, therefore, large decreases in groundwater table elevation are not expected.

**Sites Reservoir Project**

A detailed description of the existing conditions for groundwater in the Sites Reservoir Project area is provided in Appendix 8A, *Groundwater Resources Basin Setting*. In addition, Appendix 8B, *Groundwater Modeling*, was originally produced in the Sites Reservoir 2017 Public Draft EIR/EIS and presents the modeling that was undertaken to determine the effects of the Sites Reservoir Project on groundwater resources. Chapter 8, *Groundwater Resources*, describes the environmental setting, methods of analysis, and impact analysis for groundwater resources (including groundwater quality) that would potentially be affected by the construction and operation of the project. In summary, model-simulated Sacramento River groundwater elevations were almost identical to average historic conditions or conditions under the No Project Alternative. In addition, diversions would occur during high-flow events when excess surface water is available and would have minimal interference with groundwater recharge.

The project will result in ongoing operational effects at newly created facilities, including the future administration and operations building, and the maintenance and storage building. Both

would use groundwater from new or established wells during operations. It is estimated the administration and operations building would require roughly 61,000 gallons of water per year while the maintenance and storage building would use approximately 25,000 gallons of water per year. Based on current groundwater storage, groundwater use in the Colusa Subbasin, and groundwater recharge, there is sufficient groundwater to support these water needs.

Finally, the availability of additional surface water supplies will reduce dependence on groundwater pumping for participating Storage Partners

**Summary**

Alternative 2 (all phases) would result in increases in groundwater pumping within the Central Valley. Operation of the Sites Reservoir Project would not result in groundwater pumping and an increase in south-of-Delta surface water deliveries would not adversely affect ground water supplies within the SWP service area such that a change (i.e., increase) in groundwater pumping would occur in that region. On average, CVP and SWP deliveries are expected to increase with the Sites Project and would likely help reduce reliance on groundwater.

#### *AA.4.3.2 Potential Changes in Groundwater-Surface Water Interaction*

**Alternative 2**

For the Central Valley, Alternative 2 would result in an estimated average annual change in flow from groundwater to surface water ranging from 1 TAF to 31 TAF. The maximum single year increase in flow from groundwater to surface would range from 233 TAF to 449 TAF and a maximum single year decrease in flow from surface water to groundwater would range from 331 TAF to 904 TAF.

In the Southern California region, changes in surface water supply delivered to this region could result in changes in the amount of groundwater pumped. All groundwater pumping would need to be conducted in accordance with any existing regulatory setting such as an adjudication or Groundwater Sustainability Plan.

**Sites Reservoir Project**

As described in the Sites Reservoir Project Final EIR/EIS, Chapter 8, *Groundwater Resources*, Section 8.4, *Impacts and Mitigation Measures* model-simulated groundwater/surface water interaction downstream of diversions indicated that the largest change in groundwater recharge was up to 3 cubic feet per second 10 miles downstream in the TC Canal from the RBPP 20 years after the start of operations. After this increase, groundwater recharge matched existing conditions along the 12 miles of the TC Canal over the life of the project (approximately 40 years). Groundwater recharge 7 miles downstream from the GCID Main Canal head gate remained largely the same as existing conditions over the 40 years simulated. Therefore, project-related diversions would not substantially interfere with groundwater recharge. Surface water from the operation of Sites Reservoir has the potential to improve nearby shallow groundwater aquifer levels as compared to the No Project Alternative.

**Summary**

Alternative 2 (all phases) would result, on average, in increases in flows from groundwater to surface water in the Central Valley. Sites project-related diversions would not substantially interfere with groundwater recharge. Surface water from the operation of Sites Reservoir has the potential to improve nearby shallow groundwater aquifer levels as compared to the No Project Alternative. In addition, the increase in surface water supplies would result in less dependance on pumping groundwater. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not worsen, and maybe improve the groundwater to surface water interactions, as identified in the LTO EIS.

### *AA.4.3.3 Potential Changes in Groundwater Elevation*

**Alternative 2**

The predicted change in groundwater table elevation for Alternative 2 (all phases) within the Central Valley spans a range from a decrease of 30.6 feet to an increase of 3.5 feet. The greatest decreases would occur in the western Sacramento Valley and southwestern San Joaquin Valley. These changes would occur as a result in reductions in surface water deliveries occurring under Alternative 2 and a corresponding increase in groundwater pumping.

Alternative 2 would result in no measurable change in minimum water deliveries for SWP agricultural water users, but possible improvements in average water deliveries for SWP M&I water users within Southern California. This improvement may result in reduced groundwater pumping and increased groundwater elevations.

**Sites Reservoir Project**

Pipeline operation could affect the surrounding groundwater levels due to pipeline seepage along the I/O tunnel, TRR East or TRR West pipelines, Funks pipelines, and Dunnigan Pipeline (see Sites Reservoir Project Final EIR/EIS, Chapter 8, *Groundwater Resources*, Section 8.4, *Impacts and Mitigation Measures*). A portion of the water retained in the Sites Reservoir under operating conditions would infiltrate into the subsurface materials, acting as a new source of recharge to the underlying groundwater system. In the nearby Colusa Subbasin, additional groundwater recharge would be beneficial during dry periods when groundwater levels are generally low but could adversely affect adjacent land uses in the study area that are susceptible to seepage in wetter years when groundwater levels are generally higher. In most years, the reservoir seepage inflow to groundwater would provide a benefit in terms of additional shallow groundwater. Although modeled groundwater levels were higher than existing conditions, simulated hydrographs indicated even during Wet Water Years, groundwater levels were forecasted to be approximately 10 feet below ground surface near Funks Creek with little chance of flooding orchard land.

Operation of Sites Reservoir would increase shallow groundwater levels abutting the inundation area, resulting in a slight increase in groundwater supplies and recharge when compared to existing conditions.

Operation of the Sites Reservoir Project would not cause a substantial decrease in groundwater supplies or substantial interference with groundwater recharge as compared to the No Project

Alternative. Operation would have little to no effects on existing groundwater recharge due to diversions as compared to the No Project Condition

**Summary**

Operation of the Alternative 2 (all phases) would result in potential decreases in groundwater elevations within the Central Valley with the greatest changes estimated to occur in the western Sacramento Valley and southwestern San Joaquin Valley. There would be no change in groundwater elevations within the Trinity River basin and a potential benefit to groundwater elevations in Southern California. Operation of the Sites Reservoir Project would not cause a substantial decrease in groundwater supplies or substantial interference with groundwater recharge as compared to the No Project Alternative. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not exacerbate effects to groundwater, as identified in the LTO EIS.

#### *AA.4.3.4 Potential Changes in Land Subsidence*

**Alternative 2**

Average groundwater levels are simulated to decrease up to approximately 12 feet for Alternative 2 With TUCP Without VA and Alternative 2 Without TUCP Without VA in some water year types compared to the No Action Alternative. Groundwater levels may decrease closer to 20 feet for Alternative 2 Without TUCP Delta VA and Alternative 2 Without TUCP Systemwide VA compared to the No Action Alternative. Phases with larger decreases in groundwater levels have higher likelihood of causing additional subsidence. The largest decreases in groundwater levels are simulated to occur along the western portion of the Central Valley in the Sacramento San Joaquin Valleys. Portions of these areas are known to have historic subsidence and further reductions in groundwater levels may cause additional subsidence. The location and amount of subsidence is highly dependent on the local soil conditions and historical low groundwater levels in the area. It is unlikely that there would be changes in land subsidence along the Trinity River or in the Southern California Region due to implementation of Alternative 2 (all phases) because these areas are not known to be susceptible to subsidence and no increases in groundwater pumping are expected in these areas.

**Sites Reservoir Project**

As discussed in Chapter 8, *Groundwater Resources*, the Sites Project would provide a more reliable surface water supply for agricultural use, lowering dependency on groundwater pumping for crop irrigation in the Sacramento Valley and the San Joaquin Valley for Storage Partners. Surface water use could increase deep percolation that would subsequently increase groundwater storage. This increase in groundwater storage could reduce land subsidence and disconnections from surface water.

**Summary**

The Alternative 2 (all phases) would result in decreases in groundwater levels in the Central Valley, which could result in increased land subsidence. The groundwater analysis presented in the Sites Reservoir Project Final EIR/EIS concluded that operations would not result in potential changes in land subsidence. As such, it is anticipated that operation of the Sites Reservoir Project

in combination with the operation of Alternative 2 would not substantially change land subsidence within the Central Valley, as identified in the LTO EIS.

## AA.4.4 Indian Trust Resources

### *AA.4.4.1 Potential Changes to Tribal Trust Resources a Result of Project-Related Activities*

**Alternative 2**

The LTO EIS, Chapter 7, *Indian Trust Assets*, Section 7.2.1, *Effects of the Alternatives*, provides a summary of the potential effects to ITAs resulting from the implementation of Alternative 2. Potential effects include potential changes in erosion or degradation of land or sites of religious or cultural importance to federally recognized Tribes, potential changes in quality of water used by a federally recognized Tribe, and potential changes to salmonid populations.

Under Alternative 2, while there could be negligible increased potential of erosion in some of the rivers, including the Trinity River which has ITAs, there would likely be negligible to no resulting change in degradation of land or sites of religious or cultural importance caused by changes in erosion. The water quality in the Trinity River would be similarly affected by changes in flow under Alternative 2 (see LTO EIS, Appendix G, *Water Quality Technical Appendix*).

The analysis of effects to salmonids is provided in Appendix O, *Aquatic Resources Technical Appendix*. Under Alternative 2, relative to the No Action Alternative, the seasonal operations would have similar effects to most species and life stages but would result in minor adverse effects to spawning and incubating Southern Oregon/Northern California Coast Coho salmon. Therefore, under Alternative 2 there would be similar to minor adverse effects to the federally recognized Tribes, relative to the No Action Alternative.

**Sites Reservoir Project**

As demonstrated in the Sites Reservoir Project Final EIR/EIS, Chapter 29, *Indian Trust Resources*, Section 29.4, *Impact Analysis and Mitigation Measures*, project operations will not affect ITAs. The Sites Reservoir Project would not affect any operations of the Trinity River Division or the Lower Klamath River that serve ITAs. As described in Chapter 2, *Project Description and Alternatives*, the Sites Project would not affect or result in changes in the operation of the Trinity River Division facilities (including Clear Creek). Trinity River Division operations would not be affected by the Sites Project (Sites Reservoir Project Final EIR/EIS, Appendix 5B2, Tables 5B2-1-1a to 5B2-4-4c, Figure 5B2-1-1 to Figure 5B2-1-12, Tables 5B2-5-1a to 5B2-6-4c) as compared to the No Project Alternative.

Flows in several rivers (e.g., Sacramento, Feather, and American Rivers) would experience changes as a result of the Sites Project. Analysis in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, shows that the majority of these flows would be within the historical range experienced by the rivers and similar to the No Project Alternative and thus would not have substantial adverse effects on fish. The Sites Project includes pulse flow protection measures applied to precipitation-generated pulse flow events from October through May and a fish monitoring program to inform real-time operational adjustments to limit the potential for negative effects on juvenile salmonids (Sites Reservoir Project Final EIR/EIS,

Chapter 11, *Aquatic Biological Resources*) as compared to the No Project Alternative. The Wilkins Slough flow criterion, described in the Sites Reservoir Project Final EIR/EIS Chapter 11, will limit the potential for negative flow survival effects on winter-run Chinook salmon, spring-run Chinook salmon, fall-/late fall–run Chinook salmon, and Central Valley steelhead during dispersal to rearing habitat and/or migration downstream toward the Delta (Sites Reservoir Project Final EIR/EIS Section 11P.2 of Appendix 11P, *Riverine Flow-Survival*) compared to the No Project Alternative.

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 result in flooding or alter natural river geomorphic processes or existing geomorphic characteristics as compared to the No Project Alternative. Accordingly, potential adverse changes in erosion or quality of land or sites of religious or cultural importance to a federally recognized Indian tribe are not expected under the Sites Reservoir Project. Maintenance activities during operations have the potential to release sediments and other contaminants into water courses that could harm fish. Required permits from the Central Valley Regional Water Quality Control Board and implementation of BMPs for water quality and aquatic resources, such as avoiding or minimizing sediment and contaminant releases, ensuring activities occur away from receiving waters, and containing sediment or otherwise reducing soil disturbance, as described in the Sites Reservoir Project Final EIR/EIS Chapter 6, *Surface Water Quality*, and the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, would also serve to protect resources that could occur in ITAs.

During operation and maintenance activities for the Sites Project, the Wilkins Slough flow criterion, pulse flow protection measures, a fish monitoring program, and BMPs would minimize effects on aquatic species (e.g., Chinook salmon and Central Valley steelhead) important to federally recognized Indian tribes and could beneficially affect ITAs that receive CVP and SWP deliveries. The Sites Reservoir Project would not result in adverse effects from operations and maintenance activities on fish and aquatic species important to a federally recognized Indian tribe.

**Summary**

There are limited ITAs that could be affected by either project. The LTO EIS identifies ITAs associated with the Trinity River and concludes that there would be negligible to no effects to associated with the degradation of land or sites of religious or cultural importance or water quality due to erosion and minor adverse effects to spawning and incubating Southern Oregon/Northern California Coast Coho salmon due to changes in flows.

The Sites Reservoir Project does not affect the Trinity River, which is upstream from Sites Reservoir Project operations. Downstream flows would be affected but would be within the historical range experienced by the rivers and similar to the No Project Alternative. BMPs and mitigation measures adopted for the Sites Project would serve to protect fish and other resources that could occur in any downstream ITAs or are important to a federally recognized Indian tribe. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not change ITA effects, as identified in the LTO EIS.

## AA.4.5 Cultural Resources

### *AA.4.5.1 Potential Changes to Historic Properties and/or Human Remains as a Result of Project-Related Activities*

**Alternative 2**

As discussed in Appendix K, *Cultural Resources Technical Appendix*, Section K.3.4, Alternative 2, because there is no ground disturbance involved in implementation of Alternative 2, the key mechanism for impacts on cultural resources is the potential for inundation and/or exposure of buried archaeological historic properties in a way that can cause damage or destruction to those properties. Surface water elevation changes would occur under Alternative 2 at Shasta Dam releases and storage (Sacramento River/Shasta Reservoir), Whiskeytown Dam releases (Clear Creek/Whiskeytown Reservoir), and New Melones Reservoir releases (Stanislaus River minimum instream, winter instability, and fall pulse flows). Under Alternative 2, storage changes would be relatively small during each year type and follow existing patterns in reservoir storage. Therefore, Alternative 2 would not disturb or destroy archaeological historic properties and/ or human remains because no actions would result in alteration, damage, or demolition of historic properties.

**Sites Reservoir Project**

Operation of the Sites Reservoir Project would not change the qualities that convey the historical significance of the GCID Historic District or the CVP Historic District because these facilities would continue to convey water as they do under existing conditions and protect lands from flooding. Further, operations under the Sites Reservoir Project would not physically change the potentially significant built resources in the study area. There would be no operation effects on significant historic built resources.

Operations-related activities that could affect archaeological sites and human remains for the Sites Reservoir Project consist of fluctuating water surface elevations within the Sites Reservoir. Fluctuating water levels can cause erosion, which would affect unknown buried human remains that occur within the inundation area. Because cemeteries would be removed from the study area, operation of the Sites Reservoir Project would have a less-than-significant impact on the two existing known cemeteries. However, because currently unknown buried human remains may be present in the Sites Reservoir drawdown and fluctuation area, and drawdown and fluctuation cause erosion, the Sites Reservoir Project have the potential to disturb human remains in the study area during operations.

Operations of the Sites Reservoir Project could disturb unknown human remains within the Sites Reservoir inundation area and the water surface elevation fluctuation zone as compared to the No Project Alternative. Implementation of Mitigation Measures CUL-3.1 (Cemetery Relocation Plan) and CUL-3.2 (Avoid, Protect, and Treat Human Burials) would reduce effects; however, operations would result in a substantial adverse effect on human remains.

**Summary**

Alternative 2 may increase reservoir storage and release to natural waterways, which in turn, could result in erosion, however there is no potential for disturbing cultural resources. The Sites

Reservoir Project would create new storage in the Sites Reservoir with water levels fluctuating depending on releases to the Sacramento River via the CBD, resulting in potential erosion impacts to buried cultural resources in the reservoir footprint. However, this effect is unique to the Sites Reservoir Project and in combination with the operation of Alternative 2 would not result in changes to historic properties and/or human remains, as identified in the LTO EIS.

## AA.4.6 Air Quality

### *AA.4.6.1 Potential Air Quality Effects from Changes in Emissions from Fossil-Fueled Powerplants (Hydropower Generation)*

**Alternative 2**

As discussed in Appendix L, Section L.2.4, Alternative 2, air quality effects from changes in emissions from fossil-fueled powerplants from hydropower generation would be adverse under Alternative 2 (all phases). Alternative 2 (all phases) would result in a net decrease in energy generation for the CVP and SWP. As a result, emissions from fossil-fueled powerplants on the grid would increase. While criteria pollutant emissions would increase with operation of Alternative 2, the relatively low magnitudes of the emissions increase suggests that potential air quality impacts compared to the No Action Alternative would be small.

**Sites Reservoir Project**

According to Chapter 20, *Air Quality*, Section 20.3.2., *Operation*, air quality effects of Sites Reservoir operations would result in the generation of air pollutant emissions associated primarily with maintenance of facilities and use of recreation areas. Emissions would originate from the exhaust of on-road vehicles, off-road equipment, and helicopters. Emissions were quantified using project-specific activity data for maintenance activities, emission factors and methodologies from the CalEEMod and EMFAC models, the USEPA's AP-42, and other relevant agency guidance and published literature. Appendix 20A, *Methodology for Air Quality and GHG Emission Calculations*, contains a detailed description of the analysis method.

On-site hydropower generation would be an incidental benefit of conveying water through specific Sites project facilities and would be influenced by the timing of releases, movement of water, and seasonal operational decisions. However, the project would ultimately be a net user of electricity rather than a net generator of electricity and would reduce the hydroelectric power generated elsewhere in the existing system, as described in the Sites Reservoir Project Final EIR/EIS, Chapter 17, *Energy*.

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 20, *Air Quality*, Section 20.4, *Impact Analysis and Mitigation Measures*, operation of the project would require the use of electricity for conveying water into Sites Reservoir. While fossil fuel-powered electrical-generating facilities emit criteria pollutants, these facilities are regulated and permitted at a maximum emissions level. Therefore, operational emissions associated with electricity consumption are not included in the analysis as these emissions have already been evaluated and accounted for in existing permit and environmental documents.

**Summary**

The LTO EIS identified that operation of Alternative 2 (all phases) could reduce hydropower generation leading to increases in grid power generation and emissions resulting in decreased air quality. However, the magnitude of decreases is expected to be small. The Sites Reservoir Project would generate incidental hydropower but would also rely on hydroelectric power generated elsewhere in the existing system from permitted facilities.

### *AA.4.6.2 Potential Air Quality Effects from Changes in Emissions from Fossil-Fueled Powerplants and Pump Engines (Groundwater Pumping)*

**Alternative 2**

As discussed in Appendix L, Section L.2.4, Alternative 2, air quality effects from changes in emissions from fossil-fueled powerplants and pump engines from groundwater pumping would be adverse under Alternative 2 (all phases). Alternative 2 (all phases) would change operation of the CVP and SWP, which could change river flows and reservoir levels. These changes could affect the amount of water available for agricultural irrigation. If surface water availability decreases, farmers could make up the difference in water supply by increasing groundwater pumping. Approximately 90% of groundwater pumps are powered by grid, so increased pumping would increase the demand for grid power. Alternative 2 (all phases) in an average year would increase groundwater pumping. As a result, emissions from fossil-fueled powerplants on the grid and pump engines would increase. While criteria pollutant emissions would increase with operation of Alternative 2, the relatively low magnitudes of the emissions increase suggests that potential air quality impacts would be small.

**Sites Reservoir Project**

The Sites Reservoir Project Final EIR/EIS concludes that operation would improve surface water reliability and increase its use as compared to the No Action Project Alternative, which would reduce groundwater pumping in the Sacramento Valley Groundwater Basin and San Joaquin Valley (see Chapter 8, *Groundwater Resources*, Section 8.4, *Impact Analysis and Mitigation Measures*). Therefore, operations would not generate substantial air pollutant emissions due to groundwater pumping, would not constitute a net increase in emissions, and would not conflict with state plans adopted to reduce air quality emissions as compared to the No Project Alternative.

