Chapter 3 – Alternatives

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Acronyms and Abbreviations

60-20-20 Index	San Joaquin Valley "60-20-20" Water Year Hydrologic Classification
ATSP	Automated Temperature Selection Procedure
Banks Pumping Plant	Harvey O. Banks Pumping Plant
Bay-Delta	San Francisco Bay/Sacramento–San Joaquin Delta
BSPP	Barker Slough Pumping Plant
CCR	Sacramento River above Clear Creek gage
CDFW	California Department of Fish and Wildlife
cfs	cubic feet per second
CLC	Clifton Court Forebay
COA	Coordinated Operation Agreement
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
D-	Decision
DO	dissolved oxygen
DRY	Drought Relief Year
DWR	California Department of Water Resources
EIS	environmental impact statement
EOA	End-of-April
EOD	end-of-December
EOS	End-of-September
FCCL	Fish Conservation and Culture Laboratory
FNU	Formazin Nephelometric Units
Jones Pumping Plant	C. W. "Bill" Jones Pumping Plant
JPE	juvenile production estimate
km	kilometer
M&I	municipal and industrial
MAF	million acre-feet
mm	millimeter
MRR	Minimum Release Requirement
NFH	National Fish Hatchery

NGO	nongovernmental organization
NMFS	National Marine Fisheries Service
OMR	old and middle river
QWEST	net flow at Jersey Point
Reclamation	Bureau of Reclamation
RRDS	Roaring River Distribution System
SFHA	Delta smelt summer and fall habitat action
SHOT	Shasta Operations Team
Skinner Fish Facility	John E. Skinner Delta Fish Protective Facility
SLS	Smelt Larval Survey
SMSCG	Suisun Marsh Salinity Control Gate
SRG	Sacramento River Group
SRP	Stepped Release Plan
SRS	Sacramento River Settlement
SVI	Sacramento Valley Index
SWP	State Water Project
Water Board	California State Water Resources Control Board
TAF	thousand acre-feet
TCD	Temperature Control Device
TMP	Temperature Management Plan
Tracy Fish Facility	Tracy Fish Collection Facility
TUCP	Temporary Urgency Change Petitions
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VA	voluntary agreements
WOMT	Water Operations Management Team
WRO	Water Rights Order

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Chapter 3 Alternatives

The United States Department of the Interior, Bureau of Reclamation (Reclamation) formulated draft alternatives through the National Environmental Policy Act scoping process, coordination with public water agencies pursuant to the Water Infrastructure Improvement for the Nation Act, interagency coordination teams, outreach to interested parties, and Reclamation's decades of experience in operating the Central Valley Project (CVP). A Notice of Intent (87 Federal Register 11093–11095), published February 28, 2022, sought public comments. Reclamation requested comments by mail and by email and held six virtual public meetings, as described in *Chapter 1 – Introduction.* Reclamation prepared a Scoping Report that included comments received (Bureau of Reclamation 2022).

Previous consultations with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) identified measures to protect species listed under the Endangered Species Act and those measures primarily differentiate alternative approaches. Exploratory modeling simulated potential water operations under layers of operational objectives with results informing potential modifications and limitations on the seasonal operation of the CVP and State Water Project (SWP).

Reclamation coordinated with agencies and interested parties to develop the alternatives described below. Reclamation must consider potentially reasonable alternatives beyond its own jurisdiction and consider the jurisdictions of other agencies (Federal and otherwise) when determining what reasonable alternatives should be considered.

- Alternative 1 (Water Quality Control Plan (D-1641, 90-5, etc.)): Alternative 1 consists of operation to water right terms and conditions, including obligations for water quality control plan objectives for the Bay-Delta, water quality and minimum flows on CVP tributaries, and water right settlements. The needs of listed fish would rely upon habitat restoration and facility improvements completed since the 2008 and 2009 biological opinions rather than on additional flows.
- Alternative 2 (Multi-Agency Consensus): Alternative 2 consists of actions developed with the California Department of Fish and Wildlife, DWR, NMFS, and USFWS to harmonize operational requirements of CVP with California Endangered Species Act requirements for the SWP. It includes actions and approaches for the CVP and SWP identified by the state and federal fish agencies, in addition to the water supply and power generation objectives of Reclamation and DWR.
- Alternative 3 (Modified Natural Hydrograph): Alternative 3 consists of operation to increased Delta outflow up to 65% of unimpaired inflow and to carryover storage requirements in addition to other measures. This alternative was developed in coordination with the NGO community.
- Alternative 4 (Risk Informed Operation): Alternative 4 consists of modified Shasta and Folsom Dam operations for a different balance between water made available for

