Chapter 1 Introduction

On August 2, 2016, the United States Department of the Interior, Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) jointly requested the Reinitiation of Consultation on the Coordinated Long-Term Operation of the Central Valley Project (CVP) and State Water Project (SWP, or Project). The United States Fish and Wildlife Service (USFWS) accepted the reinitiation request on August 3, 2016, and the National Marine Fisheries Service (NMFS) accepted the reinitiation request on August 17, 2016. This biological assessment supports Reclamation's consultation under Section 7 of the Endangered Species Act (ESA) of 1973, as amended, and documents the potential effects of the proposed action on federally listed endangered and threatened species that have the potential to occur in the action area and critical habitat for these species. It also fulfills consultation requirements for the Magnuson-Stevens Fishery Conservation and Management Act of 1976 for Essential Fish Habitat (EFH).

Reclamation's mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. Reclamation is the largest wholesale water supplier in the United States, and the nation's second largest producer of hydroelectric power. Its facilities also provide substantial flood control, recreation, and fish and wildlife benefits. In Northern California, Reclamation operates the CVP in coordination with DWR's operation of the SWP. The mission of DWR is to manage the water resources of California, in cooperation with other agencies, to benefit the state's people and to protect, restore, and enhance the natural and human environment.

The CVP consists of 20 dams and reservoirs that together can store nearly 12 million acre-feet (MAF) of water. Reclamation holds over 270 contracts and agreements for water supplies that depend upon CVP operations. Through operation of the CVP, Reclamation delivers water in 29 of California's 58 counties in the following approximate amounts: 5 MAF of water for farms; 600 thousand acre-feet (TAF) of water for municipal and industrial (M&I) uses (enough water to supply about 2.5 million people for a year); and 355 TAF of water for wildlife refuges. Reclamation operates the CVP under water rights granted by the State of California, including those intended to protect agricultural and fish and wildlife beneficial uses in the Sacramento–San Joaquin Delta (Delta). The CVP generates approximately 4.5 million megawatt hours of electricity annually on average.

The SWP's main facilities are Oroville Dam, the Harvey O Banks Pumping Plant (Banks Pumping Plant), and San Luis Reservoir. These facilities are operated and connected by a network of canals, aqueducts, and other facilities of the SWP to deliver on average approximately 2.6 MAF of contracted water supplies annually. DWR holds contracts with 29 public agencies in the Feather River Area, North Bay Area, South Bay Area, San Joaquin Valley, Central Coast, and Southern California for water supplies from the SWP. Water stored in the Lake Oroville facilities, along with excess water available in the Delta, is captured in the Delta and conveyed through several facilities to SWP contractors. Through the SWP, DWR provides flood control below Oroville Dam and water for agricultural, M&I, recreational, and environmental purposes. DWR conserves water in Lake Oroville and makes releases to meet regulatory obligations and agreements tied to the operations of the SWP. Releases also serve three contractors in the Feather River area and two contractors from the North Bay Aqueduct. DWR pumps water at the Banks Pumping Plant in the Delta for delivery to the remaining 24 public water agencies in the SWP service areas south of the Delta.

The proposed action analyzed in this consultation centers on a Core Water Operation that provides for Reclamation and DWR to operate the CVP and SWP for water supply and to meet the requirements of State Water Resources Control Board (SWRCB) Water Right Decision 1641 (D-1641), along with other project purposes. The Core Water Operation consists of operational actions that do not require subsequent concurrence or extensive coordination to define annual operation. The proposed action also includes conservation measures designed to minimize or reduce the effects of the action on listed species. In addition, this biological assessment and resulting consultation evaluates actions that will require further development and may change during repeated implementation as more information becomes available (i.e., "adaptive management"). Adaptively managed actions will require additional coordination prior to implementation through program-specific teams established by Reclamation and DWR with input and participation from partner agencies and stakeholders.

In 2015, the USFWS and NMFS (collectively, the Services) promulgated an addition to the regulations on Interagency Cooperation (50 Code of Federal Regulations [CFR] § 402) that is relevant to this consultation. The regulation added a "mixed programmatic action" for the purpose of issuing an Incidental Take Statement for take authorization. The regulation describes a mixed programmatic action as "a Federal action that approves action(s) that will not be subject to further Section 7 consultation, and also approves a framework for the development of future action(s) that are authorized, funded, or carried out at a later time, and any take of a listed species would not occur unless and until those future action(s) are authorized, funded, or carried out and subject to further Section 7 consultation."

This distinction allows for an Incidental Take Statement to be issued for those parts of the action that are specific enough that the Services can meet the regulatory burden of reasonable certainty. Where that degree of certainty is not met, the Services may analyze the future action to determine whether jeopardy of a listed species or destruction or adverse modification of designated critical habitat is likely to result from the entirety of the proposed action, and make an overall conclusion for the listed species and designated critical habitat. Once sufficient detail is available for future actions, Reclamation agrees to initiate targeted Section 7 consultation on these actions.

The proposed action includes immediate site-specific actions, as well as future actions that may be subject to subsequent site-specific Section 7 consultation. This aligns with the description of a "mixed programmatic action," and Reclamation proposes to consult on the overall action as such.

On December 12, 2018, the California Natural Resources Agency (CNRA) presented a framework for Voluntary Agreements to the SWRCB in response to proposed Bay-Delta Water Quality Control Plan (WQCP) amendments. This framework was the result of years of coordination between CNRA, Reclamation, and several public water agencies in California. The SWRCB is currently considering the Voluntary Agreements as part of its proceeding, with at least two upcoming dates in 2019 (March and December) for deliberation. If approved, the Voluntary Agreements would provide additional flows, facility improvements, and habitat restoration that benefit listed species, with a proposed funding mechanism to implement these enhancements. Reclamation and DWR support the Voluntary Agreements and continue to participate in their development. Preliminary analysis indicates that when combined with the Core Water Operation proposed in this consultation, the Voluntary Agreements are beneficial to listed species and critical habitat. However, Reclamation is not consulting on Voluntary Agreements in this biological assessment.

1.1 Background

In this biological assessment, consistent with the ESA and applicable regulations, Reclamation separates the proposed action from the environmental baseline in order to determine whether the action is likely to adversely affect ESA-listed species. Reclamation's analysis is informed by the complex history of water and infrastructure development in California. The environmental baseline includes impacts to ESA-listed species resulting from the original construction and development of dams in the action area as well as decades of man-made and and other alterations to fish species that occurred during the last 300 years (as described below).

When developing and assessing the potential effects of the proposed action, Reclamation considers the context of the complex history of water and land development in California in order to separate the proposed action from the environmental baseline and determine whether it is likely to adversely affect ESA-listed species.

Water storage and diversion in California began in 1772, with a 12-foot high dam on the San Diego River. The discovery of gold in the Sierra Nevada in 1849 intensified the human development of the Central Valley. Natural water flows were diverted to aid in hydraulic mining, and the Sacramento River and San Joaquin River watersheds were polluted with contaminants originating from historic and active mine sites. Major flood protection efforts began in 1840 with levee construction along Grand Island. Revetments and bank armoring, and other protection measures to prevent erosion along the levees, caused and continue to cause channel narrowing and incision and prevent channel migration. Levees have also isolated former floodplains from the river channel, preventing access for rearing for juvenile salmonids.