**Summary**

Operation of criteria pollutant emissions would increase with operation of Alternative 2, the relatively low magnitudes of the emissions increase suggests that potential air quality impacts would be small. Operation of the Sites Reservoir Project would improve surface water reliability and increase its use, which would reduce groundwater pumping in the Sacramento Valley Groundwater Basin and San Joaquin Valley. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 has the potential to improve air quality effects due to changes in emissions from fossil-fueled powerplants and pump engines related to groundwater pumping, as identified in the LTO EIS. The extent of the improvements is uncertain at this time.

## AA.4.7 Greenhouse Gas Emissions

### *AA.4.7.1 Potential GHG Effects from Changes in Emissions from Fossil-Fueled Powerplants (Hydropower Generation)*

**Alternative 2**

As discussed in LTO EIS Appendix M, Section M.2.4, Alternative 2, GHG effects from changes in emissions from fossil-fueled powerplants from hydropower generation would be adverse under Alternative 2 (all phases). This is because operation of Alternative 2 (all phases) would result in a net decrease in energy generation for the CVP and SWP. As a result, emissions from fossil-fueled powerplants on the grid would increase. While GHG emissions would increase with operation of Alternative 2, the relatively low magnitudes of the emissions increase suggests that potential adverse GHG impacts would be small.

**Sites Reservoir Project**

Operations and maintenance of the Project would generate emissions of GHGs ($CO_2$, $CH_4$, $N_2O$, and $SF_6$) that could result in long-term and recurring GHG impacts. However, the Authority will develop and implement a GHG Reduction Plan that would reduce the project's GHG emissions to net zero. Hydropower generation would be an incidental benefit of conveying water through specific Sites project facilities and would be influenced by the timing of releases, movement of water, and seasonal operational decisions. The project would ultimately be a net user of electricity rather than a net generator of electricity and would reduce the hydroelectric power generated elsewhere in the existing system, as described in the Sites Reservoir Project Final EIR/EIS, Chapter 17. Because the specific sources of electricity (e.g., natural gas, solar, wind) are unknown, indirect GHG emissions from water conveyance electricity were quantified using statewide grid average emission factors from the USEPA for the "CAMx" region.

As noted in Section 21.4, *Impact Analysis and Mitigation Measures*, operation of the project, specifically associated maintenance activities, recreational vehicle trips, recreational boating, and public services and utilities, would result in relatively minor contributions to GHG emissions. Maintenance activities would consist of inspections and other required activities to maintain the facilities. The number of activities would be variable by year and would gradually decrease, though certain future years would require more activity. Emissions from public services and utilities are those that are generated from the use of water, such as in restrooms, and the generation of wastewater and waste at recreational areas and at the administration and maintenance building. Emissions from recreational boats would be also generated at Sites Reservoir.

Operations would generate substantial emissions of GHGs due to hydropower generation that constitute a net increase in emissions and could conflict with state plans adopted to reduce GHG emissions as compared to the No Project Alternative. However, with implementation of the Authority's GHG Reduction Plan (Mitigation Measure GHG-1.1), operation of the project would be consistent with a net-zero threshold.

**Summary**

While GHG emissions would increase with operation of Alternative 2, the relatively low magnitudes of the emissions increase suggests that potential adverse GHG impacts would be small. The Sites Reservoir Project in combination with the operation of Alternative 2 would not increase the severity of this effect because operations emissions from the Sites Reservoir Project would be reduced to net zero.

#### *AA.4.7.2 Potential GHG Effects from Changes in Emissions from Fossil-Fueled Powerplants and Pump Engines (Groundwater Pumping)*

**Alternative 2**

As discussed in LTO EIS Appendix M, Section M.2.4, Alternative 2, GHG effects from changes in emissions from fossil-fueled powerplants and pump engines from groundwater pumping would be adverse under Alternative 2 (all phases). Operation of Alternative 2 (all phases) in an average year would increase groundwater pumping. As a result, emissions from fossil-fueled powerplants on the grid and pump engines would increase. While GHG emissions would increase with operation of Alternative 2, the relatively low magnitudes of the emissions increase suggests that potential adverse GHG impacts would be small.

**Sites Reservoir Project**

The Sites Reservoir Project Final EIR/EIS concludes that operation would improve surface water reliability and increase its use as compared to the No Action Project Alternative, which would reduce groundwater pumping in the Sacramento Valley Groundwater Basin and San Joaquin Valley (see Chapter 8, Section 8.4, *Impact Analysis and Mitigation Measures*). Therefore, operations would not generate substantial emissions of GHGs due to groundwater pumping, would not constitute a net increase in emissions, and would not conflict with state plans adopted to reduce GHG emissions as compared to the No Project Alternative.

**Summary**

Operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not increase the severity of GHGs increase in emissions because of groundwater pumping because the Sites Reservoir Project would reduce groundwater pumping.

## AA.4.8 Visual Resources

#### *AA.4.8.1 Potential Changes in Visual Resources at Reservoirs that Store CVP Water and Tributaries that Flow to and from Reservoirs that Store CVP Water*

**Alternative 2**

As discussed in Appendix N, *Visual Resources Technical Appendix*, Section N.2.4.1, Potential changes in visual resources at reservoirs that store CVP water and tributaries that flow to and from reservoirs that store CVP water, Alternative 2 would make changes to Shasta Dam releases and storage (Sacramento River/Shasta Reservoir), Whiskeytown Dam releases (Clear Creek/Whiskeytown Reservoir), and New Melones Reservoir releases (Stanislaus River minimum instream, winter instability, and fall pulse flows). These changes in reservoir storage and releases would result in minor changes in the highest and lowest average storage volumes

but following the same pattern of storage variation over time. As a result, the vertical height of visible "bathtub rings" (e.g., bare mineral bathtub rings between the open water and upslope vegetation) in Shasta and New Melones reservoirs would increase at lower storage volumes. Within tributaries, a similar effect could occur if low water levels expose scoured banks or result in the drainage of inundated areas, which could leave exposed and muddy areas visible, or high-water levels result in the inundation of previously non-inundated areas. Given the minor changes in the modeling results these changes are not considered to adversely affect visual resources (Section N.2.8, *Summary of Impacts*).

**Sites Reservoir Project**

Operations have the potential to influence reservoir elevations and river levels. However, as indicated in CalSim hydrologic modeling results in the Sites Reservoir Project Final EIR/EIS, Chapter 5, *Water Resources*, fluctuations in elevation for Shasta, Folsom and San Luis reservoirs as well as changes in river flows are relatively small and would not be perceptible by recreationists and other viewers. As described in the Sites Reservoir Project Final EIR/EIS Chapter 2, *Project Description and Alternatives*, the project would not affect or result in changes in the operation of the Central Valley Project, Trinity River Division facilities (including Clear Creek). As discussed in Chapter 16, *Recreation*, the regulating reservoirs located below the major CVP reservoirs (Keswick Reservoir, and Lake Natoma) receive highly variable flows that result substantial fluctuations in surface water elevations on a daily and hourly basis. Changes in the operation of upstream reservoirs with implementation of the project would not affect the monthly mean elevations of these regulating reservoirs.

The operations and maintenance activities associated with the Sacramento River diversions at the Hamilton City Pump Station would not differ greatly from existing conditions at these locations. Therefore, to affected viewers, there would be no perceptible change in operations and maintenance at these facilities. Operational changes associated with the TC Canal and GCID Main Canal would result in an increase in water seen in the canals upstream or downstream of the Sites Reservoir depending on the water year type. These increased flows would improve the aesthetics due to the presence of water in the canals. Maintenance activities would not differ greatly from existing conditions and to affected viewers there would be no perceptible change in the maintenance of the canals. Operations and remotely operated vehicle maintenance inspections associated with the pipelines and tunnels would not be visible because the pipes would be underground. Operation and maintenance at Funks Reservoir and at TRR East would not be visible because public access to the reservoir is restricted. Overall, the associated operations and maintenance at Funks Reservoir and at TRR East would not alter the existing visual character and quality of view seen by the public.

Operation and maintenance of the Sites Reservoir would be visible to recreationists using the recreation areas and to motorists using the bridge and relocated road system. The recreational areas would offer new recreation opportunities in scenic lakeside and island settings, consistent with the Colusa County 2030 General Plan, and create new viewing opportunities. Similarly, the bridge would also increase visual access to the lake-like reservoir and would provide for high quality views toward the surrounding landscape. During Dry to Critically Dry Water Years and in some summer months, due to drawdown of the reservoir, its shores would become exposed to reveal unvegetated areas and create drawdown striations (i.e., "bathtub ring" effect). However, despite the potential for the "bathtub ring" effect to occur during Dry to Critically Dry Water

Years, such a visual effect is typical of many large-scale reservoirs that viewers are familiar with in northern California. Operation and maintenance activities at aboveground facilities would include inspections and repairs that would occur periodically throughout the operating period for Sites Reservoir. Operations and maintenance of new public access roads, the bridge, and maintenance access roads would appear similar to operations and maintenance activities occurring on other county roads in the region.

Operations activities would not be visible, would blend with activities already occurring at or near the Sites Project facilities, would be within historical operational ranges for water levels at existing facilities, and would not affect sensitive viewers as compared to the No Project Alternative. Operation of the Sites Project would have no adverse effect on the existing visual character and quality of the study area.

**Summary**

Operation of Alternative 2 potential minor, changes to water elevation at Shasta and New Melones reservoirs that would result in minor changes to visual resources at the reservoirs. Sites Reservoir Project operations have the potential to influence reservoir elevations and river levels. However, fluctuations in elevation for Shasta, Folsom, and San Luis reservoirs, as well as changes in river flows are relatively small and would not be perceptible by recreationists and other viewers. As such, it is anticipated that operation of the Sites Reservoir Project in combination with Alternative 2 would not result in meaningful changes to visual resources at reservoirs that store CVP water and tributaries that flow to and from reservoirs that store CVP water.

### *AA.4.8.2 Potential Changes in Vistas at Irrigated Agricultural Lands*

**Alternative 2**

As discussed in Appendix N, *Visual Resources Technical Appendix*, Section N.2.4,2 Potential changes in vistas at irrigated agricultural lands, the Alternative 2 would result in a reduction of crop acreage due to the conversion of agricultural land into non-agricultural land in the long-term average and dry and critical year conditions in the San Joaquin River and Sacramento River regions.. The agricultural deliveries for the Southern California region would be considered similar to the No Action Alternative. There would be decreases in irrigated acreage, with reductions of 5,076 acres and 7,038 acres in the Sacramento River region and 47,732 acres and 47,769 acres in the San Joaquin River region for the phases of the Alternative 2 with VAs. With Alternative 2 TUCP Without VA, there would be a very slight decrease in irrigated acreage of 650 acres in the Sacramento River region and an increase in irrigated acreage of 4,701 acres in the San Joaquin River region when compared with the No Action Alternative under the long-term average year condition. Under dry and critical conditions, across all phases of Alternative 2, there would be decreases in irrigated acreage compared with the No Action Alternative, with decreases from 4,320 acres to 5,589 acres for the Sacramento River region and 22,585 acres to 26,171 acres for phases without VAs and 41,527 acres to 47,500 acres for phases with VAs. In both the long-term average and dry and critical year conditions, overall crop acreage would primarily decrease in the San Joaquin River and Sacramento River regions under Alternative 2. Some conversion of agricultural land to nonagricultural is expected to occur in the San Joaquin

River and Sacramento River regions under Alternative 2. Alternative 2 would result in a reduction in active agriculture and an increase in fallowed land.

**Sites Reservoir Project**

The regional landscape for the Sites Reservoir Project is varied but contains agricultural lands of both crops and orchards. There are no officially designated scenic vista points in Glenn, Colusa, and Yolo Counties, but the analysis in the Sites Reservoir Project Final EIR/EIS Chapter 24, *Visual Resources*, considers agricultural landscapes on the valley floor to be viewsheds with scenic values.

On average, CVP and SWP water deliveries are expected to increase with the Sites Project, particularly in association with CVP participation. This would support irrigated crop land and associated vistas in CVP and SWP delivery areas.

**Summary**

Alternative 2 may lead to a reduction in active agriculture, leading to fallowed lands, and an overall reduction in agricultural lands, and a change in vistas at irrigated agricultural lands. The Sites Reservoir Project would not change vistas in irrigated agricultural areas under operating conditions because it would not decrease water supply to the Central Valley. Operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not increase the severity of this effect because the Sites Reservoir Project would not change vistas in irrigated agricultural areas.

## AA.4.9 Fish and Aquatic Resources

### *AA.4.9.1 Potential Upstream Effects on Winter-Run Chinook Salmon (Upper Sacramento River, and Lower American River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Sacramento River Winter-Run Chinook Salmon ESU*, and Chapter 12, *Fish and Aquatic Resources*, Section 12.2.2 *Sacramento River*, for winter-run Chinook salmon in the Upper Sacramento River, the four phases of Alternative 2 are expected have minimal to beneficial effects resulting from no effect on egg survival except an increase in critical water year type under Alternative 2 with TUCP without VA (based on IOS), increased egg to fry survival (based on OBAN), and decreased temperature dependent mortality (TDM; based on Anderson and Martin models; Figure TDM_WR). Additionally, the four phases are expected to have beneficial effects resulting from less fry stranding and lower redd dewatering potential, little to no effect on fry and juvenile rearing (based on WUA and SIT LCM habitat analysis), and no difference in fry survival except increase survival under Alternative 2 with TUCP without VA (based on IOS).

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-2, operation of Sites Reservoir Project, potential exposure of winter-run Chinook salmon to the effects of depends on the species' spatiotemporal distribution and water year type. Upstream operational impacts of Alternatives 3 on winter-run Chinook salmon

generally would be limited. Mean monthly water temperatures by water year type would remain predominantly similar during the period of presence of each life stage of winter-run Chinook salmon and the analysis of exceedance above water temperature index values and Martin and Anderson models found minimal water temperature-related effects. In addition, SALMOD predicts a slight reduction in mortality and increase in annual production under the Sites Reservoir Project relative to the NAA in the Upper Sacramento River.

Juvenile winter-run Chinook salmon that are small enough to potentially be entrained by the Red Bluff intakes would occur in July/August, a period during which diversions generally would be similar or occasionally lower than those under the NAA. Overall, juvenile entrainment risk is expected to be similar between the NAA and the Sites Reservoir Project. Impingement and screen passage/contact-related negative effects of the operation of the intakes would be limited given that these effects would only apply to the subset of juvenile winter-run Chinook salmon encountering the intakes and the intake fish screens are designed to comply with protective standards for Chinook salmon fry; near-field effects would be expected to be limited. Predation effects in the vicinity of the intakes would be limited because the extent of in-water structure at the intakes would not be changed by the Sites Reservoir Project. Overtopping can occur at the intakes, leading to potential stranding of juveniles but these would be infrequent events (e.g., approximately once per 100 years) and would occur under both the NAA and the project.

Redd scour and entombment for winter-run Chinook salmon in the Upper Sacramento River would not be changed by the Sites Reservoir Project. The results for winter-run Chinook salmon show few large differences in redd dewatering between the NAA and Alternatives 3 and differences are less than 2% for most months and water year types Overall, the effects of the Sites Reservoir Project on winter-run Chinook salmon redd dewatering are minor compared to the NAA.

Most differences in winter-run Chinook salmon spawning habitat WUA between the Sites Reservoir Project and the NAA in the Upper Sacramento River are less than 3% and are not expected to have substantial effects. Under the Sites Reservoir Project, however, there are a number of larger differences and all but one of these (September of Below Normal Water Years in Segment 6) constitutes a reduction in rearing WUA. The largest of the reductions under the Sites Reservoir Project range up to 6% for July and August of Above Normal Water Years in Segment 5. These results indicate that the Sites Reservoir Project would have a negative effect on rearing habitat WUA for winter-run Chinook salmon fry in the upper Sacramento River compared to the NAA. All the means for juvenile rearing WUA differ by <3% under the project and the NAA, except for a 4% increase in Segment 6 for November of Critically Dry Water Years under the project and a 3% reduction in Segment 4 for October of Wet Water Years under the project. These results indicate that the Sites Reservoir Project would have little effect on rearing habitat WUA for winter-run Chinook salmon juveniles in the Sacramento River compared to the NAA.

**Summary**

Under operation of the Sites Reservoir Project, upstream effects would generally be limited, ranging from minor beneficial effects on egg survival and production, no substantial change in entrainment, impingement, redd scour, entombment and dewatering and possible minor adverse effects on fry rearing habitat. Operation of Alternative 2 would mostly result in no effect to

slightly beneficial effects on winter-run Chinook salmon. As such, it is not anticipated that the combined operations of Sites Reservoir Project and Alternative 2 would result in substantial adverse effects to winter-run Chinook salmon.

#### *AA.4.9.2 Potential Effects on Winter-Run Chinook Salmon (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

The four phases of Alternative 2 are expected to have adverse and beneficial effects and are best described by grouping the four phases into "with VA" (Alternative 2 without TUCP Delta VA and without TUCP Systemwide VA) and "without VA" (Alternative 2 with TUCP without VA and without TUCP without VA). The two phases of Alternative 2 with VA are expected to decrease entrainment of genetic and length-at-date (LAD) winter-run Chinook salmon except during a wet water year type while the two phases of Alternative 2 without VA are expected to increase or decrease entrainment (Salvage Density, Negative Binomial) and have little to no effect on proportion of juveniles salvaged (coded wire tag [CWT]). The four phases of Alternative 2 are expected to have minor adverse or beneficial effects on outmigrating juveniles resulting from either increased or decreased survival based on secondary biological model, OMR grouping, and Inflow grouping. The DPM and IOS models usually found minor adverse effects to no effect of Alternative 2 on through-Delta survival, while STARS, ECO PTM and OBAN found minor adverse to minor beneficial effects.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-2, operation of Sites Reservoir Project, including releases, would have negligible toxicological effects from contaminants on winter-run Chinook salmon and no to minor beneficial effects (Fall of critically dry years) on water temperature in the lower Sacramento River and Delta. Potential near-field effects of the Sites Reservoir Project, including entrainment and impingement at intakes and predation in the vicinity of the Red Bluff and Hamilton City intakes and Dunnigan Pipeline discharge to the Sacramento River would be similar to the No Action Alternative or minimal. the Sites Reservoir Project is not expected to result in substantial negative effects on Yolo Bypass floodplain inundation and access for winter-run Chinook salmon because of the diversion criteria including pulse flow protection at Bend Bridge and minimum flow requirements at Wilkins slough, effectively limiting changes to Yolo Bypass spill frequency and duration. In addition, the Project would operate to avoid effects on the Big Notch Project's ability to achieve the same level of performance for salmonids in the Sacramento River as it would under the No Action Alternative. Both adult and juvenile Chinook salmon passage at Fremont weir are expected to remain similar to the No Project Alternative. Similarly, no adverse effect is expected for Sutter Bypass suitable habitat and juvenile and adult passage at the three Sutter Bypass weirs. the Sites Reservoir Project operations would not result in adverse flow-survival effects or substantial changes in juvenile rearing habitat availability in the north Delta and would not change entrainment risk at south Delta export facilities. While the IOS and OBAN life cycle models suggested potential negative effects of the Sites Reservoir Project relative to the NAA due to decreased flow because of the Red Bluff and Hamilton City diversions, the Project includes pulse flow protection measures to be applied to precipitation-generated pulse flow events and a 10,700-cfs Wilkins Slough bypass flow threshold from

October 1 through June 14. In addition, biological monitoring will be conducted to ensure there are no adverse effects, and, if necessary, adaptive management will be utilized to refine the diversion criteria based on monitoring results. Operation of the Sites Reservoir Project the Sites Reservoir Project is, thus, not anticipated to result in substantial adverse effects on winter-run Chinook salmon in the Bay-Delta and lower Sacramento River.

**Summary**

Under operation of the Sites Reservoir Project, no substantial adverse effect on winter-run Chinook salmon is expected in the lower Sacramento River and Bay-Delta. As such, it is not anticipated that operation of Sites Reservoir Project would worsen nor lessen the potential minor effects (beneficial and adverse) of Alternative 2 described above.

#### *AA.4.9.3 Potential Upstream Effects on Spring-Run Chinook Salmon (Upper Sacramento River, Lower American River, and Lower Feather River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2*, and Chapter 12, *Fish and Aquatic Resources*, for spring-run Chinook salmon in the Upper Sacramento River, the four phases of Alternative 2 are expected to have little effect from changes to flow on spawning, spawner abundance and egg/alevin incubation (mortality), possible minor adverse to minor beneficial effect of flow on redd dewatering habitat, and negligible effects or slight beneficial effect of water temperature on spawning and egg/alevin incubation with few negative effects at Keswick Reservoir. Additionally, the four phases of Alternative 2 are expected to have minor to no effect from changes to flow on rearing habitat, adverse effects on juvenile stranding in drier water year types, beneficial effect on mean annual survival and mean survival due to a decrease in travel time, and possible minor to negligible adverse effect or minor beneficial effect of water temperature on juvenile and yearling growth, smoltification, and predation vulnerability.