diversion and storage to protect against subsequent dry years. It scales Delta operations based on effects to listed fish populations.

The following sections summarize the No Action Alternative and the four potential Action Alternatives. Appendix E *Alternatives*, provides the full description of the range of alternatives.

3.1 Common Components

This section describes information applicable to the No Action Alternative and all action alternatives, "common components". Common components describe where interagency coordination, review of literature, and scoping comments did not identify substantial disagreement with the physical and biological science defining those actions nor substantial disagreement with the potential resource tradeoffs. Variable components are included in potential action alternatives.

Reclamation operates the CVP for the congressionally authorized purposes of: (1) river regulation, improvement of navigation, and flood control; (2) irrigation and domestic uses, and fish and wildlife mitigation, protection, and restoration; and (3) power, and fish and wildlife enhancement. DWR operates the SWP to provide flood control and water for power generation, agricultural, municipal, industrial, recreational, and environmental purposes. Public Law 99-546 authorized the 1986 Coordinated Operation Agreement (COA, as amended in 2018), which sets procedures for Reclamation and DWR to share joint responsibilities for meeting Delta standards and other legal uses of water. Operation of the CVP and SWP also provides recreation and water quality benefits.

Facilities, authorizing legislation, and requirements under the regulations, contracts, and agreements are described in Appendix C of this EIS. Alternatives are organized as follows:

1. **Watersheds:** basin-by-basin description of facilities and the proposed operation for fish and wildlife, water supply, and power generation including proposed conservation measures to promote the recovery and/or to minimize or compensate for adverse effects of operation on federally listed species.
2. **Monitoring:** the long-term evaluation of performance to assess overall effectiveness over time. Although each watershed has unique requirements, Reclamation and DWR integrate monitoring across watersheds; therefore, monitoring is organized together.
3. **Special Studies:** science-based efforts to address uncertainties in the actions that affect a reasonable balance among competing demands for water, including the requirements of fish and wildlife, agricultural, municipal, and industrial uses of water, and power contractors to inform subsequent decision making.
4. **Drought:** actions to recognize extreme dry conditions may occur during operations. The boom-and-bust nature of California hydrology and the resulting effect on species warrants special consideration for operation during droughts. During these periods, Reclamation in coordination with DWR would develop a Drought and Dry Year Planning Toolkit common to all alternative that focuses on actions to implement as intervention measures during hydrologic years with drought and dry conditions.

5. **Governance:** ongoing engagement by Reclamation and DWR with USFWS, NMFS and CDFW following completion of Biological Opinions and a Record of Decision.
6. **Adaptive Management:** science and decision analytic-based approach to evaluate and improve actions, with the aim to reduce uncertainty over time and increase the likelihood of achieving and maintaining a desired management objective.

3.1.1 Sacramento River

Reclamation operates and maintains the Shasta Division of the CVP for flood control and navigation, municipal and industrial (M&I) and agricultural water supplies, fish and wildlife, hydroelectric power generation, Sacramento River water quality, and Delta water quality. Facilities include the Shasta Dam and Power Plant, Keswick Dam and Power Plant, and a Temperature Control Device (TCD) on the upstream face of Shasta Dam. Major facilities in the Sacramento Division of the CVP include the Red Bluff Pumping Plant, the intake for the Tehama-Colusa Canal and the Corning Canal (Figure 3-1).