Commercial harvest of salmon began in the 1850s (CDFG 1929) and gill net salmon fisheries became well established in the lower Sacramento and San Joaquin Rivers by 1860. In 1910, there were 10 million pounds of commercial salmon catch; that yield declined to 4.5 million pounds by 1919, when the last inland cannery closed (CDFG 1929).

Striped Bass (*Morone saxatilis*), introduced from the East Coast in the 1880s, supported a commercial fishery for almost 50 years and currently provide a recreational fishery. Striped Bass and other introduced species prey upon listed species. A Striped Bass population of 1,000,000 could consume 9 percent of out-migrating Winter-Run Chinook Salmon (*Oncorhynchus tshawytscha*) based on Bayesian population dynamics modeling (Lindley and Mohr 2003). Other invasive animal and plant species alter sediment dynamics, compete for resources, change the physical habitat, and disrupt the foodweb. Invasive clams were first introduced in the 1940s, and the invasion of the Amur River clam (*Potamocorbula amurensis*) in 1986 fundamentally altered the Delta foodweb. These filter feeders significantly reduce the phytoplankton and zooplankton concentrations in the water column, reducing food availability for native fishes, such as Delta Smelt (*Hypomesus transpacificus*) and young Chinook Salmon.

1.1.1 Construction and Operation of the CVP and SWP

Congress authorized Reclamation to develop the CVP for the public good of delivering water and generating power, while providing flood protection to downstream communities and protecting water quality for water users within the system. Congress envisioned a large, complex project integrated across multiple watersheds that Reclamation would operate to ensure the most beneficial use of water released into the system.

The 1935 Rivers and Harbors Act authorized Reclamation to take over the CVP from the State of California and its initial features were authorized for construction. In 1937, the Rivers and Harbors Act

reauthorized the CVP under Reclamation Law. The 1937 Act and subsequent authorizations completed Friant Dam in 1942, Shasta Dam in 1944, Folsom Dam in 1956, San Luis Dam in 1967, Trinity Dam in 1962, and New Melones Dam in 1978. Today, Reclamation operates the CVP consistent with the CVP's federally authorized purposes, including:

- river regulation;
- improvement of navigation;
- flood control;
- water supply for irrigation and municipal and industrial uses;
- fish and wildlife mitigation, protection, and restoration;
- power generation; and
- fish and wildlife enhancement.

The Burns-Porter Act, approved by the California voters in November 1960 (Water Code [Wat. Code] §§ 12930–12944), authorized issuance of bonds for construction of the SWP. DWR's authority to construct state water facilities or projects is derived from the Central Valley Project Act (CVPA) (Wat. Code § 11100 et seq.), the Burns-Porter Act (California Water Resources Development Bond Act) (Wat. Code §§ 12930–12944), the State Contract Act (Pub. Contract Code § 10100 et seq.), the Davis-Dolwig Act (Wat. Code §§ 11900–11925), and special acts of the State Legislature.

In 1978, the SWRCB issued Water Rights Decision 1485 (D-1485). D-1485 required spring outflow and set salinity standards in the Delta while setting standards for the diversion of flows into the Delta during winter and spring.

In 1986, Public Law 99-546 directed the Secretary of the Interior to execute the Coordinated Operations Agreement (COA). The COA defined CVP and SWP facilities and their water supplies, coordinated operational procedures, identified formulas for sharing joint responsibility for meeting Delta standards (such as those in D-1485), identified how unstored flow was shared, and established a framework for exchange of water and services between the projects.

In 1992, Public Law 102-575 included Title 34, the Central Valley Project Improvement Act (CVPIA) that refined water management for the CVP. The CVPIA added fish and wildlife mitigation, protection, and restoration as a project purpose with the same priority as water supply, and also added fish and wildlife enhancement as a project purpose with the same priority as power generation. In addition, the CVPIA prescribed a number of actions to improve anadromous fish and provided for other fish and wildlife benefits.

In 1999, the SWRCB issued D-1641, obligating the CVP and SWP to the 1995 Bay-Delta Water Quality Control Plan. Revised in 2000, D-1641 provided standards for fish and wildlife protection, M&I water quality, agricultural water quality, and Suisun Marsh salinity. A new export to inflow ratio limited exports at Banks and Jones Pumping Plants to 35 percent of total Delta inflow from February through June, and 65 percent of total Delta inflow from July through January. Additionally, flow and salinity requirements on the San Joaquin River near Vernalis were imposed.

1.1.2 Current Requirements

The coordinated long-term operations of the CVP and SWP are currently subject to the 2008 and 2009 biological opinions issued pursuant to Section 7 of the ESA. Each of these biological opinions included

Reasonable and Prudent Alternatives (RPAs) to avoid the likelihood of jeopardizing the continued existence of listed species, or the destruction or adverse modification of critical habitat that were the subject of consultation.

The 2008 USFWS Biological Opinion concluded that the long-term operations of the CVP and SWP were likely to jeopardize the continued existence of Delta Smelt and were likely to destroy or adversely modify their designated critical habitat. Therefore, an RPA was included with five components comprising three types of actions to avoid jeopardy:

- Reduce the magnitude of net reverse Old and Middle River (OMR) flows to reduce Delta Smelt entrainment;
- Implement a "Fall X2" standard requiring that the location of the low-salinity zone (defined as 2 parts per thousand isohaline) be located at no greater than 46 and 50 miles (74 and 81 kilometers [km]) from the Golden Gate Bridge in September, October, and November of wet and above normal years, respectively, to improve rearing conditions for Delta Smelt; and
- Implement 8,000 acres of tidal restoration in Suisun Marsh and/or the north Delta to provide suitable habitat for Delta Smelt.

The OMR and Fall X2 actions have been implemented to various degrees, and portions of the 8,000 acres of tidal restoration are currently in the planning, development, or construction stages.

The 2009 NMFS Biological Opinion concluded that the long-term operations of the CVP and SWP were likely to jeopardize the continued existence of Sacramento River Winter-Run Chinook Salmon, Central Valley Spring-Run Chinook Salmon, California Central Valley Steelhead (*Oncorhynchus mykiss*), Southern distinct population segment (DPS) of North American Green Sturgeon (*Acipenser medirostris*), and Southern Resident DPS of Killer Whale (*Orcinus orca*). In addition, it concluded that the long-term operations of the CVP and SWP were likely to destroy or adversely modify designated critical habitat for Sacramento River Winter-Run Chinook Salmon, Central Valley Spring-Run Chinook Salmon, California Central Valley Steelhead and proposed (subsequently designated) critical habitat for the Southern DPS of North American Green Sturgeon. Therefore, an RPA was included consisting of a suite of actions that addressed Delta and upstream conditions throughout the CVP and SWP to avoid jeopardy of these species and the destruction or adverse modification of critical habitat for these species.