For spring-run Chinook salmon in Clear Creek, the four phases of Alternative 2 are expected to have adverse effects of flow on spawning habitat area, adverse effects of water temperature, minor beneficial effects of flow on fry rearing habitat and a minor adverse effect on juvenile (sub-yearling to yearling) rearing habitat, and minor adverse effects for juvenile and yearling criteria.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-3, exposure of spring-run Chinook salmon to the effects of the Sites Reservoir Project compared to the NAA is dependent on the species' spatiotemporal distribution. Upstream operational impacts of the Sites Reservoir Project on spring-run Chinook salmon generally would be limited compared to the NAA. Spring-run Chinook salmon would have the potential for similar types of near-field effects to those previously discussed for winter-run Chinook salmon (i.e., entrainment, impingement and screen contact, predation, and stranding behind screens). The potential for these effects would differ relative to winter-run Chinook salmon due to less than one quarter of spring-run Chinook salmon being expected to pass the

intakes. Few spring-run Chinook salmon juveniles would have the potential for entrainment given their size.

Predation effects in the vicinity of the Red Bluff intakes for the Sites Reservoir Project would be limited compared to the No Project Alternative because the extent of in-water structure at the intakes would be the same under the NAA and the project. Although overtopping during high flows can occur at the Red Bluff intakes, leading to potential stranding of juvenile spring-run Chinook salmon, these are relatively infrequent events (e.g., approximately once per 100 years at Red Bluff) that occur under the NAA and would not be changed by the Sites Reservoir Project.

Alternatives 3 would have no effect on redd scour and entombment for spring-run Chinook salmon in the Upper Sacramento River compared to the NAA. In general, the Sites Reservoir Project is not expected to substantially affect spring-run Chinook salmon redd dewatering. Feather River flows during the Wet and Above Normal Water Years, when scouring flows would be most likely to occur during the months of spring-run spawning and egg incubation (September through January), are generally similar between the NAA and the Sites Reservoir Project. Therefore, no substantial differences on the frequency of scouring flows in the Feather River are expected between the NAA and the Sites Reservoir Project.

Mean spawning habitat WUA for spring-run Chinook salmon under the Sites Reservoir Project differs from the NAA by more than 3% for only a few months and water year types. The largest difference is a 16% increase under the project in Segment 5 for August of Above Normal Water Years. The largest reduction is a 7% reduction under the project in Segment 4 for October of Wet Water Years. Other relatively large differences in spawning habitat WUA between the project and the NAA are 4% to 6% reductions occurring in Critically Dry Water Years during August in Segment 5 and during September in Segment 4. Although results indicate that the Sites Reservoir Project would lead to some reductions and increases, generally the project is not expected to substantially affect spring-run spawning habitat WUA compared to the NAA. Results for spring-run Chinook salmon juvenile rearing habitat WUA indicate that the Sites Reservoir Project would have relatively large effects (in Segment 4), including substantial increases during late spring and summer and smaller reductions during late summer and fall. Increases in WUA outnumber reductions in the results and more of them are especially large (>10%). Furthermore, the increases occur during spring and summer, when the juveniles are younger and perhaps more vulnerable to reductions in habitat availability. On balance, Alternatives 3 is expected to have little effect on spring-run Chinook salmon fry rearing habitat availability and to increase spring-run Chinook salmon juvenile rearing habitat WUA compared to the NAA.

Related to water temperature effects, observations of exceedance plots and differences in modeled mean monthly water temperatures by water year type indicate that the Sites Reservoir Project and the NAA would be predominantly similar among alternatives during the period of presence of each life stage of spring-run Chinook salmon. In addition, the analysis of exceedance above water temperature index values found limited potential water temperature-related effects that would not affect spring-run Chinook salmon at a population level.

**Summary**

While quantitative modeling suggest flow-survival effects of Sites Reservoir Project would be limited, there is some potential for Sites diversions to cause reductions in outmigration cues for

juveniles in the Sacramento River. However, effects would be minimized by diversion criteria (Bend Bridge Pulse Protection and Minimum Bypass Flows in the Sacramento River at Wilkins Slough). Overall, it is not anticipated that Sites Reservoir Project operations would appreciably worsen nor lessen the potential minor adverse to minor beneficial upstream effects of Alternative 2 operations described above.

#### *AA.4.9.4 Potential Effects on Central Valley Spring-Run Chinook Salmon (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

The four phases of Alternative 2 are expected to have beneficial and adverse effects resulting from a decrease in entrainment at the CVP facility and increase in entrainment at the SWP facility. Alternative 2 (all phases) is also expected to have adverse or beneficial effects of flow on survival depending on OMR grouping (ECO-PTM) and no effect on outmigrating juveniles (DPM).

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-3, the potential near-field effects of operation of Sites Reservoir Project on Central Valley spring-run Chinook salmon would generally be similar or lower than those previously discussed for winter-run Chinook salmon (negligeable to minor) due to less than a quarter of spring-run Chinook salmon being expected to pass the intakes. The Sites Reservoir Project is not expected to result in substantial negative effects on Yolo Bypass floodplain inundation and access for spring-run Chinook salmon because of the diversion criteria including pulse flow protection at Bend Bridge and minimum flow requirements at Wilkins slough, effectively limiting changes to Yolo Bypass spill frequency and duration. In addition, the Project would operate to avoid effects on the Big Notch Project's ability to achieve the same level of performance for salmonids in the Sacramento River as it would under the No Action Alternative. Both adult and juvenile Chinook salmon passage at Fremont weir are expected to remain similar to the No Project Alternative. Similarly, no adverse effect is expected for Sutter Bypass suitable habitat and juvenile and adult passage at the three Sutter Bypass weirs. Sites Reservoir Project operations would not result in adverse flow-survival effects or substantial changes in juvenile rearing habitat availability in the north Delta and would not change entrainment risk at south Delta export facilities. The Project includes pulse flow protection measures to be applied to precipitation-generated pulse flow events and a 10,700-cfs Wilkins Slough bypass flow threshold from October 1 through June 14. In addition, biological monitoring will be conducted to ensure there are no adverse effects, and, if necessary, adaptive management will be utilized to refine the diversion criteria based on monitoring results. Operation of the Sites Reservoir Project is thus not anticipated to result in substantial adverse effects on Central Valley spring-run Chinook salmon.

**Summary**

Under operation of the Sites Reservoir Project, no substantial adverse effect on Central Valley spring-run Chinook salmon is expected in the lower Sacramento River and Bay-Delta. As such, it is not anticipated that operation of Sites Reservoir Project would worsen nor lessen the potential effects of Alternative 2 described above.

### *AA.4.9.5 Potential Upstream Effects on California Central Valley Steelhead DPS (Upper Sacramento River, Lower American River, and Lower Feather River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2*, and Chapter 12, *Fish and Aquatic Resources*, for steelhead in the upper Sacramento River, the four phases of Alternative 2 are expected to have minor adverse and minor beneficial effects from changes to flow on spawning habitat area (depending on the water year type), generally minor beneficial effects from changes to flow on redd dewatering potential, possible beneficial effects of water temperature on spawning and egg incubation, minor adverse and minor beneficial effects from changes to flow on fry and juvenile rearing habitat area, general beneficial effects from changes to flow on fry stranding except for adverse effects for two phases of Alternative 2 in critically dry water year types, and possible beneficial effects and negligible adverse effects of water temperature on juvenile rearing and emigration.

For steelhead in Clear Creek, the four phases of Alternative 2 are expected to have beneficial effects of flow on spawning habitat area across all water year types. Possible negligible effects of water temperature on spawning and egg incubation, a negligible effect from changes to flow on fry rearing habitat, adverse effects from changes to flow on juvenile rearing habitat, and possible minor adverse effects of water temperature on juvenile rearing and emigration.

For steelhead in the lower American River, the four phases of Alternative 2 are expected to have a minor adverse effect from changes to flow on spawning habitat area and redd dewatering potential, possible similar negligible adverse and beneficial effects of water temperature on spawning and egg incubation, an adverse effect or beneficial effect on rearing habitat area depending on the month in critically dry water year types, and possible similar negligible adverse and beneficial effects of water temperature on juvenile rearing and emigration.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-5, potential exposure of steelhead to the effects of the Sites Reservoir Project is dependent on the species' spatiotemporal distribution. Upstream operational impacts of the project on steelhead generally would be limited. Steelhead would have the potential for similar types of near-field effects to those previously discussed for winter-run and spring-run Chinook salmon (i.e., entrainment, impingement and screen contact, predation, and stranding behind screens). Entrainment potential would be limited because the species tends to undergo downstream migration as larger juveniles which considerably limits the potential for all negative near-field effects due to greater swimming ability.

Related to water temperature effects, observations of exceedance plots and differences in modeled mean monthly water temperatures by water year type at all locations analyzed in the upper Sacramento, and lower American Rivers indicate that the Sites Reservoir Project and the NAA would be predominantly similar among alternatives. In addition, the analysis of exceedance above water temperature index values found no water temperature-related effects in the three rivers.

Results related to redd scour or entombment for steelhead in the upper Sacramento and lower American River indicate that the Sites Reservoir Project would have no adverse effect compared to the NAA.

The largest difference in steelhead spawning habitat WUA among alternatives is a 7% reduction under the Sites Reservoir Project in Segment 6 for February of Above Normal Water Years. Other reductions under the project ranging from 5% to 6% occur in Segment 6 during December of Wet Water Years and in Segment 5 in February of Above Normal Water Years. Most differences in all river segments under the project are < 3%. Overall, these minor reductions are not expected to substantially affect steelhead spawning habitat availability. Similarly, the Sites Reservoir Project would have little effect on steelhead fry rearing habitat availability.

**Summary**

Operation of the Sites Reservoir Project would not result in substantial adverse upstream effects on steelhead. As such, it is not anticipated that operation of Sites Reservoir Project would appreciably worsen nor lessen the potential effects (adverse or beneficials) of Alternative 2 described above.

#### *AA.4.9.6 Potential Effects on California Central Valley Steelhead DPS (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, California Central Valley Steelhead DPS*, the four phases of Alternative 2 are expected to have beneficial and adverse effects on juveniles, resulting from either an increase or decrease in entrainment at the export facilities depending on the phase and water year type. They are also expected to have minor adverse or minor beneficial effects of flow on outmigrating juveniles depending on OMR grouping. Alternative 2 would have negligible effects on flow into the Head of Old River. The Alternative 2 phases without Voluntary Agreements may have small decreases in flows into the CVP under OMR bin -2,000 cfs, while the effects of the phases with Voluntary Agreements on flow into the CVP may be negligible. Generally, the effects of diversion on flow and juvenile rearing and emigration are smaller at more upstream locations (Jersey Point) and greater at Turner Cut.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-5, the potential near-field effects of operation of Sites Reservoir Project on steelhead would generally be similar or lower than those previously discussed for winter-run and spring-run Chinook salmon (negligeable to minor), because the species tends to undergo downstream migration as larger juveniles (yearlings or older) with greater swimming ability than juvenile Chinook salmon. the Sites Reservoir Project is not expected to result in substantial negative effects on Yolo Bypass floodplain inundation and access for steelhead because of the diversion criteria including pulse flow protection at Bend Bridge and minimum flow requirements at Wilkins slough, effectively limiting changes to Yolo Bypass spill frequency and duration. In addition, the Sites Reservoir Project would operate to avoid effects on the Big Notch Project's ability to achieve the same level of performance for salmonids in the Sacramento River

as it would under the No Project Alternative. Both adult and juvenile steelhead passage at Fremont weir are expected to remain similar to the NAA. Similarly, no adverse effect is expected for Sutter Bypass suitable habitat and juvenile and adult passage at the three Sutter Bypass weirs. Sites Reservoir Project operations would not result in adverse flow-survival effects and would not change entrainment risk at south Delta export facilities. The Sites Reservoir Project includes pulse flow protection measures to be applied to precipitation-generated pulse flow events and a 10,700-cfs Wilkins Slough bypass flow threshold from October 1 through June 14. In addition, biological monitoring will be conducted to ensure there are no adverse effects, and, if necessary, adaptive management will be utilized to refine the diversion criteria based on monitoring results. Operation of the Sites Reservoir Project is, thus, not anticipated to result in substantial adverse effects on steelhead.

**Summary**

Under operation of the Sites Reservoir Project, no substantial adverse effect on steelhead is expected in the lower Sacramento River and Bay-Delta. As such, it is not anticipated that operation of Sites Reservoir Project would worsen or lessen the potential effects (adverse or beneficial) of Alternative 2 described above.

### *AA.4.9.7 Potential Upstream Effects on Southern DPS Green Sturgeon (Upper Sacramento River and Lower American River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2*, and Chapter 12, *Fish and Aquatic Resources*, for southern DPS green sturgeon in the Upper Sacramento River, the four phases of Alternative 2 are expected to have beneficial effects on spawning habitat in critically dry years and negligible effects in all other water year types, and possible beneficial effects or minor adverse effects of water temperature on spawning and egg incubation.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-6, differences in flow results were minimal between the Sites Reservoir Project and the NAA for the upper Sacramento River at Bend Bridge, near the upper limit of the green sturgeon spawning distribution in the Sacramento River. With respect to upper Sacramento River green sturgeon spawning habitat, differences in mean flow between the Sites Reservoir Project and the NAA are negligible. Similarly, for green sturgeon larvae rearing habitat in the Sacramento River, differences in mean monthly flows between the project and the NAA are minimal and may in certain situations have potential benefits compared to the NAA.

The Sites Reservoir Project would have no effect on flow conditions for upstream migrations of green sturgeon in the upper Sacramento River relative to the NAA.

Related to water temperature effects, observations of exceedance plots and differences in modeled mean monthly water temperatures by water year type indicate that the Sites Reservoir Project and the NAA would be predominantly similar during the period of presence of each life stage of green sturgeon in the Sacramento River. In addition, the analysis of exceedance above,

water temperature index values analysis found minimal water temperature-related effects in the Sacramento River.

**Summary**

Operation of the Sites Reservoir Project would not result in substantial adverse upstream effects on Southern DPS green sturgeon. As such, it is not anticipated that operation of Sites Reservoir Project would appreciably lessen the potential beneficial effects of Alternative 2 described above.

### *AA.4.9.8 Potential Effects on Southern DPS Green Sturgeon (Bay-Delta and Lower Sacramento River)*

**LTO Alternative 2**

As discussed in LTO EIS Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Southern DPS Green Sturgeon*, potential changes in flow under Alternative 2 (all phases) are not expected to have adverse effects on juvenile rearing and emigration, year class strength, adult migration, or entrainment of either juveniles or adults (beneficial effects on entrainment are possible but difficult to confirm because salvage is overall rare).

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-6, operation of Sites Reservoir Project would not have a substantial adverse effect, either directly or through habitat modifications, on green sturgeon. Near-field effects are possible with green sturgeon larvae potentially susceptible to entrainment at the Red Bluff or Hamilton City intakes in April and May. However, few years would see substantially greater diversions under the project than under the NAA and the intake screens design would exclude most larval sturgeon. The differences in flow attributable to Alternatives 3 are not expected to substantially affect rearing and emigration of green sturgeon larvae and juveniles in the Sacramento River compared to the NAA. Similarly, operation of the Site Reservoir Project is not expected to cause substantial decreases in the number of days meeting adult fish passage criteria at Fremont Weir, nor at the 3 Sutter Bypass weirs. As indicated by the results of the salvage-density analysis, operation of the Sites Reservoir Project would not cause adverse entrainment effects at south Delta export facilities compared to the NAA. Changes in Delta outflow as a result of operation of Sites Reservoir Project are not expected to result in substantial effects on green sturgeon year-class strength as the largest recruitment occurs in wetter years when there are only small differences between the Sites Reservoir Project and the NAA.

**Summary**

Based on the analyses summarized above, operations of Alternative 2 (all phases) and Sites potential changes in flow under Alternative 2 (all phases) are not expected to have adverse effects on juvenile rearing and emigration, year class strength, adult migration, or entrainment of either juveniles or adults The Sites Reservoir Project is expected to result in minor adverse effects on green sturgeon.

### *AA.4.9.9 Potential Effects on Delta Smelt (Bay-Delta and Lower Sacramento River) Potential Effects on Longfin Smelt (Bay-Delta).*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Longfin Smelt*, Alternative 2 is expected to have negligible effects on entrainment of adults, variable entrainment effects on eggs and larvae depending on location of origin, inflow and OMR flow, and substantial adverse effects to juveniles under almost all phases and water year types. Effects on low salinity habitat (as measured by X2 position) are expected to be negligible. Under all phases of Alternative 2, juvenile longfin smelt abundance would generally be similar to the No Action Alternative, with some potential for limited increases during critically dry years or decreases during wet years. Longfin smelt prey abundance would either increase or decrease depending on species, season, water year type and phase of Alternative 2.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-9, no adverse effect on entrainment of longfin smelt at south Delta export facilities is expected from operation of Sites Reservoir Project. The analyses of flow-related effects (differences in Delta outflow/X2), suggested the potential for small but uncertain negative food availability effects to longfin smelt under Alternatives 3, including minor potential decreases in *Eurytemora affinis* (up to -1%) and *Neomysis integer* (up to -3%). In addition, Delta ouflow–abundance models indicated possible minor adverse effects of project operation with up to 5% decreases in mean longfin smelt Fall Midwater Trawl Index, albeit with considerable uncertainty given the appreciably greater variability of longfin smelt abundance index estimates for a given alternative relative to the difference from the No Action Alternative. Implementation of Mitigation Measure FISH-9.1 would provide tidal habitat restoration to expand the diversity, quantity, and quality of longfin smelt rearing and refuge habitat, and mitigate the small and uncertain outflow effects of operation of Sites Reservoir Project on longfin smelt.

**Summary**

Under operation of the Sites Reservoir Project, there would be no entrainment effect on longfin smelt. As such, it is not anticipated that operation of Sites Reservoir Project would worsen nor lessen the potential entrainment effects of Alternative 2 summarized above (negligible effects on adults, minor variable effects on eggs and larvae and substantial adverse effects on juveniles). There is potential for operations of Sites Reservoir Project and Alternative 2 to combine and result in adverse flow-related and food availability effects for longfin smelt, particularly in Above Normal water years. However, the potential for adverse effects would be substantially reduced by each project's conservation measures including tidal habitat restoration under the Sites Reservoir Project, and integration of their respective planned adaptive management programs.

### *AA.4.9.10 Potential Upstream Effects on Fall-Run and Late Fall-Run Chinook Salmon ESU (Upper Sacramento River and Lower American River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2*, for fall-run Chinook salmon in the Upper Sacramento River, the four phases of Alternative 2 are expected to have minor adverse and minor beneficial effects from changes to flow on spawning habitat area (depending on the month and water year type), generally minor beneficial effects from changes to flow on redd dewatering potential, possible negligible adverse and beneficial effects of water temperature on spawning and egg incubation, minor beneficial and minor adverse effects from changes to flow on fry and juvenile rearing habitat area, generally minor adverse effects to fry stranding, possible minor to moderate adverse effects for juvenile growth, smoltification, and predation vulnerability, and minor to substantial beneficial effects of water temperature on juvenile pathogen virulence thresholds.

For late fall-run Chinook salmon in the Upper Sacramento River, the four phases of Alternative 2 are expected to have minor adverse and minor beneficial effects from changes to flow on spawning habitat area (depending on the month and water year type), periodic minor to moderate beneficial effects and minor to substantial adverse effects from changes to flow on redd dewatering potential, possible minor to substantial beneficial effects to spawning and incubation from water temperature, minor beneficial and adverse effects from changes to flow on fry and juvenile rearing habitat area, generally minor beneficial and minor adverse effects from changes to flow on fry stranding, possible minor beneficial and minor adverse effects for juvenile growth, smoltification, and predation vulnerability, and substantial beneficial and minor adverse effects of water temperature on juvenile pathogen virulence thresholds.

For fall-run Chinook salmon in Clear Creek, the four phases of Alternative 2 are expected to have beneficial effect of flow on spawning habitat area across all water year types, possible minor adverse effects of water temperature on spawning and egg incubation, minor adverse effects from changes to flow on fry and juvenile rearing habitat, and possible similar negligible adverse and beneficial effects of water temperature on juvenile rearing and emigration.