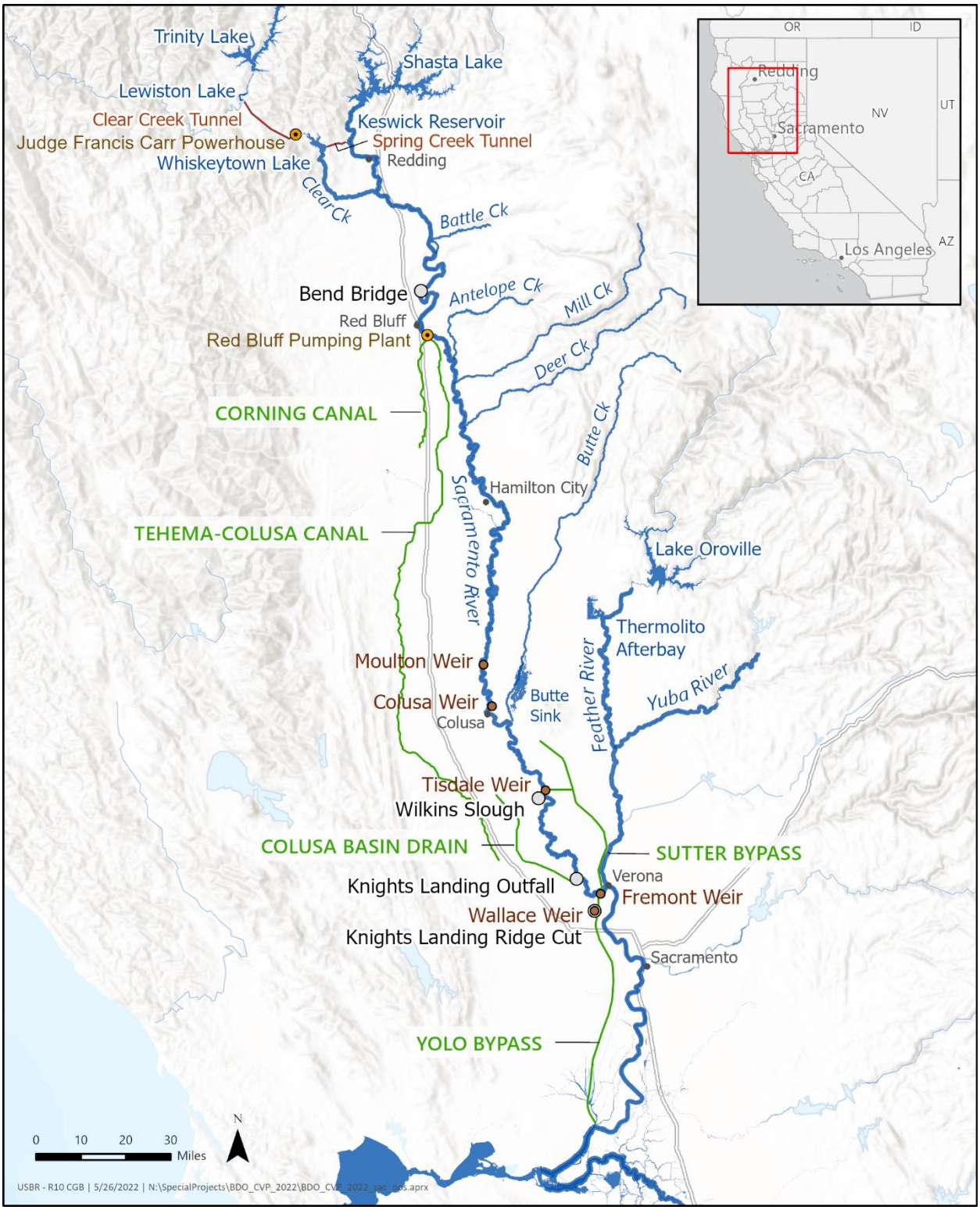


Figure 3-1. Sacramento River Facilities in the Shasta and Sacramento Divisions of the CVP and Flood Control Weirs and Bypasses.