Several components of the NMFS RPA have been implemented or are in the planning stages. Examples include Delta operational changes implemented since 2009 intended to reduce entrainment loss of Chinook Salmon and Steelhead; current planning efforts for the restoration of the Yolo Bypass; changes in water operations to improve temperature conditions for aquatic resources in the Sacramento, American, and Stanislaus Rivers; adjustments to the operations of the Suisun Marsh Salinity Control Gates and the Delta Cross Channel (DCC); investigation into the efficacy of non-physical barriers in the Delta to improve salmonid survival; upstream habitat improvement projects; and a host of monitoring activities, studies, and investigations to better understand the ongoing effects of CVP and SWP operations.

1.1.2.1 *Mitigation Measures Included in the 2009 State Water Project Longfin Smelt Incidental Take Permit*

The 2009 SWP Longfin Smelt (*Spirinchus thaleichthys*) Incidental Take Permit (ITP) was issued by the California Department of Fish and Wildlife (CDFW) on February 23, 2009. The ITP was extended by 1 year on December 31, 2018, subject to DWR's compliance with and implementation of Conditions of Approval. Several conditions have the potential to affect species addressed in this biological assessment. Conditions include minimizing entrainment at Banks Pumping Plant (Conditions 5.1 and 5.2); minimizing

entrainment at Morrow Island Distribution System in Suisun Marsh (Condition 6.1); improving salvage efficiencies (Conditions 6.2 and 6.3); maintaining fish screens at North Bay Aqueduct (NBA), Roaring River Distribution System (RRDS), and Sherman Island diversions (Condition 6.4); fully mitigating through the restoration of 800 acres of intertidal and associated subtidal wetland habitat in a mesohaline part of the estuary (Conditions 7.1–7.3); and monitoring and reporting (Conditions 8.1-8.5). Conditions 5.1 and 5.2 are being implemented through DWR's participation in the Smelt Working Group. Conditions 6.1 through 6.4 are currently being planned or implemented, and are in various stages of completion. Conditions 7.1 through 7.3 are being planned consistent with the planning for restoration required for the 2008 RPA described above. Additionally, the various monitoring programs required in Conditions 8.1–8.5 are being planned or implemented consistent with the settlement agreement associated with the permit.

1.1.2.2 *WIIN Act*

The Water Infrastructure Improvements for the Nation Act (WIIN Act) (Pub. L. 114–322, 130 Stat. 1628), is among the federal statutes that govern operation of the CVP and SWP. Section 4001 of the WIIN Act directs the Secretary of the Interior and the Secretary of Commerce to provide the maximum quantity of water supplies practicable to CVP contractors and SWP contractors by approving, in accordance with federal and applicable state laws, operations or temporary projects to provide additional water supplies as quickly as possible, based on available information. Although the duration of this biological assessment and the biological opinion(s) from this consultation may extend beyond the expiration of the WIIN Act, the congressional direction provided by the WIIN Act governs the preparation of the biological opinion(s) that will result from this ongoing Section 7 consultation. Moreover, the general principles that underlie the direction provided by Congress in section 4001 of the WIIN Act are consistent with the purposes of the proposed action and federal interests. In addition, the science and general principles behind sections 4002 and 4003 warrant incorporation into the proposed action to govern operations of the CVP and SWP beyond expiration of the WIIN Act.

Section 4004 provides for cooperation with state and local agencies to resolve water resource issues in concert with conservation of endangered species, consistent with the ESA. Public water agencies in particular shall be informed by the consulting agency, the USFWS, or NMFS, of the schedule for preparation of the biological opinion at such time as the biological assessment is submitted to the consulting agency by the action agency; receive a copy of any draft biological opinion and have the opportunity to review that document and provide comment to the consulting agency through the action agency, which comments will be afforded due consideration during the consultation; have the opportunity to confer with the action agency and applicant, if any, about reasonable and prudent alternatives prior to the action agency or applicant identifying one or more reasonable and prudent alternatives for consideration by the consulting agency; and where the consulting agency suggests a reasonable and prudent alternative, be informed how each component of the alternative will contribute to avoiding jeopardy or adverse modification of critical habitat and the scientific data or information that supports each component of the alternative, and why other proposed alternative actions that would have fewer adverse water supply and economic impacts are inadequate to avoid jeopardy or adverse modification of critical habitat. Additional provisions provide for coordination with Collaborative Science and Adaptive Management Program (CSAMP) and quarterly stakeholder meetings.

1.2 Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the purposes of this biological assessment, the action area encompasses the following reservoirs, rivers, and the land between the levees adjacent to the rivers: (1) Trinity Reservoir and Trinity River downstream of Lewiston Reservoir; (2) Sacramento River from Shasta Lake downstream to and including the Sacramento–San Joaquin Delta; (3) Clear Creek from Whiskeytown Reservoir to its confluence with the Sacramento River; (4) Feather River from the FERC boundary downstream to its confluence with the Sacramento River; (5) American River from Folsom Reservoir downstream to its confluence with the Sacramento River; (6) Stanislaus River from New Melones Reservoir to its confluence with the San Joaquin River; (7) San Joaquin River from Friant Dam downstream to and including the Sacramento–San Joaquin Delta; (8) San Francisco Bay and Suisun Marsh; and (9) the nearshore Pacific Ocean on the coast from Point Conception to Cape Falcon in Oregon. The action area was derived by considering several factors to account for potential effects of the proposed action.

Shasta, Whiskeytown, Oroville, Folsom, and New Melones dams and reservoirs are part of the Central Valley Project operations, and therefore within the Action Area.

Reclamation diverts water from the Trinity River watershed to the Sacramento River through Carr Powerplant and Spring Creek tunnel. The amount of this diversion affects flows in both the Trinity and Sacramento Rivers, affecting both Sacramento River listed species and Trinity River listed species. Therefore, the Trinity River downstream of Lewiston Reservoir is included in the action area.

DWR already has undergone Section 7 consultation on the operations of Oroville Dam on the Feather River through the Federal Energy Regulatory Commission's (FERC) process. Oroville Dam is part of the coordinated operations of the CVP and SWP; however, its effects have been addressed previously in the USFWS and NMFS biological opinions through the FERC process. This consultation addresses effects of Oroville operations that are downstream of the FERC boundary in the Feather River to the Delta, and coordinated effects with CVP operation.

Starting in 2016, Friant Dam and the Upper San Joaquin River have been hydrologically re-connected to the Delta through the release of San Joaquin River Restoration Program flows and recapture of those flows in the Lower San Joaquin River or Delta. Therefore, the San Joaquin River from Friant Dam downstream to and including the Sacramento–San Joaquin Delta is included in the action area.

The CVP and SWP affects the abundance of Central Valley Chinook Salmon originating from the Sacramento and San Joaquin Rivers, which is a prey species for Southern Resident Killer Whale, a listed species under the ESA. The range of Central Valley Chinook Salmon in the ocean is approximately from Point Conception to Cape Falcon, Oregon (Satterthwaite et al. 2013; Can J Fish Aq Sci). Therefore, while Southern Resident Killer Whale has a larger range, the effects of this action are limited to the range of Chinook Salmon. Hence, the action area is limited to portions of the California and Oregon coasts.