For fall-run Chinook salmon in the lower American River, the four phases of Alternative 2 are expected to have a minor to moderate adverse effect from changes to flow on spawning habitat area, a minor effect on redd dewatering potential except in dry water years under Alternative 2 with TUCP without VA, possible similar negligible adverse and beneficial effects of water temperature on spawning and egg incubation, adverse and beneficial effects on rearing habitat area depending on the month in critically dry water year types, and possible minor adverse and minor beneficial effects of water temperature on juvenile rearing and emigration.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-4, potential exposure of fall-run/late fall–run Chinook salmon to the effects of the Sites Reservoir Project is dependent on the species' spatiotemporal distribution. Upstream operational impacts of the project on fall-run/late fall–run Chinook salmon generally would be limited. Fall-run/late fall–run Chinook salmon would have the potential for similar types of near-field effects to those previously discussed for winter-run and spring-run Chinook

salmon (i.e., entrainment, impingement and screen contact, predation, and stranding behind screens). Around 30%–40% of fall-run/late fall–run Chinook salmon may pass the Red Bluff intakes. As discussed for winter-run and spring-run Chinook salmon, few fall-run/late fall–run Chinook salmon juveniles would have the potential for entrainment given their size.

Related to temperature effects, observations of exceedance plots and differences in modeled mean monthly temperatures by water year type at all locations analyzed in the upper Sacramento and lower American rivers indicate that the Sites Reservoir Project and the NAA would be predominantly similar among alternatives during the period of presence of each life stage of fall-run and late fall–run Chinook salmon. Exceedance above water temperature index values for fall-run and late fall–run Chinook salmon indicate that there would be minimal water temperature-related effects.

Predation effects in the vicinity of the Red Bluff intakes for the Sites Reservoir Project would be limited compared to the NAA because the extent of in-water structure at the intakes would be the same under the NAA and the project. Although overtopping during high flows can occur at the Red Bluff intakes, leading to potential stranding of juvenile fall-run/late fall–run Chinook salmon, these are relatively infrequent events (e.g., approximately once per 100 years at Red Bluff) that occur under the NAA and would not be changed by the Sites Reservoir Project.

The Sites Reservoir Project would have no adverse effects on redd scour and entombment for fall-run and late fall–run in the upper Sacramento River at any of the four locations compared to the NAA. In addition, the project would have no effect on redd scour or entombment on the lower American River for fall-run compared to the NAA.

The Sites Reservoir Project is expected to have some effects on fall-run spawning habitat WUA in some locations, months, and water year types. However, these reductions are largely limited to two of the four river segments in which most fall-run Chinook salmon spawning occurs, so the effects are not expected to substantially affect overall fall-run Chinook salmon spawning habitat availability compared to the NAA. Late fall–run Chinook salmon spawning habitat WUA under the project generally differs little from that under the NAA. Overall, the Sites Reservoir Project would not be expected to substantially affect late fall–run spawning habitat availability compared to the NAA. There could be small reductions in fry rearing WUA and substantial increases in juvenile rearing habitat WUA. Overall, Alternatives 3 would have little effect on late fall–run fry rearing habitat availability, whereas it would provide a net benefit to late fall-run juvenile rearing habitat availability compared to the NAA.

**Summary**

Operation of the Sites Reservoir Project would not result in substantial adverse upstream effects on fall-run/late fall-run Chinook salmon. As such, it is not anticipated that operation of Sites Reservoir Project would appreciably worsen nor lessen the potential effects (adverse and beneficial) of Alternative 2 described above.

### *AA.4.9.11 Potential Effects on Fall-Run and Late Fall-Run Chinook Salmon ESU (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Fall-Run and Late Fall-Run Chinook Salmon ESU*, Alternative 2 is expected to have adverse effects on fall-run Chinook salmon from entrainment at the Banks Pumping Plant, as well as negative effects in critical water year and negligible effects in all other water year types at the Jones Pumping Plant. Late fall-run Chinook salmon entrainment at both facilities would be similar to the No Action Alternative. Negligible effects on outmigrating juvenile survival are expected in all water year types.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-4, the potential near-field effects of operation of Sites Reservoir Project on fall-run and late fall-run Chinook salmon (i.e., entrainment, impingement and screen contact, predation, stranding behind screens, and attraction to reservoir discharge) would generally be similar or lower than those previously discussed for winter-run and spring-run Chinook salmon (negligeable to minor) above. Indeed, while 30 to 40% of fall-run/late fall-run Chinook salmon may pass the intakes, few juveniles would have the potential for entrainment given their size. The Sites Reservoir Project is not expected to result in substantial negative effects on Yolo Bypass floodplain inundation and access for fall-run/late fall-run Chinook salmon because of the diversion criteria including pulse flow protection at Bend Bridge and minimum flow requirements at Wilkins Slough, effectively limiting changes to Yolo Bypass spill frequency and duration. In addition, the Project would operate to avoid effects on the Big Notch Project's ability to achieve the same level of performance for salmonids in the Sacramento River as it would under the No Action Alternative. Both adult and juvenile Chinook salmon passage at Fremont Weir are expected to remain similar to the NAA. Similarly, no adverse effect is expected for Sutter Bypass suitable habitat and juvenile and adult passage at the three Sutter Bypass weirs. Sites Reservoir Project operations would not result in adverse flow-survival effects nor in substantial changes in juvenile rearing habitat availability in the north Delta and would not change entrainment risk at south Delta export facilities. The Sites Reservoir Project includes pulse flow protection measures to be applied to precipitation-generated pulse flow events and a 10,700-cfs Wilkins Slough bypass flow threshold from October 1 through June 14. In addition, biological monitoring will be conducted to ensure there are no adverse effects, and, if necessary, adaptive management will be utilized to refine the diversion criteria based on monitoring results. Operation of the Sites Reservoir Project is, thus, not anticipated to result in substantial adverse effects on fall-run/late fall-run Chinook salmon.

**Summary**

Under operation of the Sites Reservoir Project, no substantial adverse effect on Central Valley fall-run/late fall-run Chinook salmon is expected in the lower Sacramento River and Bay-Delta. As such, it is not anticipated that operation of Sites Reservoir Project would worsen nor lessen the potential effects of Alternative 2 described above (most notably, substantial adverse entrainment effects on fall-run Chinook salmon at Banks Pumping Plant). In addition, any effect

resulting from Sites Reservoir operations with the potential to combine with Alternative 2 effects would be minimized by the Project's diversion criteria.

### *AA.4.9.12 Potential Upstream Effects on White Sturgeon (Upper Sacramento River and Lower American River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, White Sturgeon*, for white sturgeon in the Upper Sacramento River, differences in flow between the four phases of Alternative 2 and the No Action Alternative are expected to have no effect or have possible beneficial effects on spawning habitat for all locations, months, and water year types. Differences in water temperature are expected to have no effect on spawning and egg incubation for all locations, months, and water year types. Differences in flow and temperature between the four phases of Alternative 2 and the No Action Alternative are expected to have no effect on rearing and emigration and upstream migration and holding for all locations, months, and water year types.

White sturgeon in the lower American River are not likely to be affected by changes in flow under all four phases of Alternative 2 compared to the No Action Alternative due to their limited distribution in the lower American River. Differences in flow and temperature between the four phases of Alternative 2 and the No Action Alternative are expected to have no effect on non-spawning white sturgeon for all locations, months, and water year types.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-7, if it is assumed that the relationship between flow and spawning habitat WUA for white sturgeon is similar to that of green sturgeon in the upper Sacramento River. Differences in WUA for the Sites Reservoir Project would have no adverse effect on white sturgeon. Due to low frequency and magnitude of differences between the project and the NAA in exceedances above water temperature index values in the Upper Sacramento River, they are not expected to be persistent enough to affect white sturgeon at a population level.

The operation of the Sites Reservoir Project would not have a substantial adverse effect, either directly or through habitat modifications, on white sturgeon adult immigration, holding, spawning, and egg incubation compared to the NAA.

**Summary**

Based on the analyses summarized above, operations of Alternative 2 (all phases) and Sites Reservoir Project are not anticipated to combine to result in measurable adverse upstream effects on white sturgeon.

### *AA.4.9.13 Potential Effects on White Sturgeon (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Southern White Sturgeon*, potential changes in flow under the four phases of Alternative 2 are expected to have negligible to possibly minor beneficial effects on juvenile rearing and emigration and subadult and adult residency in the Bay-Delta (year class strength). Similarly, potential changes in flows under Alternative 2 are not expected to have effects on the entrainment of juvenile or adult white sturgeon at any export facilities. Modeled results (salvage density model) show possible beneficial or adverse effects in various phases, months, and water year types, although, because white sturgeon are salvaged so rarely, the numbers may not be representative.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-7, overall, operation of Sites Reservoir Project would not have a substantial adverse effect, either directly or through habitat modifications, on white sturgeon. There could be small differences in temperature in the lower Sacramento River, but their low frequency and magnitude indicate they would not be persistent enough to affect white sturgeon at a population level compared to the NAA. White sturgeon spawning, and early life stages potentially vulnerable to entrainment and other near-field effects occur downstream of the Red Bluff and Hamilton City intakes, so near-field effects associated with the Red Bluff and Hamilton City intakes including entrainment are not expected to occur as a result of operations of the Sites Reservoir Project. As described for green sturgeon, the differences in flow attributable to Alternatives 3 are not expected to substantially affect rearing and emigration of white sturgeon larvae and juveniles in the Sacramento River compared to the NAA. Similarly, operation of the Site Reservoir Project is not expected to cause substantial decreases in the number of days meeting adult fish passage criteria at Fremont Weir, nor at the three Sutter Bypass weirs. Sites Reservoir releases in the Sacramento River could cause slight local reductions in water temperature compared to the NAA so effects on white sturgeon would be minimal. Likewise, there would be no temperature-related effects of Sites Reservoir releases in the Yolo Bypass via the CBD and in the Sacramento River below the Yolo Bypass under the project because no white sturgeon would be present in these locations during August through October when the Yolo Bypass would receive Sites Reservoir releases. As indicated by the results of the salvage-density analysis, operation of the Sites Reservoir Project may cause some entrainment effects at south Delta export facilities (mainly at CVP Jones Pumping Plant) compared to the NAA in below normal or dry years, but this relative difference should be placed in the context of the low observed historical salvage in recent years, indicating that any increase in entrainment would remain small in population-level terms. There could be some decreases in white sturgeon year-class index under the project in Below Normal and Dry years but changes in Delta outflow as a result of operation of Sites Reservoir Project are not expected to result in substantial effects on white sturgeon year-class strength as the largest recruitment occurs in wetter years when there are only small differences between the project and the NAA.

**Summary**

Based on the analyses summarized above, operations of Alternative 2 (all phases) and Sites Reservoir Project are not anticipated to combine to substantially affect white sturgeon within the Bay-Delta or lower Sacramento River. The potential small increases in entrainment indicated by the salvage-density analyses conducted for each project would be negligible at the population level as they would occur in dry years when recruitment of white sturgeon is low.

### *AA.4.9.14 Potential Upstream Effects on Native Minnows (Upper Sacramento River and Lower American River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Native Minnows*, in the Upper Sacramento River, seasonal operations effects of LTO Alternative 2 on native minnows would likely be negligible or slightly negative based on the CalSim 3 and water temperature analysis, with a few exceptions. Differences in flow under the four phases of Alternative 2 compared to the No Action Alternative are minimal so effects to native minnows would only be temperature related. Sub-optimal temperatures in the upper Sacramento River would likely affect native minnow negatively, but since native minnows are most common in tributaries, the negative effects under the four phases of Alternative 2 compared to the No Action Alternative would be minimal.

For hardhead in Clear Creek, there are likely negligible effects of seasonal operations based on water temperature and simulated flow analysis for the four phases of Alternative 2 compared to No Action Alternative. There would be little to no effect on habitat under the four phases of Alternative 2 compared to the No Action Alternative.

For native minnows in the lower American River, there are likely negligible effects of seasonal operations based on the difference in simulated flows for the four phases of Alternative 2 compared to the No Action Alternative. However, based off the temperature analysis at Hazel and Watt Avenue, the frequency of sub-optimal temperatures for both spawning adults and non-spawning adults/juveniles would be higher under the four phases of Alternative 2 compared to the No Action Alternative. Under the four phases of Alternative 2 differences in flows are minimal, so adult migration and spawning would likely be unaffected, but the proportion of native minnows remaining in the lower American River would be negatively affected by sub-optimal temperatures as compared to the No Action Alternative.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-11, native minnows (Sacramento splittail, Sacramento hitch, hardhead, and central California Roach) spawning is not anticipated to be adversely affected due to Sites Reservoir Project operations . Mean monthly temperatures by water year types differ little between the project and the NAA in the upper Sacramento and lower American rivers during the presence of each life stage of native minnows. Overall, operation of Sites Reservoir Project would not have a substantial adverse effect, either directly or through habitat modifications, on native minnows.

**Summary**

Under operations of Sites Reservoir Project, potential effects on native minnow populations would be minimal, so it is not expected that operations of Sites Reservoir Project would worsen the anticipated minor effects described above for Alternative 2.

### *AA.4.9.15 Potential Effects on Native Minnows (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

For many species of native minnows, it has been shown that changes in export flows can lead to higher levels of entrainment which can potentially influence population dynamics. Certain species such as Sacramento splittail are known to utilize the Delta for much of their life history so flows into the Delta could have a strong effect on these fish by limiting habitat, prey availability and access to spawning areas. As discussed in LTO EIS Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Native Minnows*, differences in export flows under Alternative 2 compared to the No Action Alternative are minimal for most of the year, but increased exports in April and May would likely cause an increase in entrainment at a key time for juvenile migration of many native minnows into the Delta. Salvage density model results confirm this for all four phases of Alternative 2, with higher predicted average monthly losses for most months and water year types compared to the No Action Alternative.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-11, operation of Sites Reservoir Project would not have a substantial adverse effect, either directly or through habitat modifications, on native minnows. Entrainment effects at the Red Bluff and Hamilton City intakes would be limited as native minnows spawning either occurs downstream of the intakes (Sacramento splittail), or early life stages of sizes susceptible to entrainment mostly occupy stream margins in early spring before potentially moving to deeper habitat at larger sizes and at times during which there would be little differences in diversions compared to the NAA (Sacramento hitch, hardhead, Central California roach). The Sites Reservoir Project would have limited potential for negative effects on Yolo Bypass floodplain inundation and access for Sacramento splittail and other native minnows. Within the Delta, few hitch, Central California roach, or hardhead have been salvaged historically and so increases in exports during summer/fall under the Sites Reservoir Project would not result in appreciable additional salvage.

**Summary**

Under operations of Sites Reservoir Project, entrainment risk and habitat effects on native minnow populations would be minimal, so it is not expected that operations of Sites Reservoir Project would worsen the anticipated effects described above for all four phases of Alternative 2 (potential adverse effects of flow on entrainment in most months, and particularly in April-May).

### *AA.4.9.16 Potential Upstream Effects on Pacific Lamprey (Upper Sacramento River and Lower American River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Pacific Lamprey*, for Pacific lamprey in the upper Sacramento River, differences in flow between the four phases of Alternative 2 and the No Action Alternative are expected to have minor positive to minor negative effects on spawning and egg incubation. Differences in flow and water temperature are expected to have a negligible effect on ammocoete rearing and emigration.

For Pacific Lamprey in Clear Creek, differences in flow between the four phases of Alternative 2 and the No Action Alternative are expected to have beneficial to minor adverse effects on spawning and egg incubation. Differences in water temperature are expected to have beneficial effects on spawning and egg incubation. Differences in flow are expected to have minor beneficial to minor adverse effects on ammocoete rearing and minor beneficial effects on juvenile emigration, and differences in water temperature are expected to have negligible effects on ammocoete rearing and emigration.

For Pacific Lamprey in the lower American River, differences in flow between the four phases of Alternative 2 and the No Action Alternative are expected to have minor beneficial to minor adverse effects on spawning and egg incubation, differences in water temperature are expected to have negligible negative effects on spawning and egg incubation, differences in flow are expected to have minor beneficial to minor adverse effects on ammocoete rearing and emigration, and differences in water temperature are expected to have negligible positive and negative effects on ammocoete rearing and emigration.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-10, There may be a low level of risk to juvenile Pacific lamprey from stranding behind the fish screens during high-flow events, but such events would be rare and would not differ between the Sites Reservoir Project and the NAA in their frequency. Operation of Sites Reservoir Project is not expected to affect redd dewatering risk nor ammocoete rearing habitat of Pacific lamprey in the Upper Sacramento River.

Overall, operation of Sites Reservoir Project is not expected to affect dewatering risk for Pacific lamprey redd and ammocoete rearing habitat in the upper Sacramento lower American rivers. Operation of the Sites Reservoir Project would not have a substantial adverse effect, either directly or through habitat modifications, on Pacific lamprey.

**Summary**

Under the Sites Reservoir Project, effects on Pacific lamprey would be minimal; therefore, it is not expected that operations of Sites Reservoir Project would lessen the anticipated mostly beneficial upstream effects described above for Alternative 2.

### *AA.4.9.17 Potential Effects on Pacific Lamprey (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Pacific Lamprey*, differences in flow between 2 and the No Action Alternative are expected to have either minor beneficial or minor adverse effects on Pacific lamprey ammocoete rearing and emigration in the Bay-Delta depending on the month and phase of Alternative 2 considered. Beneficial to minor adverse entrainment effects from Alternative 2 are expected, with either increases or decreases in losses at CVP export facilities depending on water year types and months. No substantial change in Pacific lamprey salvage at SWP export facilities is expected under Alternative 2.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-10, operation of Sites Reservoir Project would overall not have a substantial adverse effect, either directly or through habitat modifications, on Pacific lamprey. Near-field effects of the Sites Reservoir Project are not expected to differ from the NAA. Pulse flow protection measures would limit risks from exposure to the Red Bluff and Hamilton City intakes as Pacific Lamprey ammocoetes (the smallest individuals of which being potentially susceptible to entrainment or impingement) flushing from the burrows and macrophthalmia (less likely to be entrained given their size) migration would mostly occur during high flows/precipitation events. As indicated by the salvage-density analyses, operation of Sites Reservoir Project would not result in substantial changes in entrainment at south Delta export facilities.

**Summary**

Under Sites Reservoir Project, effects on Pacific lamprey would be minimal, so it is not expected that operations of Sites Reservoir Project would worsen or lessen the anticipated effects described above for Alternative 2 (potential for beneficial or minor adverse effects on entrainment at CVP facilities).

### *AA.4.9.18 Potential Upstream Effects on Striped Bass*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2*, in the Sacramento River, striped bass spawning mostly occurs between Colusa and the confluence of the Sacramento and Feather rivers. Operations of Alternative 2 are expected to result in minor adverse effects from flow in June and beneficial effects from water temperature (except for some uncommon month-water year type combinations under Alternative 2 without TUCP Systemwide VA) on striped bass spawning and egg incubation. There would be minor adverse effects from flow and water temperature on larval and juvenile rearing and emigration.

In the American River, operations of Alternative 2 are expected to result in negligible effects of both flow and water temperature on spawning habitat and adult striped bass. There would be negligible effects from flow and minor adverse effects from water temperature on juvenile rearing habitat.

In the Stanislaus River, operations of Alternative 2 are expected to result in minor beneficial effects from both flow and water temperature on spawning habitat and egg incubation. There would be minor beneficial effects of flow and minor adverse effects from water temperature larval and juvenile striped bass rearing and emigration.

In the San Joaquin River, operations of Alternative 2 are expected to result in negligible to beneficial (June through September of dry water years) effects of flow on striped bass. Water temperature at Vernalis would be similar under Alternative 2 and the No Action Alternative throughout the year, and would thus have no effect on striped bass.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-13, for striped bass in the Sacramento and the lower American rivers, there could be minor differences between the Sites Reservoir Project and the NAA in occurrences outside the water temperature index ranges for the different life stages of striped bass in some month and water year type combinations. However, due to low frequency and magnitude of differences, these are not expected to be persistent enough to result in population level effects. Similarly, while there could be reductions in Sacramento River flow near Wilkins Slough during May of Critically Dry Water Years that could adversely affect survival of striped bass eggs drifting downstream from spawning locations, it is considered unlikely that it would affect the striped bass population.

**Summary**

Alternative 2 would have minor beneficial and adverse effects on striped bass in upstream areas. The Sties Reservoir Project could have adverse effects, but these are not expected to be persistent enough to result in population level effects.