3.1.1.1 Seasonal Operations

Reclamation operates Shasta Dam in the winter primarily for flood control and minimum flows in the Sacramento River and in the Delta. With flashboards installed on top of the drum gates that raise the elevation to 1,067 feet, the maximum capacity of Shasta Reservoir is 4.552 million acre-feet (MAF). For the flood season, the U.S. Army Corps of Engineers (USACE) provides a flood control diagram that specifies by date a top of conservation pool storage. Flood operational criteria target flow rates below 100,000 cubic feet per second (cfs) at Bend Bridge for the protection of downstream populations; therefore, reservoir elevations may temporarily exceed the top of the conservation pool and encroach into flood space in order to limit downstream flows. In the winter, when not releasing for flood control, Reclamation seeks to store inflows to Shasta Reservoir and releases minimum flows necessary to meet downstream requirements. California State Water Resources Control Board (Water Board) WRO 90-5 provides a target for minimum releases from Keswick Reservoir from September through February, the 1937 Act includes consideration for navigation at Wilkins Slough, and D-1641 provides flow standards in the Delta. Reclamation generally maintains flows of 5,000 cfs at Wilkins Slough year-round and these flows may be reduced in drought years. Reclamation may make releases above the minimum to maintain fall-run Chinook salmon redds in wetter hydrologic year types when storage levels are higher in Shasta Reservoir.

In the spring, when not operating for flood control, Reclamation seeks to maximize storage of inflow to optimize the filling of CVP reservoirs by the end of the flood control season (end of May). Higher storage improves the ability to meet downstream water temperature objectives and increases the ability to make releases later in the year for water supply. Accretions (runoff, return flows and flows from non-project creeks into the Sacramento River below Shasta Dam) also contribute to meeting both instream demands and Delta outflow requirements. Wetter years with high accretions may allow Reclamation to store more water in the spring and operate mostly for flood control. Drier years with lower accretions may require Reclamation to make releases from Shasta Reservoir for downstream requirements throughout the spring season. Toward the middle to end of spring, instream diversion demands increase on the mainstem Sacramento River and require releases above minimum flows at Keswick Reservoir. Reclamation operates to flow objectives at Wilkins Slough to: (1) support diversion by Sacramento River Settlement (SRS) Contractors with a prior entitlement to water in the Sacramento River; (2) for deliveries to Central Valley Project Improvement Act (CVPIA) wildlife refuges; and (3) for deliveries to CVP water service contractors at the Red Bluff Pumping Plant. The majority of these diversions typically occur mid-April through November with variations depending on hydrology.

Delta salinity and outflow requirements may necessitate additional releases from Shasta Reservoir. When system-wide demands require augmenting flows in the system, Reclamation coordinates imports from the Trinity Basin, releases by DWR from Oroville Reservoir, and releases from Folsom Reservoir. Each reservoir has factors to consider including instream requirements, amounts in storage, forecasted inflow, and refill potential. The 1986 Coordinated COA and 2018 Addendum describe the CVP portion of Delta outflow requirements. Reclamation balances releases for the CVP portion of Delta outflow requirements between Shasta and Folsom reservoirs to maximize storage in each reservoir and minimize negative impacts between CVP tributaries. When increased releases are necessary to meet Delta needs, Reclamation generally first adjusts exports, then releases from Folsom Reservoir while releases from Shasta Reservoir

travel down the Sacramento River. Once releases from Shasta Reservoir arrive in the Delta (about five days' travel time), releases from Folsom Reservoir can be reduced to balance the demands on each reservoir. When Reclamation can export water from the Delta during periods of excess flow, Reclamation can store more water in San Luis Reservoir south of the Delta. Maximizing exports in the spring reduces the reliance on stored water later in the year for meeting late season demands.

Summer operational considerations include releases for temperature control, instream diversion demands, Delta outflows, Delta salinity, and exports. In-river temperatures downstream of Keswick Dam can be controlled via two methods. The first is thermal mass, by changing release volume or shifting releases between Trinity Basin imports and Shasta Reservoir, and the second is selective withdrawal of colder water through the TCD. Determination of which method to use is made daily as operators balance releases from multiple reservoirs to meet downstream needs. Releases in the summer meet water temperature objectives, support essential features of critical habitat and support water supply deliveries. Releases from Shasta Reservoir typically begin increasing in April as storm frequency decreases, air temperatures increase, and system-wide demands increase. Peak releases from Shasta Reservoir typically occur June through August and begin to decrease from the peak sometime in August or September. Occasionally, in very wet years, high storage levels through the summer may result in a need to release higher than normal flows in early fall to meet flood control requirements for the next year. Consideration of fall conditions may also warrant measures for drought protection and rebalancing of storage between reservoirs.