Figures 1-1 through 1-8 below show the extent of the action area. Figure 1-1 has grey boxes to indicate subsequent zoomed-in maps. On Figure 1-2, the grey box indicates the action area in the Pacific Ocean.

Figure 1-1. Overview of the CVP and SWP

Figure 1-2. Action Area—Coastal Extent

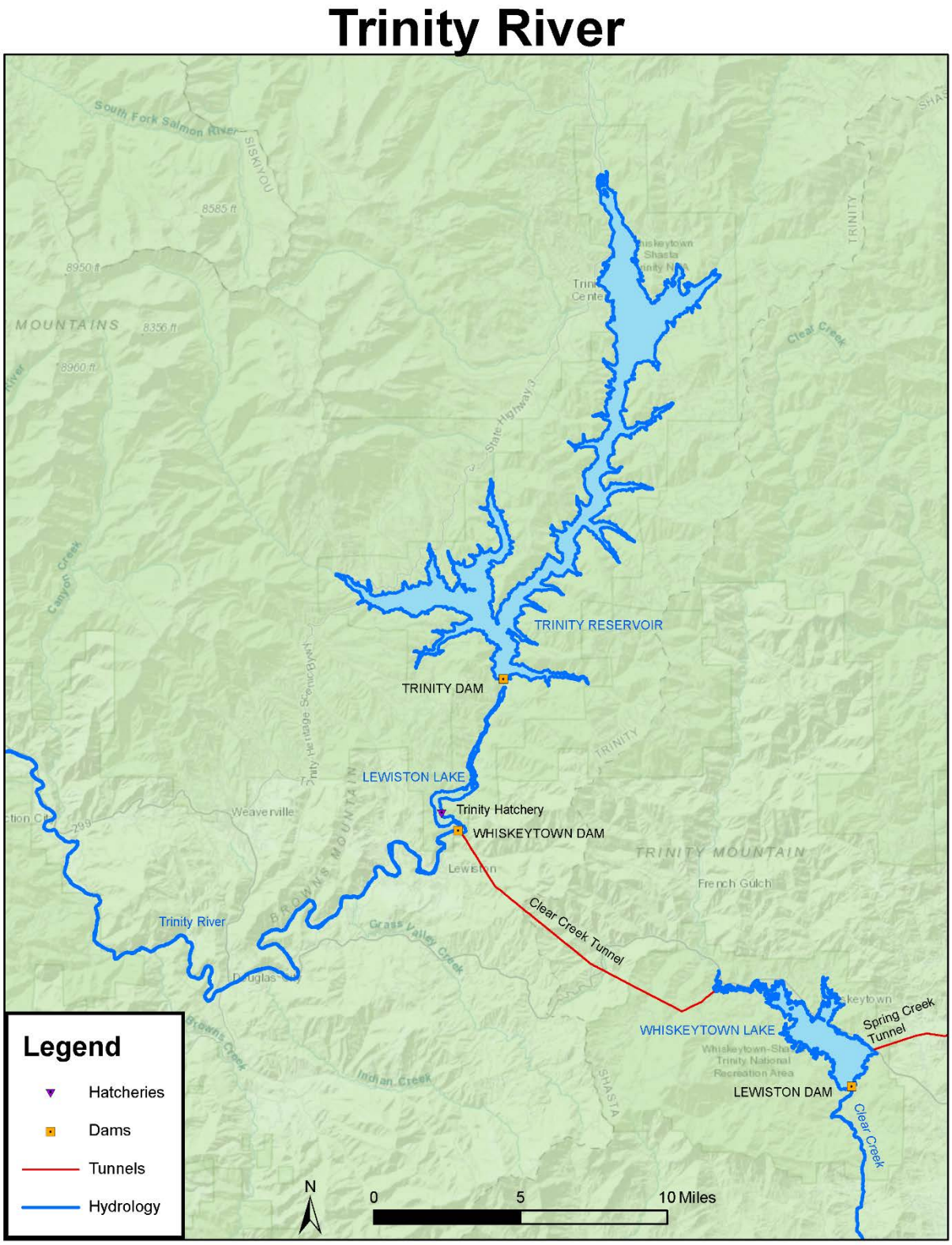

Figure 1-3. Action Area—Trinity River

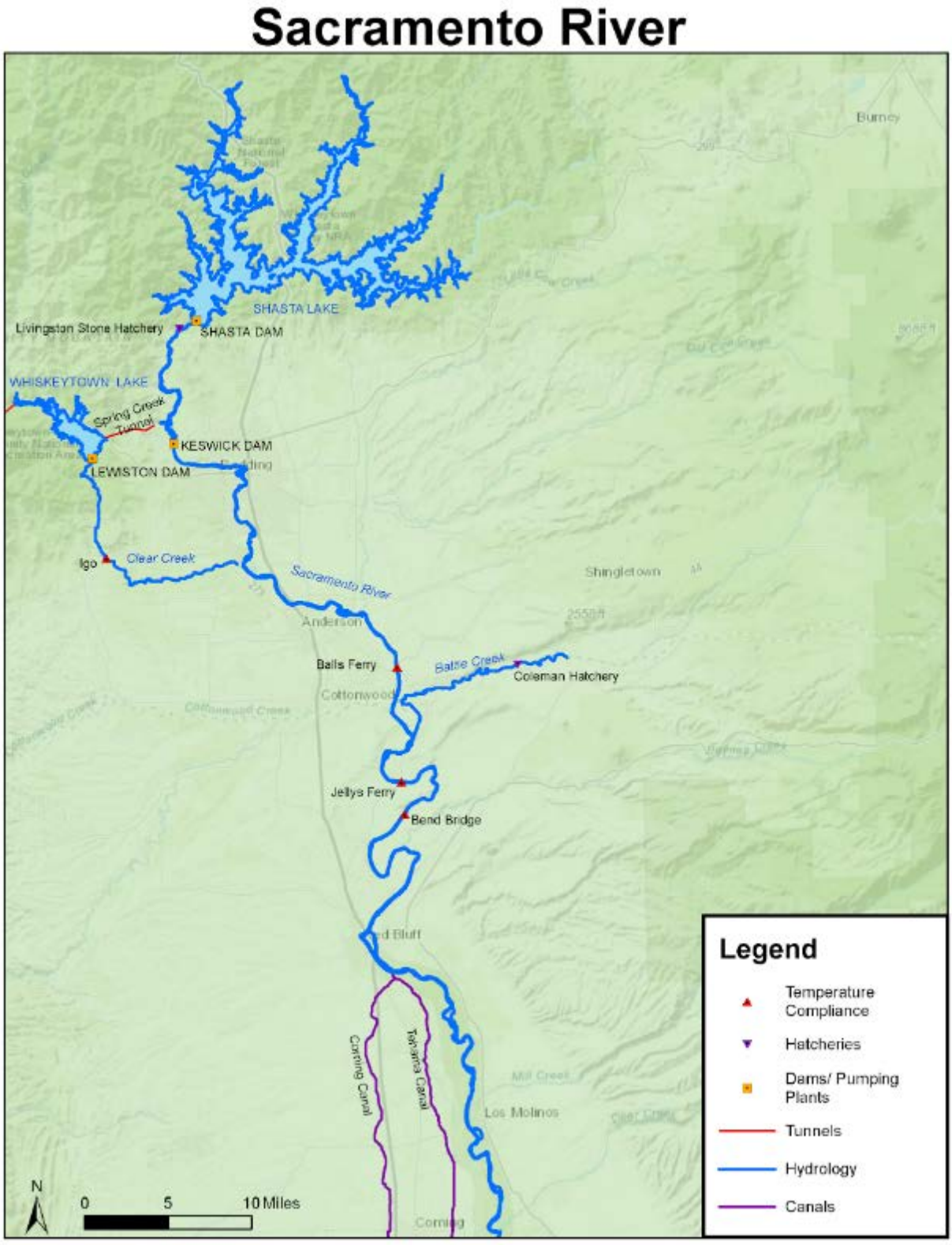

Figure 1-4. Action Area—Sacramento River

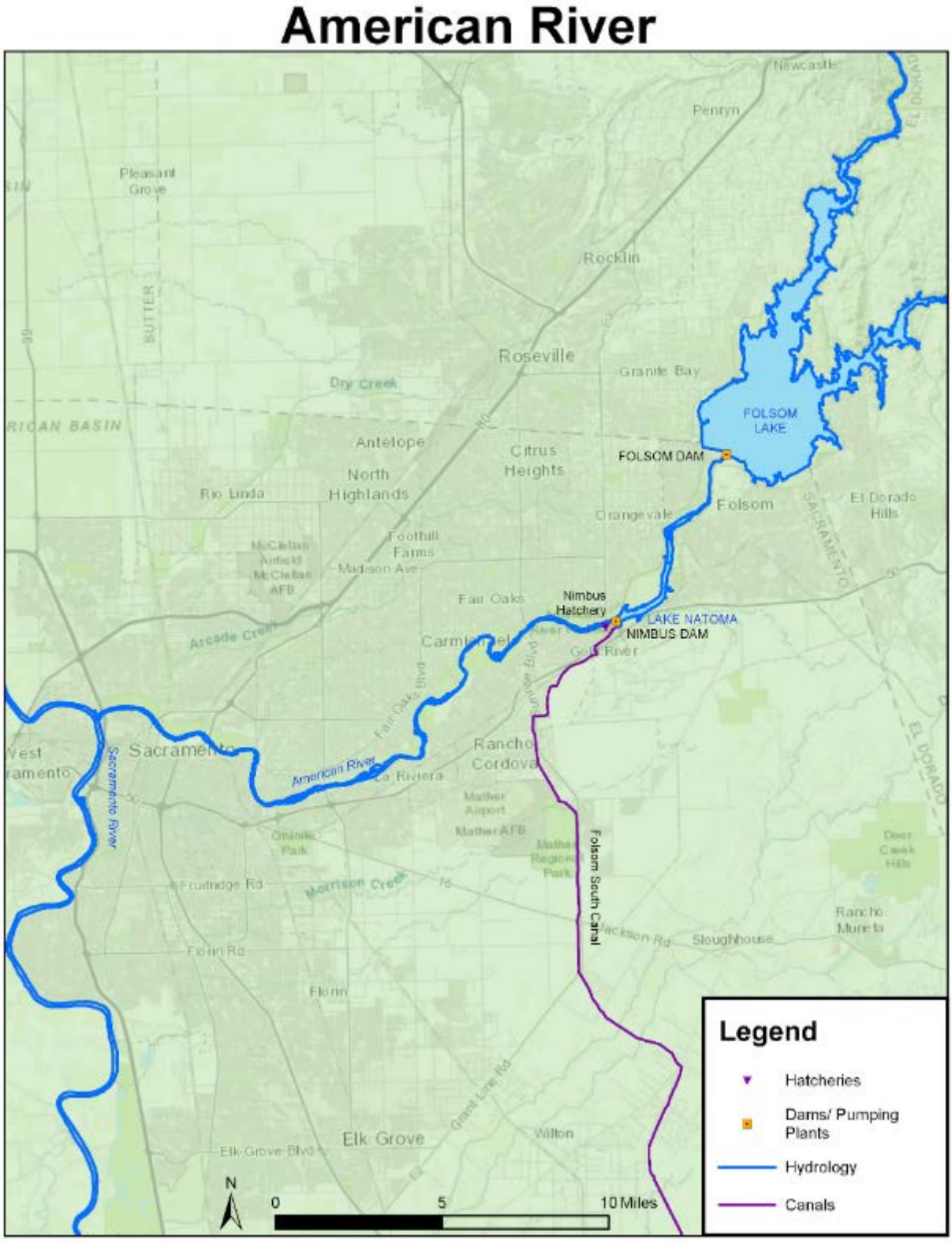

Figure 1-5. Action Area—American River

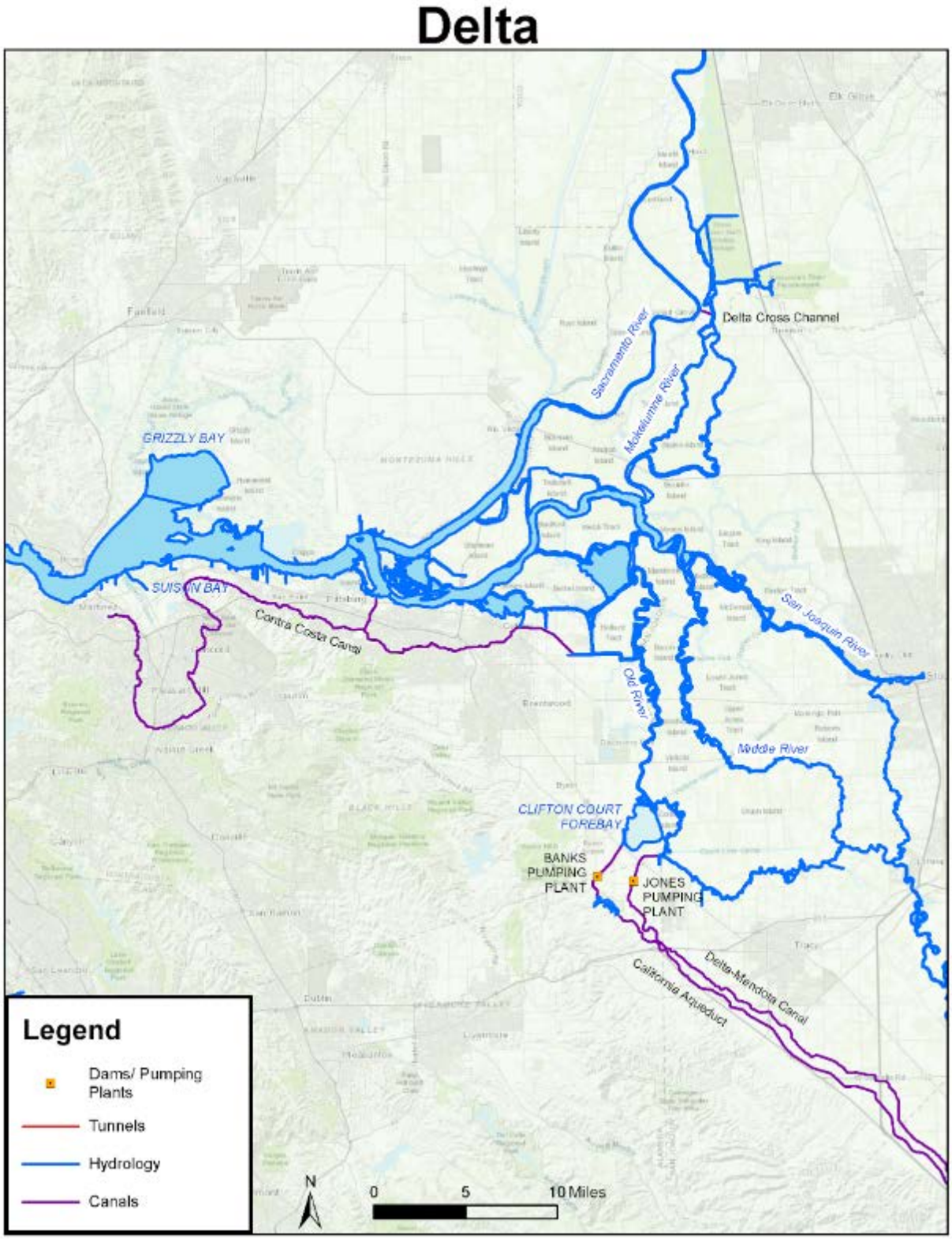

Figure 1-6. Action Area—Delta

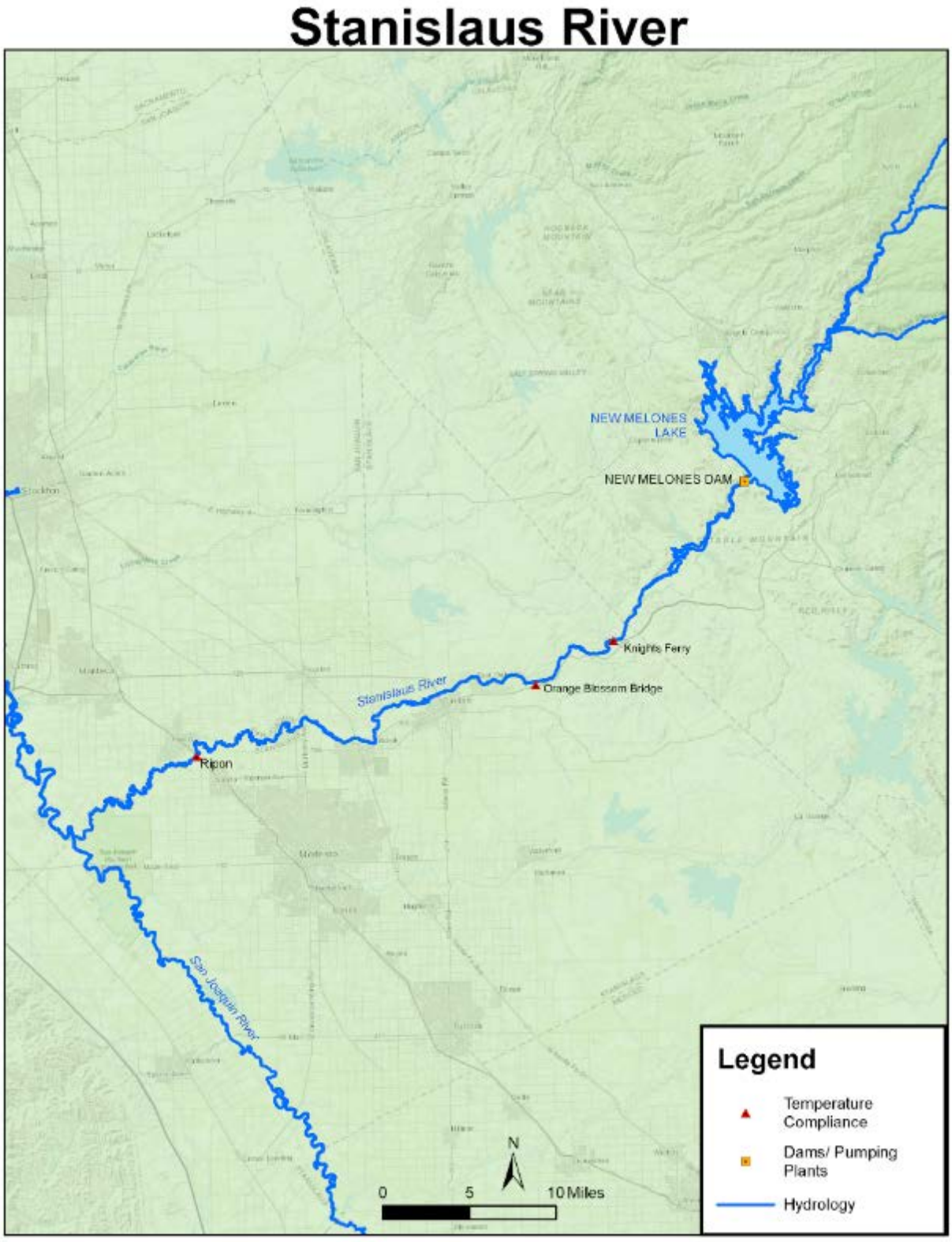

Figure 1-7. Action Area—Stanislaus River

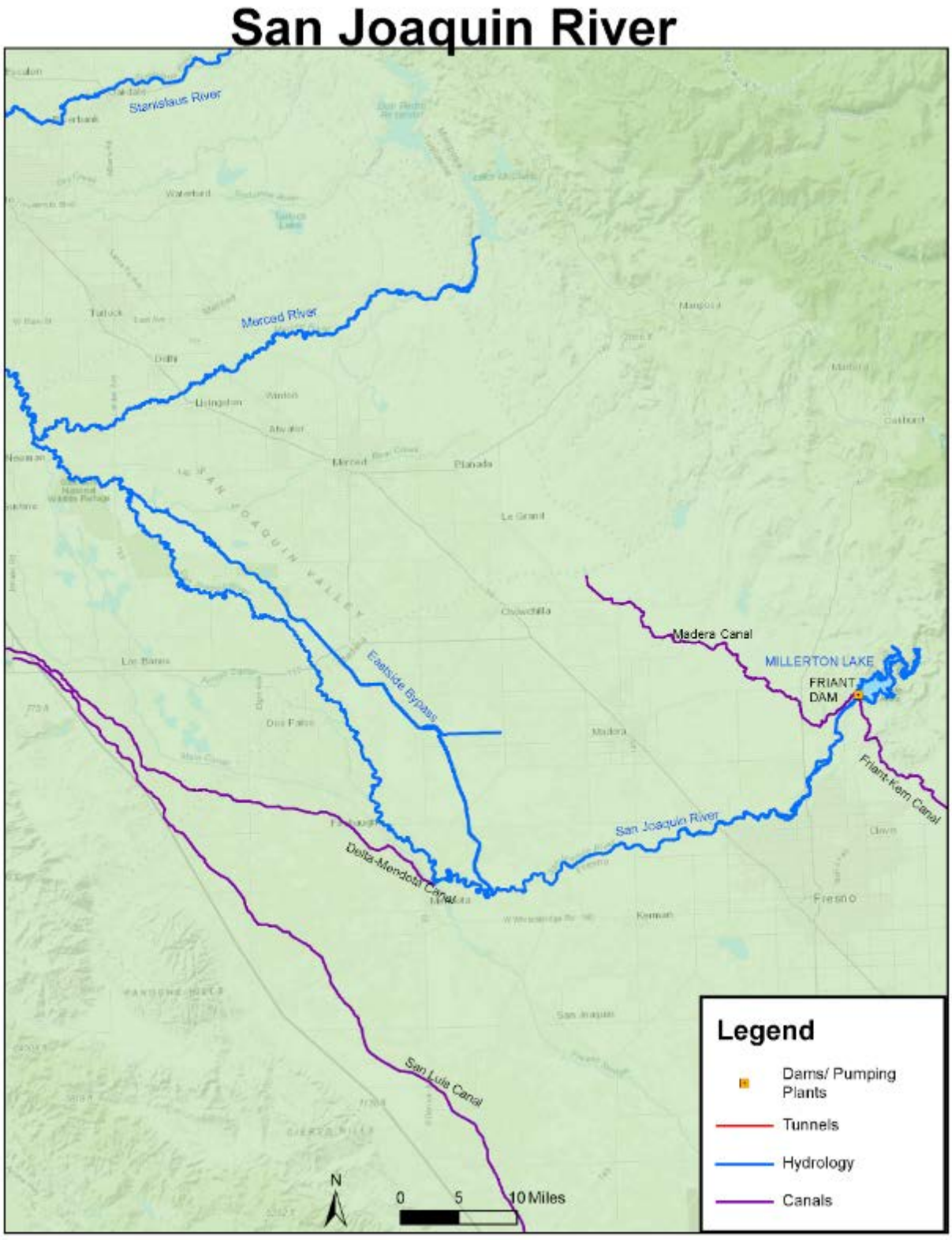

Figure 1-8. Action Area—San Joaquin River

1.3 Species Considered

Pursuant to the interagency consultation requirements of Section 7 of the ESA, this biological assessment has been prepared to assess the potential effects of the proposed action on federally protected species and designated critical habitat. Aquatic and terrestrial species considered in this biological assessment include those that are federally listed as threatened or endangered. The following input was used to determine which listed species should be considered for inclusion in this biological assessment:

- ESA-listed species distributional maps and literature review of species life-history requirements and habitat use
- Environmental documentation prepared in support of other Reclamation projects
- Discussions with federal and state agencies
- NMFS and CDFW online species lists (NMFS 2017; CDFW 2018)
- USFWS Information for Planning and Conservation (IPaC) system (USFWS 2018a)
- California Natural Diversity Database (CNDDB) Rarefind 5 online application
- California Native Plant Society (CNPS) Online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2018)

Based on this information, the species to be addressed are shown in Table 1-1.

Table 1-1. Federally Protected Species and Critical Habitat Addressed in this Biological Assessment

Species	Status	Jurisdiction	Critical Habitat
Sacramento River Winter-Run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	Endangered	NMFS	Designated in action area
Central Valley Spring-Run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	Threatened	NMFS	Designated in action area
Central Valley Steelhead DPS (*Oncorhynchus mykiss*)	Threatened	NMFS	Designated in action area
Central California Coast Steelhead DPS (*Oncorhynchus mykiss*)	Threatened	NMFS	Designated in action area
Green Sturgeon Southern DPS (*medirostris*)	Threatened	NMFS	Designated in action area
Southern Resident Killer Whale (*Orcinus orca*)	Endangered	NMFS	Designated but not in action area
Southern Oregon/Northern California Coastal Coho Salmon ESU (*Oncorhynchus kisutch*)	Threatened	NMFS	Designated in action area

Species	Status	Jurisdiction	Critical Habitat
Eulachon *(Thaleichthys pacificus)*	Threatened	NMFS	Designated in action area
Delta Smelt (*Hypomesus transpacificus*)	Threatened	USFWS	Designated in action area
Riparian brush rabbit (*Sylvilagus bachmani riparius*)	Endangered	USFWS	None designated
Riparian woodrat (*Neotoma fuscipes riparia*)	Endangered	USFWS	None designated
Salt marsh harvest mouse (*Reithrodontomys raviventris*)	Endangered	USFWS	None designated
California clapper rail (*Rallus obsoletus*)	Threatened	USFWS	None designated
Least Bell's vireo (*Vireo bellii pusillus*)	Endangered	USFWS	Designated but not in action area
Yellow-billed cuckoo[1] (*Coccyzus americanus*)	Threatened	USFWS	Proposed
Giant garter snake (*Thamnophis gigas*)	Threatened	USFWS	None designated
Soft bird's beak (*Cordylanthus mollis* ssp. *Mollis*)	Endangered	USFWS	Designated in action area
Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*)	Endangered	USFWS	Designated in action area
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	Threatened	USFWS	Designated in action area
Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)	Threatened	USFWS	None designated
Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)	Endangered	UWFWS	Designated but not in action area
California Tiger Salamander (*Ambystoma californiense*)	Endangered	USFWS	Designated but not in action area
California Least Tern (*Sterna antillarum browni*)	Endangered	USFWS	None designated
California red-legged frog (*Rana draytonii*)	Threatened	USFWS	Designated but not in action area

ESU = Evolutionarily Significant Unit; NMFS = National Marine Fisheries Service; DPS = distinct population segment; USFWS = United States Fish and Wildlife Service