### *AA.4.9.19 Potential Effects on Striped Bass (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Striped Bass*, limited effects on striped bass abundance are expected from all phases of Alternative 2 in most water year types except Critically Dry years, during which all phases except Alternative 2 without TUCP without VA would have beneficial effects on striped bass abundance (up to +15% for Alternative 2 without TUCP Systemwide VA, based on Delta outflow – abundance model results). Salvage density model results indicate entrainment losses at SWP export facilities would generally be similar to the No Action Alternative for all phases of Alternative 2, except in Below Normal water years for all phases of Alternative 2 except Alternative 2 with TUCP without VA, during which minor adverse effects are expected. At CVP export facilities, entrainment losses would remain mostly unchanged in most water year types, or would decrease by up to 11% in below normal years (Alternative 2 without TUCP Systemwide VA) or up to 12% in dry years (Alternative 2 with TUCP without VA, Alternative 2 without TUCP without VA, Alternative 2 without TUCP Delta VA).

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-13, operation of Sites Reservoir Project would overall not have a substantial adverse effect, either directly or through habitat modifications, on striped bass. Striped bass spawning occurs in the Sacramento River from Colusa to Sacramento, which is downstream of the Red Bluff and Hamilton City intakes. Thus, smaller life stages potentially vulnerable to entrainment or other near-field effects would not occur at the intakes. Salvage-density analyses indicate that operation of Sites Reservoir Project could lead to minor to moderate increases in salvage of striped bass, particularly in critically dry water years at Banks Pumping Plant, but those are not expected to result in population-level effects. There would be negligible differences in mean X2 between the Sites Reservoir Project and the NAA, and thus no to negligible effects on juvenile striped bass abundance and survival.

**Summary**

Alternative 2 would have mostly beneficial effects on striped bass in the lower Sacramento River and the Bay Delta. The Sites Reservoir Project could have adverse effects, but these are not expected to be persistent enough to result in population level effects.

### *AA.4.9.20 Potential Upstream Effects on American Shad (Upper Sacramento River and Lower American River,)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, American Shad*, for American shad in the Upper Sacramento River, differences in flow below Keswick Dam between the four phases of Alternative 2 and the No Action Alternative are largely expected to have minimal effect on spawning and larval rearing, and water temperatures for spawning initiation at Butte City are expected to have negligible effects on spawning and larval rearing. Therefore, the differences in flow and water temperature for the four phases of Alternative 2 compared to the No Action Alternative are expected to have negligible effects on spawning and larval rearing. Differences in flow between the four phases of Alternative 2 and the No Action Alternative are largely expected to have little effect on juvenile rearing and emigration, and differences in water temperatures would have negligible effects on juvenile rearing and emigration. Therefore, the differences in flow and water temperature for the four phases of Alternative 2 compared to the No Action Alternative are expected to have a negligible effect on spawning and larval rearing.

For American shad in the lower American River, differences in flow between the four phases of Alternative 2 and the NAA are largely expected to have minimal effect on spawning and larval rearing below Nimbus Dam and at H Street, and water temperatures for spawning initiation from Hazel Avenue and Watt Avenue are expected to have a beneficial and negative effect on spawning and larval rearing. Therefore, the differences in flow and water temperature are expected to have some positive and negative effects on spawning and larval rearing. Differences in flow between the four phases of Alternative 2 and the NAA are largely expected to have little effect on juvenile rearing and emigration, and differences in water temperatures at Hazel Avenue and Watt Avenue would have beneficial and negative effects on juvenile rearing and emigration.

Therefore, the differences in flow and water temperature are expected to have some beneficial and negative effects on juvenile rearing and emigration.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-14, American shad do not spawn in the upper Sacramento River. Exceedance plots and differences in modeled mean monthly temperatures by water year type between the Sites Reservoir Project and the NAA in the lower American river indicate that water temperatures would be predominantly similar during the period of presence of each life stage of American shad. It is unlikely that change in flow associated with Alternatives 3 operations compared to the NAA would have potential effects on American shad. Operation of the Sites Reservoir Project, would not have a substantial adverse effect, either directly or through habitat modifications, on American shad.

**Summary**

Under Sites Reservoir Project and the Alternative 2, upstream effects on American shad would be minimal.

### *AA.4.9.21 Potential Effects on American Shad (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, American Shad*, minimal flow-related effects on American shad from all four phases of LTO Alternative 2 are expected in most water year types. Minor beneficial effects on abundance are possible, particularly in dry and critically dry water years for all but Alternative 2 without TUCP without VA (up to +10% for Alternative 2 without TUCP systemwide VA). Salvage density analyses indicate possible minor decreases in entrainment losses at SWP intakes in critically dry water years and possible minor increases in entrainment losses at CVP intakes in dry water years for some phases of Alternative 2.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-14, operation of Sites Reservoir Project would overall not have a substantial adverse effect, either directly or through habitat modifications, on American shad. American shad spawning mainly occurs downstream of the Red Bluff and Hamilton City intakes. Thus, smaller life stages potentially vulnerable to entrainment or other near-field effects would not occur in substantial numbers at the intakes. In addition, spawning occurs mostly between May and July, when there would be little difference in diversion between the Sites Reservoir Project and the NAA. Salvage-density analyses indicate that operation of Sites Reservoir Project could lead to increases in salvage of American shad due to greater summer exports, particularly in dry and critically dry water years at Banks Pumping Plant. However, the overall density of American shad in the south Delta is low relative to other areas occupied by the species, including the north Delta, Sacramento River from Colusa to Sacramento, so the increased entrainment potential relative to the NAA would not have population-level consequences for American shad. There would be negligible differences in mean X2 between the Sites Reservoir Project and the NAA, and thus no to negligible effects on juvenile American shad abundance and survival.

**Summary**

Under operation of Sites Reservoir Project, effects on American shad would be small, so it is not expected that operation of Sites Reservoir Project would worsen or lessen the anticipated effects (adverse or beneficial described above for Alternative 2.

### *AA.4.9.22 Potential Upstream Effects on Threadfin Shad (Upper Sacramento River and Lower American River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Threadfin Shad*, for threadfin shad in the upper Sacramento River, there may be negligible to negative effects of seasonal operations on spawning based on analyses of simulated flows and water temperature under Alternative 2 compared to the No Action Alternative. Under Alternative 2, changes in flows are unlikely to have a substantial effect on spawning and larval rearing. Water temperature analysis suggests slight negative effects for the Alternative 2 without TUCP and systemwide VA phase and negligible effects for all other phases.

For threadfin shad in the lower American River, for the four phases of Alternative 2 compared to the No Action Alternative there may be negligible beneficial and negative effects of seasonal operations on spawning based on analyses of simulated flows and water temperature, and changes in flows are unlikely to have a substantial effect on spawning and larval rearing. Water temperature analysis suggests negligible beneficial and negative effects for Alternative 2 in the American River.

**Sites Reservoir Project**

Threadfin shad, while widely distributed in fresh water, is most commonly encountered and most abundant in the southeastern Delta, especially the San Joaquin River near and just downstream of Stockton, and potentially also found in high abundance in the northeast Delta in dead-end sloughs as indicated by historical surveys. Threadfin shad is a warm water species and spawning peaks in June and July when temperatures exceed 20°C in areas with abundant submerged or floating structure/vegetation to which eggs can stick (hence the higher abundance in the Delta, where high density of submerged aquatic vegetation provides ideal spawning and rearing habitat). As such, the Sites Reservoir Project Final EIR/EIS effect analysis focuses on the Bay-Delta and lower Sacramento River where potential risks of population-level effects would be centered (see below). Nevertheless, as described for other species including striped bass and American shad, operations of Sites Reservoir Project would only result in minor changes in water temperature or flow in upstream areas where threadfin shad could occur, albeit outside of the main population centers. For these reasons, substantial population-level upstream effects are unlikely.

**Summary**

Threadfin shad is most abundant in the Delta. Potential upstream effects of both Alternative 2 and Sites Reservoir Project operations to individuals outside these main population centers are anticipated to be minimal to negligible. There is little potential for operations of the two projects to combine and result in substantial upstream adverse effects to threadfin shad.

### *AA.4.9.23 Potential Effects on Threadfin Shad (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Threadfin Shad*, changes in flow due to Alternative 2 operations are unlikely to have substantial effects on threadfin shad spawning and larval rearing, or on juvenile rearing and non-spawning adults. Salvage density analyses indicate possible increases or decreases in entrainment losses at SWP and CVP intakes depending on water year type and phase of Alternative 2 considered. Alternative 2 with TUCP without VA is not expected to affect entrainment risk at either facility, except for some potential decreases in losses at CVP Jones Pumping Plant in dry and critically dry years (up to 6% decrease). Alternative 2 without TUCP without VA would generally have little effect on entrainment, except in dry years when it could lead to minor decreases at SWP Banks Pumping Plant (up to 6%) and at CVP Jones Pumping Plant (up to 5%), or critically dry years when it could lead to minor increases (up to 10%) at CVP Jones Pumping Plant. Alternative 2 without TUCP Delta VA could lead to minor increases in entrainment at SWP Banks Pumping Plant in dry years (up to 6%) and either minor increases in critically dry years (up to 5%) or decreases in entrainment in below normal and dry years (up to 5%) at CVP Jones Pumping Plant. Alternative 2 without TUCP Delta VA could lead to minor increases in entrainment at SWP Banks Pumping Plant in dry years (up to 8%) and either minor increases in critically dry years (up to 5%) or decreases in entrainment in below normal years (up to 5%) at CVP Jones Pumping Plant.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-15, operation of Sites Reservoir Project is overall not expected to have a substantial adverse effect, either directly or through habitat modifications, on threadfin shad. Nevertheless, salvage-density analyses indicate that operation of Sites Reservoir Project could lead to substantial increases in salvage of threadfin shad in dry and critically dry water years at Banks Pumping Plant.

**Summary**

Alternative 2 would result in relatively minor beneficial and adverse effects to threadfin shad at the Delta facilities. The Sites Reservoir Project could result in increases in entrainment of threadfin shad at Banks Pumping Plant in dry and critically dry water years.

### *AA.4.9.24 Potential Upstream Effects on Black Basses (Upper Sacramento River and Lower American River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Black Basses*, in the Upper Sacramento River, under the four phases of Alternative 2 compared to the No Action Alternative, there would be generally minor adverse flow effects on spawning habitat for all three black bass species in June for Alternative 2 with TUCP Systemwide VA, and negligible water temperature effects on spawning and egg incubation. There would also be minor adverse effects of flow on non-spawning adults of all three species, and negligible (adult

largemouth and spotted bass) to adverse (adult smallmouth bass) water temperature effects in certain month and water year type combinations.

In the American River, operations of Alternative 2 are expected to result in negligible flow effects, and either negligible (smallmouth bass) or minor beneficial water temperature effects (largemouth and spotted bass) on spawning habitat and egg incubation. For non-spawning adults, effects of flow would be negligible and effects of water temperature would range from adverse (small mouth bass) to negligible (largemouth and spotted bass).

In the Stanislaus River, operations of Alternative 2 are expected to result in beneficial effects from both flow and water temperature on spawning habitat and egg incubation for all three black bass species. For non-spawning adults, there would be minor beneficial effects of flow on all three species and negligible effects from water temperature.

In the San Joaquin River, operations of Alternative 2 are expected to result in negligible to beneficial (June through September of dry water years) effects of flow on spawning habitat and egg incubation for all three black bass species. Water temperature at Vernalis would be similar under Alternative 2 and the No Action Alternative throughout the year and would thus have no effect on black basses.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-16, black bass (Largemouth Bass, Smallmouth Bass, and Spotted Bass) are anticipated to have minimal population-level effects related to entrainment at the Red Bluff intakes. Exceedance plots, differences in modeled mean monthly water temperatures by water year type between Alternatives 3 and the NAA, and water temperature exceedance analyses in the Upper Sacramento and lower American rivers indicate that water temperatures would be predominantly similar during the period of presence of each life stage of black bass. All three black bass species are adaptable, so it is highly unlikely that the relatively small differences in flow between Alternatives 3 and the NAA would have more than minimal effects on the black bass populations in the Upper Sacramento and lower American rivers. Population-level effects from changes in entrainment risk as a result of the Sites Reservoir Project would be small. The Sites Reservoir Project would not have a substantial adverse upstream effect, either directly or through habitat modifications, on black bass.

**Summary**

Alternative 2 would result in relatively minor beneficial and adverse effects to black basses in upstream areas. Under operation of Sites Reservoir Project, effects on black bass would be small and not reach population level.

### *AA.4.9.25 Potential Effects on Black Basses (Bay-Delta and Lower Sacramento River)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Black Basses*, non-spawning adults are present year-round in the Bay Delta. Alternative 2 may have noteworthy favorable effects on black basses in generally 17% of the months and unfavorable effects generally 17% of the months, all with varying intensity depending on time of

the year and location. Entrainment losses as a result of Alternative 2 operations are anticipated to vary greatly depending on the export facilities (SWP or CVP), water year type and phase of Alternative 2 considered. For Alternative 2 with TUCP without VA, largemouth bass losses would generally be similar to the No Action Alternative, but could increase up to 20% in below normal years or decrease by up to 5% in critically dry water years at SWP Banks Pumping Plant, and decrease by up to 12% in dry years at CVP Jones Pumping Plant. For Alternative 2 without TUCP without VA, largemouth bass losses would generally be similar to the No Action Alternative, but could increase up to 21% in below normal years at SWP Banks Pumping Plant, and decrease by up to 11% in dry years at CVP Jones Pumping Plant. For Alternative 2 without TUCP Delta VA, largemouth bass losses would generally be similar to the No Action Alternative, but could increase up to 109% in critically dry years at SWP Banks Pumping Plant, and decrease by up to 12% in dry years at CVP Jones Pumping Plant. For Alternative 2 with TUCP systemwide VA, largemouth bass losses would generally be similar to the No Action Alternative, but could increase up to 113% in critically dry years at SWP Banks Pumping Plant, and decrease by up to 11% in dry years at CVP Jones Pumping Plant.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-16, operation of Sites Reservoir Project is overall not expected to have a substantial adverse effect, either directly or through habitat modifications, on black bass. Near-field effects such as entrainment or impingement at the Red Bluff and Hamilton City intakes would have no to minimal population-level effects on black bass because the smallest life stages would tend to occur during spring/early summer when there would be little difference in diversions between the Sites Reservoir Project and the NAA. In addition, the species are widespread in the Central Valley (and particularly in the Delta) without specific migratory patterns (e.g., those of anadromous fish) that would cause them to systematically move past the intakes. Historical salvage data at the south Delta export facilities show few smallmouth or spotted bass are entrained, whereas largemouth bass are entrained in relatively high numbers. While results from the salvage-density analyses suggest potential increases in salvage in dry and critically dry years at Banks Pumping Plant under the Sites Reservoir Project, largemouth bass tend to primarily occupy nearshore habitats which limits their entrainment risk. In addition, the species is widespread in the Delta so population-level effects from changes in entrainment risk are expected to be small.

**Summary**

Based on the analyses summarized above, while population-level effects of entrainment are not expected because of the widespread occurrence of largemouth bass and affinity for nearshore habitat, there is potential for the combined operations of Sites Reservoir Project and the phases with VA of Alternative 2 to result in increased entrainment risk at Banks Pumping Plant in dry and critically dry water years.

#### *AA.4.9.26 Potential Effects on Starry Flounder (Bay-Delta)*

**Alternative 2**

As discussed in Appendix O, *Fish and Aquatic Resources Technical Appendix, Alternative 2, Starry Flounder*, starry flounders primarily inhabit coastal marine waters, with age-0 juveniles mostly found in Suisun Bay and San Pablo Bay and lower abundances in the west Delta. For Alternative 2 with TUCP without VA and Alternative 2 without TUCP Delta VA, no effect of flow on starry flounder abundance is expected, except in critically dry years during which a minor beneficial effect could be anticipated. Alternative 2 without TUCP without VA is not anticipated to have any effect on starry flounder abundance. Alternative 2 without TUCP systemwide VA would potentially have more substantial positive effects on abundance in drier years. Historical loss of starry flounder at both CVP and SWP export facilities is infrequent, which results in generally low predicted loss from Alternative 2 operations based on the salvage density analysis. Some increases in entrainment could be expected at SWP facilities and some decreases in entrainment at CVP facilities depending on water year types and months considered, for all four phases of Alternative 2.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 11, *Aquatic Biological Resources*, Impact FISH-12, operation of Sites Reservoir Project would not have a substantial adverse effect, either directly or through habitat modifications, on starry flounder. While the salvage-density method suggests entrainment risk under the Sites Reservoir Project could increase slightly in drier years as the species temporally overlaps the period with greater exports, only a small number of fish would be affected given the overall small numbers of starry flounder commonly salvaged under the NAA, particularly relative to the overall range of the species along the Pacific coast. In addition, negligible change in bay otter trawl abundance as a function of March-June X2 is expected from operation of Sites Reservoir Project.

**Summary**

Under operation of Sites Reservoir Project, effects on starry flounder would be minor, so it is not expected that operation of Sites Reservoir Project would lessen the anticipated mostly beneficial effects described above for Alternative 2.

## AA.4.10 Terrestrial Biological Resources

#### *AA.4.10.1 Potential Changes to Terrestrial Resources from Seasonal Operations*

**Alternative 2**

As discussed in LTO EIS Appendix P, *Terrestrial Biological Resources Technical Appendix*, Section P.2.4, Alternative 2, flow changes in the Trinity River and Clear Creek under Alternative 2 (all phases) could negatively impact aquatic habitat and result in injury, mortality, or disrupt normal behaviors of northwestern pond turtle and the North Coast distinct population segment (DPS) of the foothill yellow-legged frog.

Flow changes in the Sacramento River under Alternative 2 (all phases) could adversely affect aquatic habitat and result in injury, mortality, or disrupt normal behaviors of northwestern pond

turtle and the North Coast DPS of the foothill yellow-legged frog. All phases of Alternative 2 could result in the temporary loss of aquatic habitat for giant garter snake through the conversion of rice to dryland farming or fallowed lands. Proposed flow changes under Alternative 2 during the non-breeding season could increase available habitat and could result in bank collapse during the breeding season, resulting in beneficial or adverse effects on bank swallow; however, the degree of effects is dependent upon the timing and degree of proposed flow changes. Proposed flow changes under Alternative 2 are not expected to substantially change habitat conditions for western yellow-billed cuckoo and least Bell's vireo relative to the No Action Alternative. Finally, flow changes on the Sacramento River under Alternative 2 are presumed negligeable to western yellow-billed cuckoo critical habitat, as the riparian vegetation of the surrounding habitat would not be substantially altered (Appendix P, Section P.2.4.2, Potential changes to Critical Habitat from seasonal operations).

Flow changes in the American River under Alternative 2 (all phases) would be similar to the No Action Alternative; therefore, no adverse effects on northwestern pond turtle are anticipated. Proposed flow changes under Alternative 2 are not expected to substantially change habitat conditions for western yellow-billed cuckoo relative to the No Action Alternative. Additionally, elevated water flows are not anticipated to result in adverse effects on nesting western yellow-billed cuckoos. Finally, flow changes on the American River are unlikely to produce measurable changes in quantity or quality of valley elderberry longhorn beetle critical habitat in the American River watershed, as the riparian vegetation of the surrounding habitat would not be substantially altered (Appendix P, Section P.2.4.2, Potential changes to Critical Habitat from seasonal operations).

Flow changes in the Stanislaus River under Alternative 2 (all phases) could negatively impact aquatic habitat and result in injury, mortality, or disrupt normal behaviors of northwestern pond turtle and the North Coast DPS of the foothill yellow-legged frog. The seasonal operations in the Stanislaus River and the potentially beneficial impacts associated with spring pulse flows will have a negligeable impact on western yellow-billed cuckoo and least Bell's vireo habitat. Additionally, elevated flows are not anticipated to rise to the level that would cause impacts to nesting western yellow-billed cuckoos or least Bell's vireo.

As discussed in Appendix P, Section P.2.4.1.6, San Joaquin River, proposed flow changes in the San Joaquin River would not affect the northwestern pond turtle or the South Sierra DPS of foothill yellow-legged frog in the San Joaquin River watershed, as there would be no actions that affect suitable habitat.