In the fall, Reclamation's objective is to reduce Keswick Dam releases and rebuild storage in Shasta Reservoir. Reclamation balances fall operations based on highly variable conditions, including water temperature control (dependent on winter-run Chinook salmon emergence timing), maintenance of winter-run Chinook salmon redds (dependent on spawning depths), instream diversion demands on the mainstem of the Sacramento River upstream and downstream of Wilkins Slough (dependent on seasonal planting and wildlife refuges), fall-run Chinook salmon redd dewatering minimization (dependent on late-summer flows and fall spawning timing), and release stabilization through the fall-run Chinook salmon egg and alevin incubation. The remaining coldwater pool in Shasta Reservoir is usually limited in the fall at the end of the water temperature management season. Release reductions from Shasta Reservoir early in the fall include the following considerations: (1) winter-run Chinook salmon eggs and alevin incubation; (2) whether significant instream diversion demands (e.g., rice decomposition) remain on the mainstem of the Sacramento River between Keswick Dam and Wilkins Slough,: (3) Delta smelt habitat; and, (4) Delta requirements that may require upstream reservoir releases for Delta outflow objectives from the Water Board. If early fall flows drop substantially after fall-run Chinook salmon spawn at high river stages, their redds may be dewatered when flows are later reduced to rebuild storage.

3.1.1.2 Rice Decomposition Smoothing

Rice decomposition smoothing could minimize impacts to fall-run Chinook salmon by minimizing fry stranding and redd dewatering as flows drop in the winter. Reclamation would release flows based on Sacramento Valley Water Service Contractors demand and SRS Contractors coordinated rice decomposition smoothing diversion schedule. SRS Contractors and CVP Water Service Contractors would synchronize their diversions to lower peak rice decomposition demand. The diversion schedule considers dewatering risk for winter-run Chinook salmon redd locations.

3.1.2 Clear Creek

As a component of the Trinity Division of the CVP, Reclamation operates and maintains Whiskeytown Dam on Clear Creek, with a capacity of 241,100 acre-feet, for irrigation and other beneficial uses, hydroelectric power generation, fish and wildlife, recreation, and upper Sacramento River temperature control and water rights requirements. Whiskeytown Lake provides reregulation of trans-basin imports from the Trinity River.