[1] = species included for programmatic construction actions

1.3.1 Species Considered but Not Addressed Further

In addition to the species listed in Table 1-2, a number of species and their critical habitat were considered for inclusion because initial review indicated they could occur in the Project vicinity. Although listed as potentially occurring within the wider surrounding area based on agency and county lists, several species can be considered as highly unlikely to occur in the action area and therefore do not warrant analysis of potential project impacts. These species considered but not addressed further are the following: giant kangaroo rat (*Dipodomys ingens*), gray wolf (*Canis lupus*), southern sea otter (*Enhydra lutris nereis*), California condor (*Gymnogyps californianus*), California least tern (*Sterna antillarum browni*), marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), short-tailed albatross (*Phoebastria [=Diomedea] albatrus*), western snowy plover (*Charadrius nivosus nivosus*), Alameda whipsnake *[=striped Racer]* (*Masticophis lateralis euryxanthus*), green sea turtle (*Chelonia mydas*), San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), California tiger salamander (*Ambystoma californiense*), tidewater goby (*Eucyclogobius newberryi*), Bay checkerspot butterfly (*Euphydryas editha bayensis*), callippe silverspot butterfly (*Speyeria callippe callippe*), Delta green ground beetle (*Elaphrus viridis*), Lange's metalmark butterfly (*Apodemia mormo langei*), mission blue butterfly (*Icaricia icarioides missionensis*), Myrtle's silverspot butterfly (*Speyeria zerene*), San Bruno elfin butterfly (*Callophrys mossii bayensis*), California freshwater shrimp (*Syncaris pacifica*), Conservancy fairy shrimp (*Branchinecta conservation*), longhorn fairy shrimp (*Branchinecta longiantenna*), Shasta crayfish (*Pacifastacus fortis*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus Packard*), Antioch dunes evening-primrose (*Oenothera deltoides* ssp. *Howellii*), beach layia (*Layia carnosa*), Butte County meadowfoam (*Limnanthes floccosa* ssp. *Californica*), California seablite (*Suaeda californica*), Chinese Camp (*Brodiaea Brodiaea pallida*), clover lupine (*Lupinus tidestromii*), Colusa grass (*Neostapfia colusana*), Contra Costa goldfields (*Lasthenia conjugens*), Contra Costa wallflower (*Erysimum capitatum* var. *angustatum*), El Dorado bedstraw (*Galium californicum* ssp. *Sierra*), fleshy owl's-clover (*Castilleja campestris* ssp. *Succulent*, Franciscan manzanita *Arctostaphylos franciscana*, fountain thistle (*Cirsium fontinale* var. *fontinale*), Greene's tuctoria (*Tuctoria greenei*), hairy Orcutt grass (*Orcuttia pilosa*), Hartweg's golden sunburst (*Pseudobahia bahiifolia*), Hickman's potentilla (*Potentilla hickmanii*), Hoover's Spurge (*Chamaesyce hooveri*), Keck's checker-mallow (*Sidalcea keckii*), large-flowered fiddleneck (*Amsinckia grandiflora)*, Layne's butterweed (*Senecio layneae)*, Marin dwarf-flax (*Hesperolinon congestum)*, marsh sandwort (*Arenaria paludicola),* Mcdonald's rock-cress (*Arabis macdonaldiana*), Metcalf Canyon jewelflower (*Streptanthus albidus* ssp. *Albidus*), pallid manzanita (*Arctostaphylos pallida*), palmate-bracted bird's beak (*Cordylanthus palmatus*), Pine Hill ceanothus (*Ceanothus roderickii*), Pine Hill flannelbush *Fremontodendron californicum* ssp. *Decumbens*), Presidio clarkia (*Clarkia franciscana*), Presidio manzanita (*Arctostaphylos hookeri* var. *ravenii*), red hills vervain *Verbena californica*), robust spineflower (*Chorizanthe robusta* var. *robusta*), Sacramento Orcutt grass (*Orcuttia viscida*), San Francisco lessingia (*Lessingia germanorum [=L.g.* var. *germanorum]*), San Joaquin Orcutt grass (*Orcuttia inaequalis*), San Mateo thornmint (*Acanthomintha obovata* ssp. *Duttonii*), San Mateo woolly sunflower (*Eriophyllum*), Santa Clara Valley dudleya (*Dudleya setchellii*), Santa Cruz tarplant (*Holocarpha macradenia*), Sebastopol meadowfoam (*Limnanthes vinculans*), Showy Indian Clover (*Trifolium amoenum*), slender Orcutt grass (*Orcuttia tenuis*), Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*), Sonoma spineflower (*Chorizanthe valida*), Sonoma sunshine (*Blennosperma bakeri*), Stebbins' morning-glory *Calystegia stebbinsii*), Tiburon paintbrush (*Castilleja affnis* ssp. *Neglecta*), white-rayed pentachaeta (*Pentachaeta bellidiflora*), and yellow larkspur (*Delphinium luteum*), Fresno kangaroo rat (*Dipodomys nitratoides*), San Joaquin kit fox (*vulpes macrotis mutica*), and Blunt Nosed-Leopard Lizard (*Gambelia sila*). NMFS (2009, p.75) noted that DWR's Suisun Marsh Salinity Control Gates (SMSCG) in Montezuma Slough are located to the east of the three Suisun Marsh steelhead streams and Central California Coast Steelhead (CCC Steelhead) (*Oncorhynchus mykiss*) are unlikely to travel 10-15 miles eastward through Montezuma Slough to the SMSCG. Therefore, NMFS (2009, p.75) concluded

that it would be unlikely that CCC Steelhead will encounter the SMSCG or the Delta pumping facilities during their upstream and downstream migrations, because their spawning streams are located in the western portion of Suisun Marsh. Therefore, Reclamation concluded no effect to CCC Steelhead.

1.4 Consultation History

Reclamation has consulted with the USFWS and NMFS on CVP operations as species were listed and critical habitat designated since the early 1990s. The most recent consultation on CVP operations was completed in 2008 and 2009. Both biological opinions were conditionally accepted by Reclamation and were challenged in federal court. On appeal, the biological opinions were upheld and Reclamation issued a Record of Decision to adopt them in 2016. Table 1-2 provides a summary of this consultation history.

Table 1-2. Consultation History

Date	Issuer	Document	Rationale for Consultation	Subject / Species	Finding
February 1992	USBR	Interim Central Valley Project Operations Criteria and Plan		OCAP	
June 1993	NMFS	BO	Winter-Run listed in 1991	Winter-Run Chinook Salmon	Jeopardy
March 1995	USFWS	BO	Delta Smelt listed in March 1993; Splittail proposed in 1994	Delta Smelt and Splittail	Non-jeopardy
June 2004	USBR	BA	Combined ESA species consultation in one assessment	Winter-Run Chinook Salmon, Spring-Run Chinook Salmon, Steelhead, Coho Salmon, Delta Smelt	Likely to Adversely Affect: Winter-run, Spring-run, CV Steelhead; May Affect/Not Likely to Adversely Affect: Coho, Delta Smelt
July 2004	USFWS	BO	Coordinate with combined NMFS ESA species consultation	Delta Smelt	Non-Jeopardy
October 2004	NMFS	BO	Combined ESA species consultation	Winter-Run Chinook Salmon, Spring-Run Chinook Salmon, Steelhead, Coho Salmon	Non-Jeopardy

Date	Issuer	Document	Rationale for Consultation	Subject / Species	Finding
May 2008	USBR	BA	Green Sturgeon was listed in 2006; Pelagic Organism Decline	Winter-Run Chinook Salmon, Spring-Run Chinook Salmon, Steelhead, Green Sturgeon, Coho Salmon, Delta Smelt	Adversely Affect: Delta Smelt; LAA: CV steelhead, Winter-run, spring-run; Green Sturgeon; NLAA: Coho Salmon
December 2008	USFWS	BO	Pelagic Organism Decline; conflicts with Sturgeon	Delta Smelt	Jeopardy
June 2009	NMFS	BO and Conference Opinion	Green Sturgeon listed in 2006	Winter-Run Chinook Salmon, Spring-Run Chinook Salmon, Steelhead, Green Sturgeon	Jeopardy and Adverse Mod
January 2019	USBR	BA	Drought; New Science; Declining status	Winter-Run Chinook Salmon, Spring-Run Chinook Salmon, Steelhead, Green Sturgeon, Coho, Delta Smelt	See Effects Determination in this document