**Sites Reservoir Project**

Although the Sites Reservoir Project has the potential to impact terrestrial biological resources during project operation, effects on wildlife resources would largely not occur due to implementation of best management practices (BMPs) and resource plans such as the Land Management Plan (see Sites Reservoir Project Final EIR/EIS, Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies*). The Authority will further develop and implement the Land Management Plan (LMP) and other plans and BMPs to protect special-status plants. The Sites Reservoir Project Final EIR/EIS also identifies mitigation measures, as described in detail in the Sites Reservoir Project Final EIR/EIS Chapter 9, *Vegetation and*

*Wetland Resources*, and Chapter 10, *Wildlife Resources*. The implementation of BMPs, plans and mitigation measures will reduce effects as summarized below:

- Operation effects on special-status plants would not occur from erosion, sedimentation, or spills of hazardous or petroleum substances because such activities either would not be located in proximity to special-status plant species or potential impacts would be minimized by implementation of BMP-12 and BMP-13 by the Authority.
- Effects related to the operation of the Sites Reservoir Project on special-status plants from vegetation maintenance would not occur due to either the lack of species or implementation of BMP-12, BMP-13, the LMP, the RMP. Furthermore, Mitigation Measure VEG-1.3, would reduce adverse effects associated with vegetation maintenance. Therefore, operation effects would not be adverse.
- Effects related to the operation of the Sites Reservoir Project on sensitive natural communities from erosion, sedimentation, and spills of hazardous or petroleum substances could result in substantial adverse effects on sensitive natural communities in vegetation maintenance areas as compared to the No Project Alternative. Implementation of BMP-12, BMP-13, the LMP, the RMP, and Mitigation Measure VEG-2.3 is required. Therefore, operation effects on sensitive natural communities would not be adverse.
- Effects related to the operation of the Sites Reservoir Project on wetlands and non-wetland waters from erosion, sedimentation, and spills of hazardous or petroleum substances could result in substantial adverse effects on wetlands and non-wetland waters in maintenance areas as compared to the No Project Alternative. Implementation of BMP-12, BMP-13, the LMP, the Recreation Management Plan, and Mitigation Measure VEG-3.4 is required. Therefore, operation effects would not be adverse.
- Operation of the Sites Reservoir Project could result in a substantial adverse effect on oak woodlands protected by general plan policies and the California Oak Woodland Conservation Act in vegetation maintenance areas as compared to the No Project Alternative. Implementation of BMPs and Mitigation Measure VEG-4.3 is required. Therefore, operation effects would not be adverse.
- Operation of the Sites Reservoir Project would have no additional effects on vegetation and wetland resources protected by the adopted Yolo County Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP) or Yolo Bypass Wildlife Area LMP as compared to the No Project Alternative.
- Operation of the Sites Reservoir Project would result in a substantial adverse effect on vernal pool branchiopods as compared to the No Project Alternative as a result of removal of suitable habitat and loss of individuals. Operational effects on vernal pool branchiopods would be avoided or minimized through implementation of BMP-15, the LMP, and the Recreation Management Plan. With implementation of Mitigation Measures WILD-1.1, WILD-1.2, and WILD-1.3, the operation effects would be reduced to no adverse effect on vernal pool branchiopods.
- Operation of the Sites Reservoir Project would result in a substantial adverse effect on wildlife movement and habitat connectivity as compared to the No Project Alternative

due to the creation of barriers to, or impeding wildlife movement within, existing natural landscape blocks and essential connectivity areas. Implementation of mitigation measures discussed in Impact WILD-1 (including Mitigation Measures WILD-1.15 and WILD-1.16) would reduce operation impacts on nursery sites, wildlife movement, and habitat connectivity; however, they would not fully reduce effects associated with the movement barrier created by Sites Reservoir. Operation of the Sites Reservoir Project would result in a substantial adverse effect on wildlife movement and habitat connectivity before and after mitigation.

- Operation of the Sites Reservoir Project would not result in the increased spread of invasive plants that would result in an adverse effect on sensitive terrestrial natural communities, wetlands, or non-wetland waters as compared to the No Project Alternative because of the low likelihood of spread. In addition, implementation of BMP-36 as part of construction, and the vegetation control activities in the LMP as part of operation, would reduce the potential for introduction and spread of invasive plant species. The potential effects associated with the introduction and increased spread of invasive plants would not be adverse.
- Operation of the Sites Reservoir Project would result in a substantial adverse effect on local policies and ordinances protecting wildlife resources as compared to the No Project Alternative. Through implementation of mitigation measures discussed under Impacts WILD-1, effects would be reduced to no adverse effect.
- Operation of the Sites Reservoir Project would not conflict with provisions of the Yolo Bypass Wildlife Area LMP but would conflict with provisions of the Yolo County HCP/NCCP as compared to the No Project Alternative. The Sites Reservoir Project would result in a substantial adverse effect from conflicting with provisions of the Yolo County HCP/NCCP, but through implementation of mitigation measures under Impact WILD-1, effects would be reduced to no adverse effect.

**Summary**

Changes in flows in rivers upstream of the Delta attributable to Alternative 2 could result in negative effects on special-status species in the Trinity River, Clear Creek, Sacramento River, American River, and Stanislaus River. The Sites Reservoir Project operations would not affect the Trinity River and Clear Creek areas. The effects to terrestrial resources due to operation of the Sites Reservoir Project would be minimized, as outlined above, and would not contribute to potential effects on terrestrial biological resources upstream of the Delta as identified in the LTO EIS.

### *AA.4.10.2 Potential Changes to Critical Habitat from Seasonal Operations (Delta)*

**Alternative 2**

Proposed changes in operation of the Suisun Marsh Salinity Control Gates (SMSCG) to direct more fresh water into the Suisun Marsh is expected to have a beneficial effect on northwestern pond turtle and negligible adverse effects on soft bird's beak and Suisun thistle. Alternative 2 would not affect other special-status species in the Delta (Appendix P, Table P.1-1, Special-Status Wildlife Species and Table P.1-2, Special-Status Plant Species).

**Sites Reservoir Project**

The Site Reservoir Project study area for terrestrial biological resources does not include the Suisun Marsh. As discussed in the Sites Reservoir Project Final EIR/EIS, Chapter 10, Section 10.4, *Impacts and Mitigation Measures*, operation of Sites Reservoir (flow releases) would not have substantial effects on the Sacramento River downstream of the release locations. Diversions from the Sacramento River to the reservoir would occur only under higher Sacramento River flow regimes. Based on CALSIM II modeling, the percent change in maximum monthly average flow (in January or February) in the Sacramento River would be a less than 1% increase to a less than 2.5% decrease when compared to the No Project Alternative. The banks of the Sacramento River provide suitable habitat for elderberry shrubs; however, the minimal changes to the natural river geomorphic processes and existing geomorphic characteristics for the Sacramento River would not affect elderberry shrubs and valley elderberry longhorn beetle. Operation impacts that could result in mortality of golden eagle, bald eagle, white-tailed kite would have to be avoided because both species are fully protected under the California Fish and Game Code.

**Summary**

Implementation of Alternative 2 (all phases) would result in potential beneficial effects on northwestern pond turtle and negligible adverse effects on soft bird's beak and Suisun thistle, which are confined to Suisun Marsh. The Site Reservoir Project study area for terrestrial biological resources does not include the Suisun Marsh.

Alternative 2 would not affect other special-status terrestrial species in the Delta region. The operation of Sites Reservoir Project in combination with Alternative 2 would not result in meaningful adverse changes to terrestrial resources from seasonal operations.

### *AA.4.10.3 Potential Changes to Critical Habitat from Seasonal Operations*

**Alternative 2**

As discussed in Appendix P, *Terrestrial Biological Resources Technical Appendix*, Section P.2.4.2, *Potential Changes to Critical Habitat from Seasonal Operations*, effects due to flow changes in the Delta through the SMSCG associated with Alternative 2 would likely be negligeable to both soft bird's beak and Suisun thistle critical habitat (designated April 12, 2007 72 Federal Register [FR] 18518).

**Sites Reservoir Project**

Operations of the Sites Reservoir Project would not affect critical habitat in the Delta region.

**Summary**

As described above, Alternative 2 would not result in adverse effects on soft bird's beak or Suisun thistle critical habitat in the Suisun Marsh. Operation of the Sites Reservoir Project would have no effect on designated critical habitat, including critical habitat for soft bird's beak and Suisun thistle.

## AA.4.11 Regional Economics

### *AA.4.11.1 Potential Changes in Regional Economics*

**Alternative 2**

Alternative 2 may lead to reduced water elevations in Trinity Reservoir which may render boat ramps on the reservoir unusable in December. However, the lowering of reservoir levels coincides with the offseason (December) for recreational visitation; therefore, Alternative 2 is not expected to have a substantial impact on recreational visitation, recreational revenue, or recreational regional economics in Trinity County.

In the Sacramento River Region, Alternative 2 would increase water supply deliveries to M&I water contractors in the Sacramento River Region under the without TUCP phases and decrease supplies under the with TUCP phase, details provided in Table Q.215, *Sacramento River Region M&I Water Supply Costs under Alternative 2 phases compared to No Action Alternative*. These increases in CVP and SWP M&I water supplies under Alternative 2 would help meet anticipated increases in future water demands and would reduce the need for reliance on water transfers and development of alternate water supplies in the region to meet these demands. However, reliance on groundwater increases in the Sacramento region is expected under all phases of Alternative 2 due to forecast groundwater costs being lower than forecast surface water costs. These estimates include the anticipated effects of Sustainable Groundwater Management Act (SGMA). Typically, water supply cost increases or decreases are passed on to water customers through water rate increases or decreases, respectively. Under Alternative 2 (all phases), there would be a reduction in water supply costs and consequently, water rates would be lower than the No Action Alternative. This reduction in rates would result in an increase in disposable income and could result in more discretionary spending in the regional economy. Average annual agricultural water supply deliveries are expected to decrease under Alternative 2 (all phases) during average and dry conditions. As summarized in Table Q.225, these decreases in annual agricultural water supplies are expected to result in reductions in irrigated acreage under average and dry conditions. This decrease in irrigated acreage would result in a decrease in gross revenue under the without VA phases. Under the Delta VA and Systemwide VA phases, gross revenue increases would primarily be driven by an increase in higher value fruit and vegetable farming in the region.

For the San Joaquin River region, Alternative 2 would increase water supply deliveries to M&I water contractors in the San Joaquin River Region under all phases. There would also be a reduction in water supply costs and consequently, water rates would be lower than the No Action Alternative under all phases of Alternative 2. This reduction in water rates would result in an increase in disposable income and could result in more discretionary spending in the regional economy. Average annual agricultural water supply deliveries are expected to decrease under all phases of Alternative 2 except under the with TUCP phases during average conditions. As summarized in Table Q.227, these decreases in annual agricultural water supplies are expected to result in decreases to irrigated acreage under average and dry conditions and resulting decreases in gross revenue associated with agriculture.

Alternative 2 would increase water supply deliveries to M&I water contractors in the San Francisco Bay Area Region under all phases. These increases in CVP and SWP M&I water supplies under Alternative 2 would help meet anticipated increases in future water demands and would reduce transfer costs, shortage costs and excess water costs under the without TUCP

phases. Typically, water supply cost increases or decreases are passed on to water customers through water rate increases or decreases, respectively. Under the without TUCP Alternative 2 phases, there would be a reduction in water supply costs and consequently, water rates would be lower than the No Action Alternative. This reduction would result in an increase in disposable income and could result in more discretionary spending in the regional economy. Alternative 2 phases are expected to decrease average annual agricultural water supply deliveries in the San Francisco Bay Area Region by up to 2,000 AFY under average conditions and by up to 3,000 AFY under dry conditions. Decreases in agricultural water supply in the region could result in a decrease in irrigated acreage and agricultural revenues in the region. This would result in less spending in the regional economy.

Alternative 2 would increase water supply deliveries to M&I water contractors in the Central Coast Region under all phases. These increases in CVP and SWP M&I water supplies under Alternative 2 would help meet future water demands with reduced reliance on groundwater use in the region. Typically, water supply cost increases or decreases are passed on to water customers through water rate increases or decreases, respectively. Under the Alternative 2 phases, there would be a reduction in water supply costs and consequently, water rates would be lower than the No Action Alternative. This reduction in water rates would result in an increase in disposable income and could result in more discretionary spending in the regional economy. CVP and SWP water supply deliveries to the Central Coast Region affected by Alternative 2 are primarily delivered to M&I water contractors. Therefore, there are no forecast changes in irrigated lands under the Alternative 2 phases. Consequently, there would be no impacts to regional economy from changes in deliveries to agricultural contractors in the Central Coast Region under the Alternative 2 phases.

Alternative 2 would increase water supply deliveries to M&I water contractors in the South Coast Region under all phases. These increases in CVP and SWP water supplies would help meet future water demands without development of other alternative water supplies. Additionally, increased water supplies under Alternative 2 would reduce storage costs, groundwater pumping costs and excess water costs under all phases. Typically, water supply cost increases or decreases are passed on to water customers through water rate increases or decreases, respectively. Under the Alternative 2 phases, there would be a reduction in water supply costs and consequently, water rates would be lower than the No Action Alternative. This reduction in water rates would result in an increase in disposable income and could result in more discretionary spending in the regional economy. Alternative 2 phases are expected to have minimal impacts to annual agricultural deliveries in the South Coast Region. Resulting impacts to the regional economy would be minimal.

As described in detail in Appendix U, *Power Technical Appendix*, the CVP net hydropower generation would be similar or slightly higher over the long-term and over dry and critically dry years under the Alternative 2 phases compared to the No Action Alternative. The hydropower generated by the CVP is marketed and transmitted by the Western Area Power Administration (WAPA) Sierra Nevada Region. As CVP annual and plant-in-service power costs increase (including Central Valley Project Improvement Act Environmental Restoration Funds), and available energy for sale decreases, the net unit cost of CVP power may slightly decrease. Typically, decreases in power costs would be passed on to customers through rate decreases. This power rates reduction would result in a slight increase in disposable income and could result in more discretionary spending in the regional economy.

Under Alternative 2 phases compared to the No Action Alternative, SWP net generation over the long-term would be slightly lower for both long-term average and in dry and critically dry years. Power generated by the SWP is transmitted by PG&E, Southern California Edison, and California ISO through other facilities (California Department of Water Resources 2022). The SWP also markets energy in excess of the SWP demands to a utility and members of the WSPP, formerly known as the Western Systems Power Pool. A decrease in SWP net generation would increase the need for the development of other alternative supplies which could result in an overall increase in power cost. Typically, increases in power costs would be passed on to customers through rate increases. This increase would result in a decrease in disposable income and could result in less discretionary spending in the regional economy.

Operations of Alternative 2 has potential to change water elevations in reservoirs, which would lead to a small reduction in potential recreational use at Trinity Reservoir, however this change in use is not expected to have an adverse effect on the recreational-related economy activity in the region. All other economic effects are primarily related to changes in water rates passed to the customer and water supply which may affect costs of agricultural goods and lead to changes in agriculture production.

**Sites Reservoir Project**

The potential effects on regional economics from the operation of the Sites Reservoir Project are discussed at the county level in the Sites Reservoir Project Final EIR/EIS, Chapter 30, *Environmental Justice and Socioeconomics*.

The Sites Reservoir Project would create sources of labor income and jobs due to operation and maintenance of the associated facilities and recreational areas as compared to the No Project Alternative. These effects would be in Glenn, Colusa, and Yolo Counties, where the Sites Reservoir and associated facilities are located, including those for conveyance to the CBD. The economic modeling quantified operational effects using IMPLAN and found that there would be a permanent increase in direct and indirect labor income that would be correlated with a permanent increase in direct jobs and total jobs in affected counties. The overall effect of the operation of the Sites Reservoir Project on regional economics would be positive and beneficial, although the number of jobs generated by Project operations would be small in the context of total employment in the study area.

**Summary**

Operations of Alternative 2 has potential to change water elevations in reservoirs, which would lead to a small reduction in potential recreational use at Trinity Reservoir; however, this change in use is not expected to have an adverse effect on the recreational-related economy activity in the region. All other economic effects (adverse and beneficial) are primarily related to changes in water rates passed to the customer and water supply which may affect costs of agricultural goods and lead to changes in agriculture production. The Sites Reservoir Project would create new sources of labor income and jobs due to operation and maintenance of the project facilities and recreational areas. These localized effects would occur in Glenn, Colusa, and Yolo Counties and are unique to the Sites Reservoir Project. Therefore, the Sites Reservoir Project in combination with the operation of Alternative 2 would not result in changes to economic effects, as identified in the LTO EIS

## AA.4.12 Land Use and Agricultural Resources

### *AA.4.12.1 Potential Changes in Land Use*

**Alternative 2**

As discussed Appendix R, *Land Use and Agricultural Resources Technical Appendix*, Section R.2.4.1 and Section R.2.8, *Summary of Impacts*, Table R.2-36, Impact Summary, annual average water deliveries would increase across Alternative 2 (all phases) with the exception of the Sacramento Region under Alternative 2 Without TUCP Without VA which would have no change from the No Action Alternative and under Alternative 2 With TUCP Without VA which would have a slight decrease in average annual deliveries compared to the No Action Alternative costs. Under Alternative 2 Without TUCP Delta VA and Alternative 2 Without TUCP Systemwide VA, there would be an average annual reduction in cost across all regions. Under Alternative 2 Without TUCP Without VA, the Southern California region would see increased annual costs while the other regions would experience a reduction in cost. Under Alternative 2 With TUCP Without VA, which would be implemented in times of drought, most of the regions would see a reduction in costs, with the Southern California region receiving the greatest reduction, however, the San Francisco Bay Area region would see an increase in average annual costs. It is anticipated that additional water supplies would not result in changes in the general plan development plans without subsequent environmental documentation. Therefore, adequate water supplies would be available to support future municipal and industrial land uses projected in existing general plans and urban water supply management plans.

**Sites Reservoir Project**

As discussed in Chapter 14, *Land Use*, Section 14.4, *Impact Analysis and Mitigation Measures*, operation of the Sites Reservoir Project would not result in effects on existing land uses, conflicts with existing land use plans and policies, or physical division of existing communities. Operation of the Sites Reservoir Project would not physically divide the established community of Lodoga to Maxwell relative to the No Project Alternative. Similarly, operation of the Sites Reservoir Project would not conflict with existing land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect as compared to the No Project Alternative because either there are no pertinent county land use plans, policies, or regulations or operation activities would generally be consistent.

**Summary**

The Sites Reservoir Project would not result in effects on existing land uses, conflicts with existing land use plans and policies, or physical division of existing communities. In general, Alternative 2 would result in an increase in annual average water deliveries; therefore, it is anticipated that adequate water supplies would be available under Alternative 2 to support projected land uses. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not result in a substantial change in land use within the CVP or SWP service areas, as identified in the LTO EIS.

### *AA.4.12.2 Potential Changes in Irrigated Agricultural Land*

**Alternative 2**

As discussed in Appendix R, *Land Use and Agricultural Resources Technical Appendix*, Section R.2.4.1 and Section R.2.8, *Summary of Impacts*, Table R.2-36, Impact Summary, the long-term average and dry and critical year average deliveries for agricultural uses would decrease across all phases of Alternative 2 for the Sacramento River, San Joaquin River, and San Francisco Bay Area Regions. The agricultural deliveries for the Southern California region would be considered similar to the No Action Alternative.

In both the long-term average and dry and critical year conditions, overall crop acreage would primarily decrease in the San Joaquin River and Sacramento River regions under Alternative 2 (all phases) when compared to the No Action Alternative. Crop productivity would primarily decrease for the San Joaquin River region under both conditions. Crop productivity in the Sacramento Region would be more variable, with smaller increases and decreases in productivity compared to the No Action Alternative. Therefore, some conversion of agricultural land to nonagricultural is expected to occur in both regions.

**Sites Reservoir Project**

As discussed in Chapter 15, *Agriculture and Forestry Resources*, Section 15.4, *Impact Analysis and Mitigation Measures*, operation of the Sites Reservoir Project would result in the conversion of farmland to nonagricultural use. Placement of aboveground project facilities on land in conservation under local Williamson Act contracts would result in removal of this land from contract and would create remnant parcels. Some of the Farmland Protection Policy Act (FPPA) Important Farmland that the project affects lies within Farmland Mapping and Monitoring Program (FMMP) Important Farmland. Mitigation Measure AG-1.1 would reduce effects to these lands; however, effects for FPPA Important Farmland that overlaps with FMMP Important Farmland would continue to be adverse. The FPPA Important Farmland is predominantly not currently used for irrigated cropland; the only FPPA Important Farmland mapped within cropland areas is confined to areas affected by access roads. Most of the FPPA Important Farmland in the study area is in current use for grazing. Conversion of grazing land to nongrazing uses is not considered to be a substantial adverse effect on agricultural resources under NEPA.

Sites Reservoir Project facilities permanently located on agricultural lands would not conflict with zoning on adjacent parcels zoned for agricultural use as compared to the No Project Alternative because the new uses would be compatible with adjacent agriculture.

On average, CVP and SWP water deliveries are expected to increase with the Sites Project, particularly in association with CVP participation. As discussed in Chapter 8, *Groundwater Resources*, the Sites Project would provide a more reliable surface water supply for agricultural use, lowering dependency on groundwater pumping for crop irrigation in the Sacramento Valley and the San Joaquin Valley for Storage Partners. Surface water use could increase deep percolation that would subsequently increase groundwater storage and improve groundwater quality because surface water has been shown to have better water quality than groundwater, especially in the San Joaquin Valley. This would support irrigated crop land in CVP and SWP delivery areas.