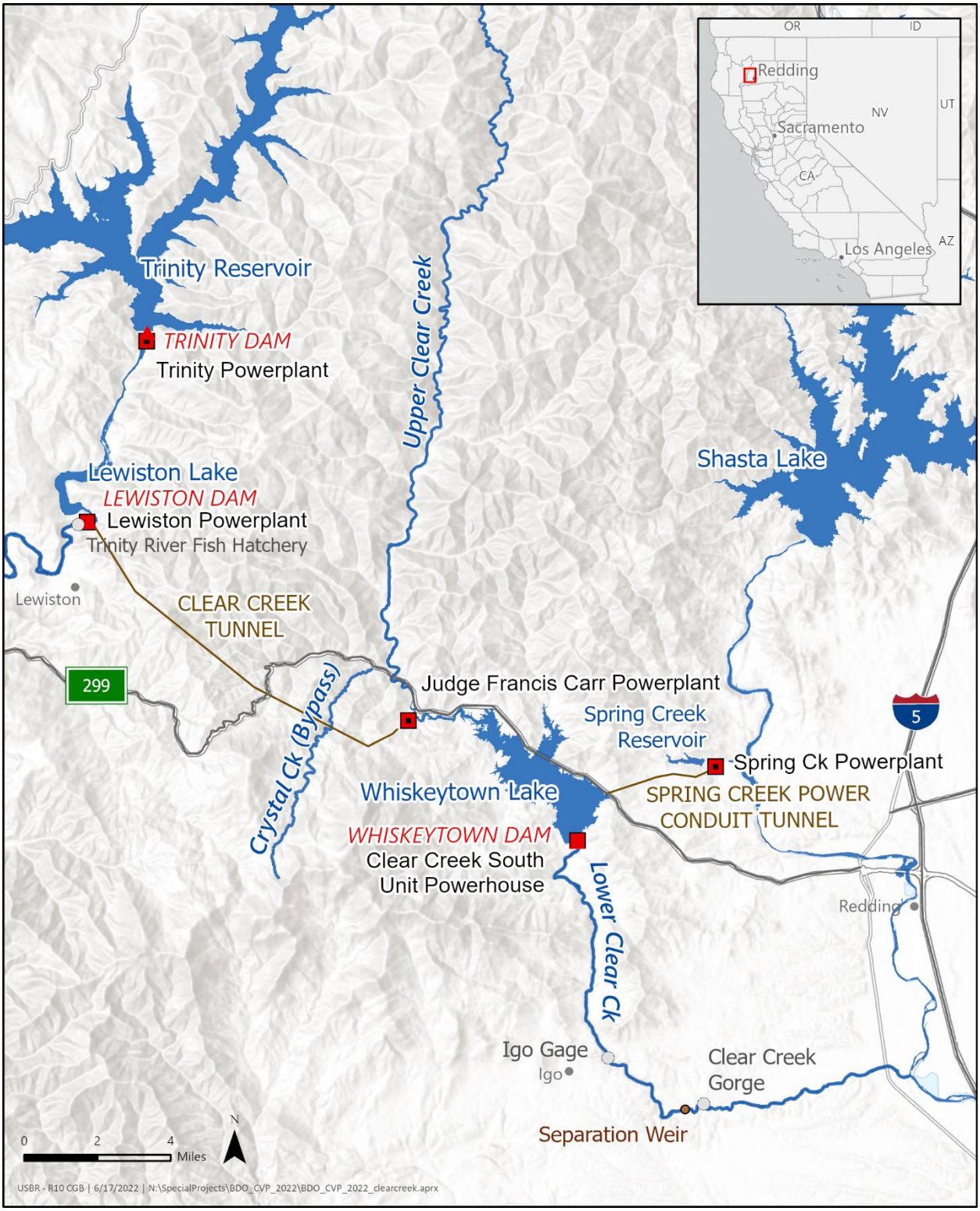


Figure 3-2. Clear Creek Facilities in the Trinity Division of the CVP.

3.1.2.1 Seasonal Operations

In the winter and spring, Whiskeytown Reservoir is operated to regulate flows for flood management. Starting in November, Reclamation would draw down Whiskeytown Reservoir by approximately 35 thousand acre-feet (TAF) to create flood management space, generally refilling in April or May. On occasion, imports of Trinity River water to Whiskeytown Reservoir may be suspended to avoid aggravating high flow conditions in the Sacramento Basin. Heavy rainfall events occasionally result in uncontrolled Gloryhole Spillway discharges to Clear Creek, through the Whiskeytown Gloryhole.

During the summer and early fall, Reclamation operates to provide lake elevations as full as practical for recreation. Whiskeytown Reservoir is a major recreational destination with recreational facilities administered by the National Park Service. Summer and fall imports help maintain Whiskeytown Lake elevations, provide cool water for releases to Clear Creek for water temperature control objectives, decrease residence time in Lewiston Lake for Trinity River temperature control, and help maintain water temperature objectives in the Sacramento River by supplying water to Keswick Reservoir.

3.1.2.2 Ramping Rates

Reclamation would limit down ramping rates to no lower than 25 cfs per hour due to operational limitation of Whiskeytown Dam infrastructure. Reclamation may vary from these ramping requirements during flood control or develop a faster ramping rate on a case-by-case basis.

3.1.2.3 Segregation Weir

Reclamation would place a segregation weir on Clear Creek between the Clear Creek Gorge Cascade and Clear Creek Road Bridge in late August through early November. Placement of the weir would occur before fall-run Chinook salmon enter Clear Creek to minimize hybridization with spawning spring-run Chinook salmon and redd superimposition. Removal of the weir would occur after the peak of fall-run Chinook salmon spawning when the risk of redd superimposition is very low. The weir location and timing protect most of the spring-run Chinook salmon utilizing Clear Creek, while minimizing effects to other salmonids.

3.1.3 American River

Reclamation operates and maintains the American River Division of the CVP for flood control, M&I and agricultural water supplies, hydroelectric power generation, fish and wildlife protection, recreation, and Delta water quality. Facilities include Folsom Dam, its reservoir (977 TAF capacity), power plant, temperature control shutters on the power plant, and the Joint Federal Project auxiliary spillway, as well as the Nimbus Dam, Lake Natoma, Nimbus Power Plant, and Folsom South Canal. The CVP additionally delivers water to the Freeport Regional Water Project Intake.

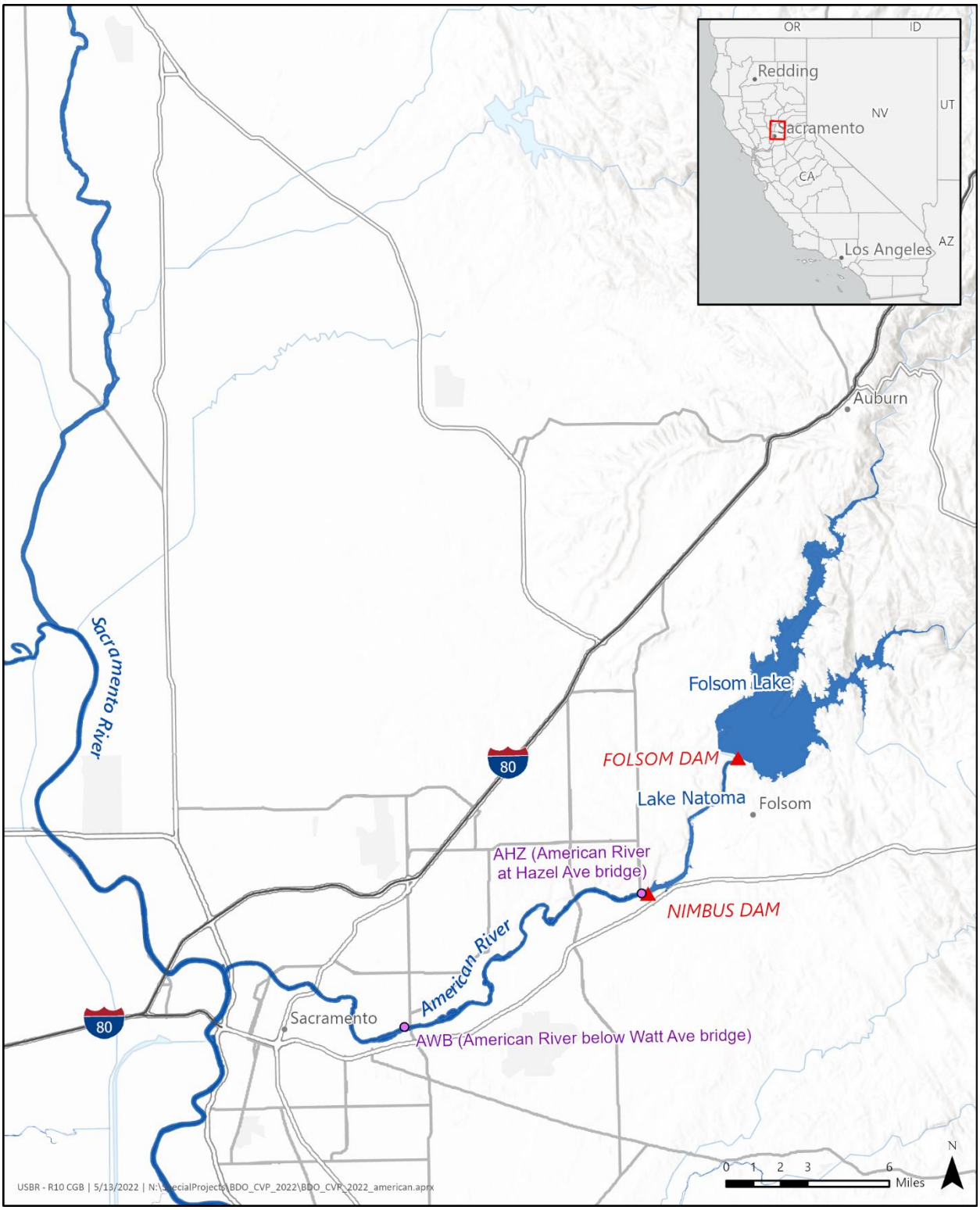


Figure 3-3. Facilities in the American River Division of the CVP.

3.1.3.1 Seasonal Operations

Reclamation operates Folsom Reservoir in the winter primarily for flood control and minimum flows in the lower American River and Delta. During non-flood control operations, Reclamation stores Folsom Reservoir inflows that exceed releases for minimum instream flows and Delta water quality requirements. Reclamation seeks consistent steady releases to minimize potential redd dewatering, redd scouring, and juvenile stranding for steelhead and fall-run Chinook salmon, but Delta outflow requirements may require varying releases.

In the spring, when not operating to flood control requirements, Reclamation seeks to maximize capture of the spring runoff to fill as close to full as possible, while also considering conditions in the lower American River for fisheries needs. The American River Minimum Flow Standard includes both minimum releases and, in some years, a pulse flow to cue juvenile salmonids to emigrate. Reclamation also operates for water supply and Delta outflow requirements. As the closest reservoir to the Delta, increased releases from Folsom Reservoir are frequently called on to address Delta water quality objectives under D-1641. When releases from upstream CVP and SWP reservoirs meet Delta outflow objectives, Folsom Dam releases can be reduced and system-wide reservoirs balanced.