**Summary**

The long-term average and dry and critical year average deliveries for agricultural uses would decrease across all phases of Alternative 2 for the Sacramento River, San Joaquin River, and San Francisco Bay Area Regions. Operation of the Sites Reservoir Project would result in the conversion of farmland to nonagricultural use in areas developed with project facilities. However, the FPPA Important Farmland outside FMPP Important Farmland is predominantly not currently used for irrigated cropland. Surface water supplies would support irrigated crop land in CVP and SWP delivery areas and benefit agriculture. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would add beneficial contributions to potential changes in irrigated agricultural land, as identified in the LTO EIS.

## AA.4.13 Recreation

### *AA.4.13.1 Potential Changes to Recreational Opportunities*

**Alternative 2**

No changes would occur to recreational resources at Trinity Reservoir, Lewiston Reservoir, Keswick Dam, Whiskeytown Reservoir, Folsom Reservoir, the American River Parkway, Rancho Seco Park and Lake, New Melones Reservoir, Tulloch Reservoir, Millerton Reservoir, the San Joaquin River region, the CVP and SWP Service Areas, or the Nearshore Pacific under long-term average conditions. Potential minor benefits to boating, camping, day use, and/or fishing would occur at Shasta Reservoir, Clear Creek (November through May), Lake Natoma, the Bay-Delta Area, and San Luis Reservoir under long-term average conditions. Potential minor, adverse impacts boating, camping, day use, and/or fishing would occur at Clear Creek (June through October), and the lower Stanislaus River (March through May) under long-term average conditions.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 16, *Recreation*, Section 16.4, *Impact Analysis and Mitigation*, the Sites Reservoir Project would have no adverse effect on existing recreation resources as compared to the No Project Alternative as a result of increased use. A potential beneficial effect could occur as a result of the new recreation opportunities at the Sites Reservoir because potentially less intensive use would occur at other recreational facilities in the study area, which could reduce crowding.

**Summary**

As described above, operation of Alternative 2 potential minor, adverse and beneficial impacts on recreation. The Sites Reservoir Project would have a potential beneficial effect as a result of the new recreation opportunities at the Sites Reservoir.

## AA.4.14 Environmental Justice

### *AA.4.14.1 Potential Disproportionate Effects to Employment of Minority or Low-Income Populations*

**Alternative 2**

As discussed in Appendix T, *Environmental Justice Technical Appendix*, Section T.2.4, Alternative 2, the minimum elevations of Trinity Reservoir under Alternative 2 (all phases) except without TUCP and with Delta Voluntary Agreements, would remain similar to the No Action alternative. Under Alternative 2 without TUCP and with Delta Voluntary Agreements, minimum reservoir elevations may be lower than 2,170 feet. When Trinity Reservoir falls below 2,170 feet and boat ramps on the lake become unusable, recreational visitation is expected to be reduced by up to 27%. Reduced revenue resulting from decreased recreation visitation could result in a reduction in labor income or jobs. Affected jobs would likely include park staff, retail workers, hotel staff, and more. As described in Section T.1.1.2, *Poverty Levels*, Trinity County is considered a "poverty area." Therefore, it is anticipated that Alternative 2 without TUCP and with Delta Voluntary Agreements would result in potential disproportionately high and adverse impacts on minority and low-income populations from the loss of jobs in the tourism industry in the Trinity River Region.

Changes in CVP and SWP operations under Alternative 2 (all phases) would decrease the average annual agricultural water supply delivered to the Sacramento Valley Region, which would decrease the irrigated acreage under average and dry conditions, resulting in loss of revenue in both agricultural and agriculture-supporting businesses. Alternative 2 could result in an approximately 0.6% increase in the total farm worker labor force and/or an approximately 32.9% decrease in the total farm worker labor force during average conditions, and an approximately 1.0% to 32.2% decrease of the total farm worker labor force during dry conditions. While the jobs that would be lost or gained in the other sectors (not including agriculture) are primarily within the services sector, which includes jobs that are not predominantly held by low-income/minority populations, most agricultural jobs are held by minority and/or low-income populations. Thus, the loss of agricultural jobs and, to a lesser degree, the jobs within other sectors, under all phases of Alternative 2 could have disproportionately high and adverse effects on minority populations and localized populations of low-income people in these counties and throughout the region.

Changes in CVP and SWP operations under Alternative 2 (all phases) would increase M&I water supplies delivered to contractors in the San Joaquin Valley Region. Expected minor increases in labor income within multiple non-service-related job sectors have the potential to have negligible to minor beneficial effects for all workers in those sectors within the region. Changes in CVP and SWP operations under Alternative 2 would decrease the average annual agricultural water supply delivered to the San Joaquin Valley Region, which would decrease the irrigated acreage under

average and dry conditions, resulting in loss of revenue, both agricultural and agriculture-supporting businesses. This alternative may result in a decrease of up to 2.3% in the total farm worker labor force or an increase of up to 0.3% in the total farm worker labor force during average conditions. During dry conditions, Alternative 2 may result in a decrease in the farm worker labor force by between 1.0% and 2.0%. While the jobs that would be lost or gained in the other sectors (not including agriculture) are primarily within the services sector, which includes jobs that are not predominantly held by low-income/minority populations, most agricultural jobs are held by minority and/or low-income populations. Thus, the loss of agricultural jobs and, to a lesser degree, the jobs within other sectors, under all phases of Alternative 2 could have disproportionately high and adverse effects on minority populations and localized populations of low-income people in these counties and throughout the region.

Changes in CVP and SWP operations under Alternative 2 (all phases) would increase M&I water supplies delivered to contractors in the San Francisco Bay Area Region. Most of the potential for employment and labor income decreases and increases identified with these changes in M&I water supply deliveries would occur in the services sector. The expected minor increases in labor income within other sectors have the potential to have small effects on any workers in those sectors within the region. Although job losses could adversely affect minority and/or low-income individuals, these effects are not expected to be disproportionately high and adverse since the majority of individuals that would be affected by job losses are workers in the service sector. Implementation of Alternative 2 is expected to decrease average annual agricultural water supply deliveries in the San Francisco Bay Area Region. This could decrease the irrigated acreage and agricultural revenues in the region, resulting in a loss of agricultural jobs and/or a decrease in the income of agricultural workers, which could result in disproportionately high and adverse effects on minority and/or low-income populations.

**Sites Reservoir Project**

The Sites Reservoir Project would not cause disproportionate effects to employment of minority or low-income populations. Rather, it would create sources of labor income and jobs in Glenn, Colusa, and Yolo Counties due to operation and maintenance of the associated facilities and recreational areas as compared to the No Project Alternative. The overall effect of the operation of the Sites Reservoir Project on employment would be positive and beneficial, although the number of jobs generated by Project operations would be small in the context of total employment in the study area.

**Summary**

Alternative 2 has the potential to result in disproportionately high and adverse economic effects on minority populations and localized populations of low-income people throughout the Alternative 2 study area. These high and adverse economic effects are related to recreation within the Trinity River watershed, and agriculture within the Central Valley, including Sacramento County and San Joaquin County, and San Francisco Bay Region. The overall effect of the operation of the Sites Reservoir Project on employment would be positive and beneficial and in combination with the operation of Alternative 2 would not result in changes to disproportionate effects to employment of minority or low-income populations, as identified in the LTO EIS.

### *AA.4.14.2 Potential Disproportionate Effects to Health of Minority or Low-Income Populations*

**Alternative 2**

Alternative 2 would require chemical weed control and algae treatments involving the use of toxic herbicides at Clifton Court Forebay. However, these weed control and algae treatments would comply with relevant conditions required in the General Pesticide Permit issued for the work, and the same activities would be implemented under the No Action alternative. Alternative 2 is not expected to substantially reduce reservoir levels in the study area and is not expected to impair firefighting abilities in the study area. Thus, there would be no adverse effects related to human health on the population, including minority and low-income populations, within the study area.

**Sites Reservoir Project**

As discussed in Chapter 30, *Environmental Justice and Socioeconomics*, of the Sites Reservoir Project Final EIR/EIS, one block group with an identified minority-based environmental justice population is in Colusa County. Adverse effects or substantial adverse effects with the potential to result in disproportionately high and adverse effects to environmental justice populations in this block group were identified for air quality and visual resources. This block group would experience disproportionate effects from criteria pollutant mass emissions and localized criteria pollutant emissions due to proximity to permanent facilities.

Two of the block groups that contain Sites Reservoir Project facilities and have a minority-based environmental justice population are in Yolo County. Adverse effects or substantial adverse effects with the potential to result in disproportionately high and adverse effects on environmental justice populations in this block group were identified in air quality. Similar to the effects discussed above, this community would experience disproportionate criteria pollutant mass emissions.

There is one block group in Colusa County that contains facilities for the Sites Reservoir Project and has a low-income-based environmental justice population and thus is considered to have an environmental justice community. Population in this block group is concentrated in the communities of Lodoga and Stonyford. Adverse effects with the potential to result in disproportionately high and adverse effects to low-income populations were identified in the resource areas of air quality. This block group would experience the disproportionate adverse effects described above.

Overall, implementation of the Sites Reservoir Project would result in disproportionately high and adverse effects to minority environmental justice populations in the resource areas of air quality. The Sites Reservoir Project would increase criteria pollutant mass emissions as compared to the No Project Alternative. Substantial adverse effects would occur. As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 20, *Air Quality*, the feasibility of mitigation is discussed and where feasible mitigation is proposed to reduce the effects. Mitigation Measures AQ-1.1, AQ-1.2, AQ-2.1, and AQ-2.2 would reduce effects on air quality for affected receptors, including environmental justice populations. These mitigation measures would not fully reduce the identified effects of criteria pollutant emissions because there could be insufficient supply of

offsets, making it infeasible to reach offset targets. Therefore, emissions of criteria pollutants would remain substantially adverse.

**Summary**

Implementation of Alternative 2 would not result in adverse effects related to human health, including minority and low-income populations, within the study area. The Sites Reservoir Project Final EIR/EIS identified the potential for project operations to result in disproportionately high and adverse effects to environmental justice populations in a block group located in Colusa County related to air quality emissions due to proximity to permanent facilities. However, this effect is unique to the Sites Reservoir Project.

## AA.4.15 Power

### *AA.4.15.1 Potential Changes in Central Valley Project Net Generation*

**Alternative 2**

As discussed in LTO EIS Appendix U, under Alternative 2 Without TUCP Delta VA, there would be a 2% increase in average annual net power generation for all years, i.e., long-term average, and a 3% increase in net power generation in dry and critically dry years. For the other 3 phases of Alternative 2 there would be an increase in net power generation of up to 1% for the long-term average for CVP facilities, and up to 3% in dry and critically dry years. Under Alternative 2 Without TUCP Delta VA, reductions in monthly average CVP net power generation for the long-term average greater than 5% would occur in August (5%) and in dry and critically dry years, there would be monthly average reductions greater than 5% in August (6%) and September (13%). At a monthly level for the other three Alternative 2 phases, reductions in average CVP net power generation in all years, greater than 5% would occur in September (5%) under Alternative 2 Without TUCP Without VA and under Alternative 2 Without TUCP Systemwide VA. In dry and critically dry years, monthly reductions greater than 5% would occur in August (5%) and September (11%) under Alternative 2 Without TUCP Without VA, and in January (8%), August (6%), and September (12%) under Alternative 2 Without TUCP Systemwide VA. As described in Section U.2.7, *Mitigation Measures*, changes under Alternative 2 would result in decreased annual and/or monthly net energy generation and increased potential energy use by CVP water users for alternate water supplies.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 17, *Energy*, operation of the Sites Reservoir Project would result in generation of renewable hydroelectric power; however, renewable energy generated by the Sites Reservoir Project would be incidental to operations. The Sites Reservoir Project would result in a reduction in net electricity generation for the CVP as compared to the No Project Alternative. While a net reduction may occur, the reduction would not conflict or obstruct renewable energy plans or energy efficiency. The electrical equipment used during operation of the project would meet state and federal energy standards and the operation of nonresidential structures would not conflict with applicable energy efficiency standards would not result in wasteful, inefficient, or unnecessary consumption of electrical and petroleum project energy during construction and operation.

As described in Chapter 2, *Project Description and Alternatives*, operation of the Sites Reservoir Project would occur in coordination with the CVP/SWP system, thus potentially affecting CVP/SWP operations, including energy consumption and energy generation. Table 17-11 of the Sites Reservoir Project Final EIR/EIS shows the effect of the Sites Reservoir Project on the CVP as compared to the No Action Alternative. At CVP power facilities, capacity would be 7 GWh/year less long-term and 13 GWh/year higher in dry and critically dry water years. Energy generation would be 7 GWh/year less long-term and 17 GWh/year less in dry and critically dry water years. At CVP pumping facilities, energy use would be 14 GWh/year less long-term and 34 GWh/year less in dry and critically dry water years. Off-peak pumping targets would be unchanged.

**Summary**

As described above, Alternative 2 hydropower production would increase under Alternative 2 Without TUCP Delta VA but decrease during the remaining phases. The Sites Reservoir Project would result in a reduction in net electricity generation for the CVP as compared to the No Project Alternative; however, the reduction would not conflict or obstruct renewable energy plans or energy efficiency.

### *AA.4.15.2 Potential Changes in State Water Project Net Generation*

**LTO Alternative 2**

As discussed in LTO EIS Appendix U, under LTO Alternative 2 Without TUCP Delta VA would result in a 5% decrease in average annual net generation for all years and a 4% decrease in dry and critically dry years at SWP facilities. For the other LTO Alternative phases, a range of 5% to 6% decrease is estimated to occur over all years and a decrease of up to 5% in dry and critically dry years.

When estimated monthly, average SWP net generation would in all years decrease by 5% under LTO Alternative 2 Without TUCP Delta VA, ranging from 6% in October to 21% in May. Under LTO Alternative 2 Without TUCP Without VA would range from 5% in March to 23% in May. Under Alternative 2 Without TUCP Systemwide VA from 6% in October and March to 18% in February and May, and under LTO Alternative 2 With TUCP Without VA from 6% in March to 23% in May.

In dry and critically dry years monthly reductions greater than 5% would occur under Alternative 2 Without TUCP Delta VA from 5% in September to 59% in July; under Alternative 2 Without TUCP Without VA from 5% in August to 26% in July; under Alternative 2 Without TUCP Systemwide VA from 11% in June to 60% in July; and under Alternative 2 With TUCP Without VA from 6% in April to 44% in July.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 17, operation of the Sites Reservoir Project would result in generation of renewable hydroelectric power; however, renewable energy generated by the Sites Reservoir Project would be incidental to operations. The Sites Reservoir Project would result in a reduction in net electricity generation for the SWP as compared to the No Project Alternative. While a net reduction may occur, the reduction would not conflict or obstruct renewable energy plans or energy efficiency. Net electricity generation of

all facilities decreases for the Sites Reservoir Project as compared to the net electricity generation of the No Project Alternative for both long-term average and Dry and Critically Dry Water Years.

As described in Chapter 2, *Project Description and Alternatives*, operation of the Project would occur in coordination with the CVP/SWP system, thus potentially affecting CVP/SWP operations, including energy consumption and energy generation. Table 17-11 of the Sites Reservoir Project Final EIR/EIS shows the effect of the Sites Reservoir Project on the SWP as compared to the No Project Alternative. At SWP power facilities, capacity would be 15 GWh/year less long-term and 26 GWh/year less in dry and critically dry water years. Energy generation would be 80 GWh/year less long-term and 161 GWh/year less in dry and critically dry water years. At SWP pumping facilities, energy use would be 243 GWh/year less long-term and 540 GWh/year less in dry and critically dry water years. Off-peak pumping targets would be unchanged.

**Summary**

As described above, Alternative 2 net hydropower production would decrease under Alternative 2 (all phases) at SWP facilities. The Sites Reservoir Project would also result in a reduction in net electricity generation for the SWP.

## AA.4.16 Hazards and Hazardous Materials

### *AA.4.16.1 Expose People or Structures to a Substantial Risk of Loss, Injury or Death Involving Wildfires*

**Alternative 2**

As discussed in LTO EIS Appendix V, Section V.2.4, Alternative 2, there would be no adverse effects on people or structures from wildfires under Alternative 2 (all phases) because changes in CVP and SWP operations would not substantially impair the ability to fight wildfires. Reservoir water levels in the study area would not be substantially different from the No Action Alternative and thus ample water from reservoirs would be available to fight wildfires, if needed. Further, given that most of the study area, specifically the Sacramento and San Joaquin Valleys, is outside of an area designated as a Very High or High Fire Hazard Severity Zones, and given that there are multiple methods that are used in suppressing wildfires aside from drawing water from reservoirs via helicopter, including fire retardants and suppressants and containment lines, implementation of Alternative 2 would not impair the ability to suppress wildfires.

**Sites Reservoir Project**

The Sites Reservoir Project would not expose people or structures to a significant risk, loss, injury or death involving wildland fires as compared to the No Project Alternative. There would be no adverse effect on people or structures, either directly or indirectly, due to increased risk of loss, injury, or death involving wildland fires. As described in the Sites Reservoir Project Final EIR/EIS Chapter 27, the project would not exacerbate fire risk as compared to the No Project Alternative. BMP-18 would be implemented and the Sites Reservoir would represent a potential water source in the event of a wildfire. The Sites Reservoir Project would also not substantially impair an adopted emergency response plan or emergency evacuation plan for facilities located

in a State Responsibility Area or VHFHSZ as compared to the No Project Alternative. During operation, no permanent occupants would be present, as compared to the No Project Alternative. The Sites Reservoir Project would not expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire and there would be no adverse effects.

**Summary**

The Sites Reservoir Project Final EIR/EIS determined that there would not be an adverse effect on people and structures from wildfires due to Sites Reservoir Project operations. Similarly, the LTO EIS concluded that implementation of Alternative 2 (all phases) would not result in adverse effects on people and structures from wildfires. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not expose people or structures to a substantial risk of loss, injury or death involving wildfires, as identified in the LTO EIS.

### *AA.4.16.2 Increase the Potential for Creating a Public or Environmental Hazard through the Use or Accidental Release of Hazardous Materials*

**Alternative 2**

Under Alternative 2 (all phases) there would be no project-related construction. Implementation of Alternative 2 would not result in hazards or hazardous materials impacts as the result of operations-related activities because there would be no accidental release or changes in the use of hazardous material. Operations-related activities that require the use of hazardous materials (e.g., Clifton Court Forebay Weed Management) have already undergone separate environmental review and permitting.

**Sites Reservoir Project**

The Sites Reservoir Project would not create a significant hazard to the public or the environment as compared to the No Project Alternative. The public would be prevented from accessing areas of handling, use, and transport of hazardous materials, which would reduce the likelihood of accidents or upsets resulting in a significant hazard to the public. In addition, the transportation, handling, and disposal of hazardous materials will be in accordance with applicable regulations and compliant with regulations enforced by CUPAs, OSHA, and other regulating and permitting agencies (including the implementation of BMP-12, BMP-13, and BMP-30, as described in Chapter 27 of the Sites Reservoir Project Final EIR/EIS). Operation of the Sites Reservoir Project would not occur on a site that is included on the lists of hazardous materials sites compiled pursuant to California Government Code Section 65962.5.

**Summary**

The LTO EIS concluded that implementation of all phases of Alternative 2 would not result in adverse effects related to hazardous materials. Similarly, the Sites Reservoir Project Final EIR/EIS concluded that the project would not create a significant hazard to the public or the environment as compared to the No Project Alternative. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not increase the potential for creating a public or environmental hazard through the use or accidental release of hazardous materials, as identified in the LTO EIS.

## AA.4.17 Geology and Soils

### *AA.4.17.1 Potential Changes in Soil Erosion*

**Alternative 2**

As discussed in LTO EIS Appendix W, during dry and wet periods, changes in CVP and SWP operations under Alternative 2 (all phases) would result less mass-wasting (i.e., landslides) and surface erosion in Trinity Reservoir there would be less drawdown in the reservoir relative to the No Action Alternative. Changes in peak flows during wet periods due to CVP and SWP operations are expected in the Trinity River below Lewiston Dam under Alternative 2 (all phases). Operations during wet periods under Alternative 2 for phases without Voluntary Agreements would likely result in more erosion than the No Action Alternative because peak flows in Trinity River below Lewiston Dam would be greater than the No Action Alternative. During dry periods, releases to the Trinity River under all phases of Alternative 2 would be lower and, therefore, there would be less mass-wasting and erosion relative to the No Action Alternative.

*Sacramento Valley*

During dry periods, all phases of Alternative 2 would result in greater mass-wasting and surface erosion in Shasta Reservoir relative to the No Action Alternative because drawdown would be greater, which would result in more shoreline exposed. For wet periods, all phases of Alternative 2 except Alternative 2 Without TUCP All VA, have drawdown values that indicate a higher probability for mass-wasting and surface erosion compared to the No Action Alternative. Sacramento River releases during both dry and wet periods would be greater relative to the No Action Alternative for all phases of Alternative 2 and, therefore, there is a higher likelihood for mass-wasting and surface erosion to occur.

During dry periods, Folsom Reservoir drawdowns for all phases of Alternative 2, except for Alternative 2 Without TUCP Without VA, would have a higher likelihood of resulting in mass-wasting and surface erosion relative to the No Action Alternative. For wet periods, there is lower likelihood for mass-wasting and surface erosion in Folsom Reservoir under Alternative 2 (all phases) due to lower drawdowns.

American River releases during dry periods Alternative 2 (all phases) would have a lower likelihood for mass-wasting and surface erosion relative to the No Action Alternative. American River releases during wet periods for Alternative 2 Without TUCP Without VA and Alternative 2 With TUCP Without VA would not be different from the No Action Alternative drawdown and therefore mass-wasting and surface erosion would not be expected. Alternative 2 Without TUCP With Delta VA and Alternative 2 Without TUCP All VA, during wet periods, would have a lower likelihood for mass-wasting and surface erosion in the American River relative to the No Action Alternative.

Peak flows through the Yolo Bypass are expected to increase minimally under Alternative 2 Without TUCP Without VA and Alternative 2 With TUCP Without VA relative to the No Action Alternative. However, peak flows through the Yolo Bypass are expected to decrease somewhat under Alternative 2 Without TUCP With Delta VA and Alternative 2 Without TUCP All VA relative to the No Action Alternative. These minor changes in winter flood flows through the

Yolo Bypass are negligible given the low channel gradient, large cross-sectional area for flow and low flow velocities at the margins of the bypass and is unlikely to result in a potential impact.

Relative to the No Action Alternative, Alternative 2 (all phases) would result in an increase in lands subject to fallowing in the Sacramento River Region, which would increase the potential for erosion. All phases of Alternative 2 would result in increases in lands subject to fallowing during average, critical and dry water year types relative to the No Action Alternative. The greatest increases in acres of land subject to fallowing in the Sacramento River Region would occur under Alternative 2 Without TUCP Systemwide VA during average water years.

*San Joaquin River Region*

During dry periods, all phases of Alternative 2 would likely result in less mass-wasting and surface erosion in New Melones Reservoir relative to the No Action Alternative because there would be less drawdown. For wet periods, all phases of Alternative 2 have drawdown values that indicate a higher likelihood for mass-wasting and surface erosion than under the No Action Alternative. Releases to the Stanislaus River from the New Melones Reservoir under all phases for both dry and wet periods would also have a greater likelihood for mass-wasting and surface erosion relative to the No Action Alternative.

There would be no change in CVP operations with respect to water storage in Millerton Reservoir or release of water to the San Joaquin River.

Relative to the No Action Alternative, all phases of Alternative 2 except Alternative 2 With TUCP Without VA would increase lands subject to fallowing in the San Joaquin River Region during both average water years and the average of dry and critical water year types, which would increase the potential for erosion. The greatest increase in lands subject to fallowing would occur under Alternative 2 Without TUCP Systemwide VA during average water years. When compared to the No Action Alternative, Alternative 2 With TUCP Without VA would decrease lands subject to fallowing in the San Joaquin River Region during average water years, which would decrease the potential for erosion. However, during the average of critical and dry water year types, there would be an increase in acreages of fallowed land, which would increase the potential for erosion.

*Bay-Delta Region*

Because there are no storage reservoirs associated with the Bay-Delta Region no changes in reservoir water levels would occur that could result in shoreline erosion. No changes in peak flows are expected in the Bay-Delta under Alternative 2 (all phases), relative to the No Action Alternative, therefore, erosion related to peak flow events would not occur in this area. No changes in peak flows are expected in the Suisun Marsh or the San Francisco Bay under Alternative 2; therefore, there is no expected change to erosion rates.

**Sites Reservoir Project**

As discussed in the Sites Reservoir Project Final EIR/EIS Chapter 12, *Geology and Soils*, no degradation of soil health would occur during operation because all vegetation clearing, temporary soil disturbances and temporary soil stockpiling would occur during construction. No adverse effects related to increased soil erosion rates or loss of topsoil would occur as the result

of the Sites Reservoir Project. In addition, releases that enter into GCID Main Canal would not cause substantial erosion because of energy dissipation structures. Similarly, releases from the Dunnigan Pipeline would not cause erosion because energy dissipation structures would be in place to prevent erosion at the CBD.

According to the Chapter 7, *Fluvial Geomorphology* analysis, operation of the project would not substantially alter natural river geomorphic processes and existing geomorphic characteristics for the Sacramento River, Yolo Bypass, Sutter Bypass, and Delta. The average (system-wide) decrease in monthly average flow between the No Project Alternative and operations under Alternative 1 or 3 is approximately 2% and diversions would only occur under higher flow regimes in the Sacramento River. Operational impacts on the geomorphic regime (including natural river geomorphic processes such as sediment transport and bank erosion) and existing river geomorphic characteristics (e.g., sinuosity, channel gradient, substrate composition, channel width and depth, and riparian vegetation) of the greater Sacramento River system are expected to be minimal. The overall volume of water available and the pattern of water diversion in the Sacramento River would generally be similar to the amount and pattern of water diversion under No Project Alternative conditions. In the Yolo Bypass, any scouring (and associated downstream deposition) that occurs would be limited to the low-flow channel and cause minimal disruption to the overall channel within the bypass during the driest months. The proposed flows into the bypasses would be within historical values typically received by the bypass and would not significantly alter the existing geomorphic processes during the wet months.

**Summary**

The LTO EIS determined that Alternative 2 operations could result in increased potential for erosion in some reservoirs, rivers and fallowed agricultural land in some water year types in the Trinity River Region, Sacramento Valley, and San Joaquin River Region. No adverse effects related to increased soil erosion rates or loss of topsoil would occur as the result of the Sites Reservoir Project. The Sites Reservoir Project would also not substantially alter natural river geomorphic processes and existing geomorphic characteristics for the Sacramento River, Yolo Bypass, Sutter Bypass, and Delta. As such, operation of Sites Reservoir in combination with Alternative 2 would not change soil erosion as disclosed within the LTO EIS.

### *AA.4.17.2 Potential Changes in Rate of Land Subsidence Due to Increased Use of Groundwater*

**Alternative 2**

Average groundwater levels are simulated to decrease up to approximately 12 – 20 feet depending on the Alternative 2 phase. Phases with larger decreases (e.g., Alternative 2 Without TUCP Delta VA and Alternative 2 Without TUCP Systemwide VA) would have a higher likelihood of causing additional subsidence. The largest decreases in groundwater levels are simulated to occur along the western portion of the Central Valley in the Sacramento San Joaquin Valleys. Portions of these areas are known to have historic subsidence and further reductions in groundwater levels may cause additional subsidence. The location and amount of subsidence is highly dependent on the local soil conditions and historical low groundwater levels in the area.

**Sites Reservoir Project**

In summary, model-simulated Sacramento River groundwater elevations were almost identical to average historic conditions or conditions under the No Project Alternative. In addition, diversions would occur during high-flow events when excess surface water is available and would have minimal interference with groundwater recharge. The availability of additional surface water supplies will reduce dependence on groundwater pumping for participating Storage Partners and the CVP/SWP service areas (Appendix 8A).

**Summary**

As described above Alternative 2 (all phases) would result in increases in groundwater pumping within the Central Valley. As stated above, the Sites Reservoir Project would lower dependency on groundwater pumping and would not increase use of groundwater. Operation of the Sites Reservoir Project would not result in groundwater pumping and an increase in south-of-Delta surface water deliveries would benefit rather than adversely affect ground water supplies within the SWP service area such that a change (i.e., increase) in groundwater pumping would occur in that region. On average, CVP and SWP deliveries are expected to increase with the Sites Project and would likely help reduce reliance on groundwater. This increase in groundwater storage could reduce land subsidence and disconnections from surface water. As such, it is anticipated that operation of Sites Reservoir Project in combination with the operation of Alternative 2 would not worsen and maybe reduce groundwater pumping and the effects to subsidence, as identified in the LTO EIS.

## AA.4.18 Public Health and Safety

### *AA.4.18.1 Potential Changes in the Potential for Valley Fever Related to Changes in Irrigated Agricultural Land*

**Alternative 2**

As discussed in LTO EIS Appendix X, Section V.2.4, Alternative 2, there would be decrease in irrigated agricultural acreages in the Sacramento River and San Joaquin River Regions over the long-term average condition for all phases of Alternative 2 except for the San Joaquin River under Alternative 2 with the Temporary Urgency Change Petitions without the Voluntary Agreements (Alt2wTUCPwoVA). For all Alternative 2 phases except Alt2wTUCPwoVA over the long-term average condition, reductions would be greatest for the San Joaquin River Region. In dry and critical dry years under Alternative 2 (all phases) there would be decreases in irrigated agricultural acreages in both the Sacramento River Region and the San Joaquin River Region and reductions would be greatest for the San Joaquin River Region. Although there would be an overall reduction in irrigated agricultural land in the study area under Alternative 2, conversion of this land to non-agricultural use would not necessarily mean that the land would be fallowed or idled; land taken out of production could be converted to a different land use altogether that is not conducive to the growth of Coccidioides.

**Sites Reservoir Project**

Chapter 20, *Air Quality*, of the Sites Reservoir Project Final EIR/EIS explains the conclusion that *C. immitis* spores do not commonly infect people with Valley Fever in the study area despite the presence of dusty conditions. However, the Sites Reservoir Project still includes BMP-28 to

control fugitive dust, including using soil stabilizers and routine watering that would minimize dusty conditions, and BMP-19 to train workers to identify symptoms of Valley Fever, which would both reduce the risk of receptors contracting Valley Fever. The Sites Reservoir Project would not expose sensitive receptors to significant emissions related to Valley Fever. Implementation of BMP-28 and BMP-19 would minimize dusty conditions and reduce the risk of contracting Valley Fever. There would be no adverse effect from the project related to dust related to Valley Fever.

**Summary**

The Sites Reservoir Project Final EIR/EIS determined that Sites Reservoir Project operations would not increase the potential Valley fever. Similarly, the LTO EIS concluded that implementation of all phases of Alternative 2 would not increase the potential for Valley fever. As such, it is anticipated that operation of the Sites Reservoir Project in combination with the operation of Alternative 2 would not result in an increase in the potential for Valley fever, as identified in the LTO EIS.

### *AA.4.18.2 Potential Changes in Methylmercury Production and Resultant Changes in Bioaccumulation in Fish for Human Consumption*

**Alternative 2**

As discussed in LTO EIS Appendix X, *Public Health and Safety Technical Appendix*, modeled changes in water column concentrations of total methylmercury at Delta assessment locations, Alternative 2 (all phases) would have little to no measurable effect on Delta fish tissue concentrations relative to the No Action Alternative. Similarly, operations would not contribute to additional water quality degradation with respect to water column methylmercury concentrations or increased methylmercury bioaccumulation in biota in Suisun Bay and San Francisco Bay because Delta outflow rates in all months except June would be lower than the No Action Alternative. Therefore, Alternative 2 (all phases) would not result in increased health risks to humans consuming fish from the Delta, Suisun Bay, or San Francisco Bay.

**Sites Reservoir Project**

Due to inundation of organic matter in the Sites Reservoir footprint during the initial filling of the reservoir, aqueous methylmercury concentrations in the reservoir would be higher than average concentrations in the long term. The overall potential intake of mercury-tainted fish by the public would be reduced by following these fish consumption advisories. Furthermore, as described in Chapter 6, Mitigation Measure WQ-1.1, *Methylmercury Management* will be implemented to reduce mercury methylation and bioaccumulation in Sites Reservoir. Based on results from fish tissue monitoring, and in coordination with the State Water Board, Central Valley RWQCB, and OEHHA, fish consumption warning signs will be posted in several visible locations around the reservoir if fish tissue concentrations exceed the 0.20 mg/kg ww sport fish objective. These actions will further reduce the overall potential intake of mercury-tainted fish by the public.

Releases from Sites Reservoir would not increase total mercury concentrations in the CBD because estimated expected short- and long-term concentrations in reservoir releases would be lower than average concentrations in the CBD under the No Project Alternative. If

methylmercury concentrations in the CBD were to increase somewhat from Sites Reservoir releases, it is unlikely that this would lead to a substantial long-term increase in fish tissue concentrations because water residence time would be low due to Sites Reservoir releases, which would generally occur from May–November. 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, including recreational and subsistence fisherpersons, against the overconsumption of fish with increased body burdens of mercury.

Sites Reservoir releases to Funks and Stone Corral Creeks would result in increased mercury and methylmercury in these creeks relative to the No Project Alternative, and concentrations would be higher in the short term compared to the long term, as discussed above for Sites Reservoir. Because Funks and Stone Corral Creeks are small, intermittent streams and their stream banks are located primarily on private land, it is unlikely that anglers would be fishing these waterbodies; accordingly, any potential increases in methylmercury bioaccumulation of fish in these creeks would not be expected to affect the public.

Methylmercury in fish in the study area and public health due to the consumption of those fish would not be expected to change substantially as compared to the No Project Alternative. OEHHA standards and fish consumption advisories would be implemented as required under applicable laws for the consumption of study area fish, and implementation of Mitigation Measure WQ-1.1 would further reduce potential effects from methylmercury. There would be no adverse effect on public health.

**Summary**

The LTO EIS concluded that implementation of Alternative 2 (all phases) would not increase public health risks from methylmercury due to the consumption of fish from the Delta, Suisun Bay, or San Francisco Bay. Similarly, methylmercury in fish in the Sites Reservoir study area and public health due to the consumption of those fish is expected to result in minor changes as compared to the No Project Alternative. OEHHA standards and fish consumption advisories would be implemented as required under applicable laws for the consumption of study area fish, and implementation of Mitigation Measure WQ-1.1 would further reduce potential effects from methylmercury.

### *AA.4.18.3 Potential Changes in the Potential for Public Exposure to Cyanotoxins Due to an Increase in CHABs*

**Alternative 2**

As discussed in LTO EIS Appendix X, LTO Alternative 2 (all phases) is expected to have minor, if any, effect on the environmental variables (i.e., irradiance, nutrients, water column turbulence/mixing, temperature, and residence time) in the Delta, Suisun Marsh, Suisun Bay, or San Francisco Bay such that there would not be expected to increase the frequency or magnitude of cyanobacteria harmful algal blooms (CHABs), relative to the No Action Alternative. As such, Alternative 2 would not increase the potential for public exposure to cyanotoxins.

**Sites Reservoir Project**

Operating Sites Reservoir would result in reservoir drawdown, reduced storage volume, and higher water temperatures during late spring through fall that would further contribute to favorable conditions for HABs during the initial filling period, as well as in subsequent years, and reduced storage volumes (particularly during the late spring through fall of Dry and Critically Dry Water Years) would potentially result in higher concentrations of cyanotoxins if HABs were to occur. The Sites Project Authority would develop and implement a Reservoir Management Plan, which would minimize the potential for effects on public health due to HABs during the initial filling period and during reservoir operation.

The initial filling and operations of Sites Reservoir would potentially result in conditions that are conducive to the formation and maintenance of HABs as compared to the No Project Alternative. The HAB-associated actions implemented for the RMP would minimize the risk to public health from potential cyanotoxin exposure.

**Summary**

The LTO EIS identified implementation of Alternative 2 (all phases) would not increase the potential for public exposure to cyanotoxins. The HAB-associated actions implemented for the Sites Reservoir RMP would minimize the risk to public health from potential cyanotoxin exposure.

# AA.5 Resources Not Analyzed within the Appendix

## AA.5.1 Flood Control

As discussed in LTO EIS Chapter 23, *Resources Not Analyzed in Detail*, CVP and SWP reservoirs provide flood control in addition to their other purposes. In theory, changing the operations of the facilities could have the potential to affect flood management; however, Reclamation and DWR are not proposing to alter flood control requirements. Each facility has a flood control curve that defines storage throughout the year that must be available to help manage high flows. Alternative 2 would not change these flood control curves or operational parameters established in cooperation with the U.S. Army Corps of Engineers to manage flood risk. Reclamation and DWR would continue to operate with the same flood management procedures under the action alternatives; therefore, the action alternatives would not affect flood control.

Flood control is evaluated in the Sites Reservoir Project Final EIR/EIS Chapter 5, *Surface Water Resources*. The study area for flood control and management facilities includes the local drainages in the inundation area and downstream, as well as the larger flood management system along the Sacramento River and the Yolo Bypass. As discussed in Chapter 5, *Surface Water Resources*, the Sites Reservoir would have no adverse effect for flood control. The Sites Reservoir Project would incorporate design criteria and avoidance or minimizing of fault crossings and operate through pumping for offstream storage. The Sites Reservoir Project would not have an adverse effect on flooding and impediment or redirection of flood flows. The Sites Reservoir Project would not substantially increase flooding on site or off site as compared to the No Project Alternative. In addition, the project would provide direct flood control benefits within

the Stone Corral Creek and Funks Creek watersheds by reducing the size of the floodplain within the region, having a beneficial effect.

### AA.5.2 Population and Housing

As discussed in LTO EIS Chapter 23, *Resources Not Analyzed in Detail*, a detailed analysis of population and housing was not included in this EIS because Alternative 2 (all phases) would not cause impacts on population and housing. Alternative 2 is comprised primarily of operational changes that would not directly or indirectly affect housing or residential populations or create new water supplies that are anticipated to accommodate growth. Alternative 2 would not create additional housing, provide infrastructure to support additional population, or displace existing populations necessitating the creation of housing in another location. Therefore, it is not anticipated that Alternative 2 would result in direct or indirect population growth as the result of operations-related activities.

As discussed in Chapter 25, *Population and Housing*, the Sites Reservoir would have no adverse effect for population and housing.

Because neither operation of the LTO EIS action alternatives nor the Sites Reservoir Project would affect population and housing, population and housing is not further addressed in this appendix.

### AA.5.3 Navigation, Transportation, and Traffic

As discussed in LTO EIS Chapter 23, *Resources Not Analyzed in Detail*, the alternatives evaluated in the EIS would not cause impacts on traffic and transportation because Alternative 2 (all phases) are comprised primarily of operational changes that would not directly or indirectly affect traffic. The operational changes would not induce additional traffic or interfere with existing traffic and transportation patterns. Therefore, it is not anticipated that Alternative 2 (all phases) would result in impacts on traffic and transportation as the result of operation-related activities.

Navigation, transportation, and traffic is discussed in the Sites Reservoir Project Final EIR/EIS Chapter 18, *Navigation, Transportation, and Traffic*. The study area for navigation, transportation, and traffic consists of the local study area (i.e., project inundation area and construction footprint of the associated facilities) and regional study area (i.e., trip origins from surrounding population centers). The Sites Reservoir Project would have no adverse effect on the study area circulation system or conflict with programs, plans, ordinances, or policies addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. Operation of the Sites Reservoir Project would change certain travel patterns in the regional study area. There would be an offset between the vehicle miles traveled (VMT) reduction due to the changed recreational trips and the VMT increase expected from new trips generated to the recreation areas and the reservoir supporting facilities for operations and maintenance. The VMT recreational reduction is substantially greater than the VMT operations and maintenance increase. Federal policy, like Senate Bill 743, encourages reductions in greenhouse gas emissions through a variety of means. As such, effects would not occur. Roads under the Sites Reservoir Project would result in no adverse effect. The Sites Reservoir Project would also result in no adverse effect on emergency access, school bus travel, or navigable waterways.

### AA.5.4 Noise

As discussed in LTO EIS Chapter 23, *Resources Not Analyzed in Detail*, typically, noise and vibration effects would be the result of construction activities. Alternative 2 (all phases) would not include construction activities for new infrastructure and, therefore, would not include any operations or maintenance activities for any newly constructed infrastructure. Therefore, it is not anticipated that Alternative 2 would result in adverse noise and vibration effects.

Operational noise is discussed in the Sites Reservoir Project Final EIR/EIS Chapter 19, *Noise*. The study area for noise consists of a 1-mile-wide buffer distance around all Project facilities in Tehama, Glenn, Colusa, and Yolo Counties, including the inundation area and roads, PGPs, intakes, and associated infrastructure. There would be no adverse effect on sensitive receptors due to noise from the permanent operation of facilities under the Sites Reservoir Project. There would also be no adverse effect on sensitive receptors or damage to buildings due to vibration.