Reclamation is implementing a pilot program that considers an end-of-December (EOD) planning minimum of 300 TAF (Water Forum Memorandum of Understanding, March 2021). When developing the operational forecast, Reclamation would consider an EOD Folsom Reservoir storage of at least 300 TAF. In some years, operational constraints may result in an EOD storage of less than 300 TAF. If, based on the May forecast, Reclamation does not anticipate meeting 300 TAF at EOD, it would be reported at the May American River Group (ARG) meeting. In September, storage is typically at its lowest after releases and diversions for summer demands.

In the summer, Reclamation typically releases flows above the minimum instream flow requirements for instream temperature control, Delta outflow, and water supply. Reclamation manages water temperatures through the volume of water released and shutter elevations, in consideration of projected meteorological conditions, balancing the Folsom Reservoir coldwater pool for instream temperature control during the summer for steelhead and the need to preserve cold water for fall-run Chinook salmon.

In the fall, operations focus on water temperature control management. Limited coldwater pool and limited storage require balancing releases and shutter operations to maximize the ability to maintain suitable water temperatures for steelhead rearing and fall-run Chinook salmon spawning. If reservoir inflows are greater than the release needs, Reclamation stores the surplus water.

3.1.3.2 Ramping Rates

Reclamation would ramp down releases in the American River below Nimbus Dam as shown in Table 3-1Table 3-1 and at night, if possible.

Table 3-1. Lower American River Ramping Rates.

Daily Rate of Change (cfs)	Amount of Decrease in 24 Hours (cfs)	Maximum Change per Step (cfs)
20,000 to 16,000	4,000	1,350
16,000 to 13,000	3,000	1,000
13,000 to 11,000	2,000	700
11,000 to 9,500	1,500	500
9,500 to 8,300	1,200	400
8,300 to 7,300	1,000	350
7,300 to 6,400	900	300
6,400 to 5,650	750	250
5,650 to 5,000	650	250
<5,000	500	100

cfs = cubic feet per second.

3.1.4 Delta

Reclamation operates and maintains the Delta Division of the CVP for M&I and agricultural water supplies, hydroelectric power generation, fish and wildlife protection, recreation, and Delta water quality. The major CVP features are the Delta Cross Channel, Contra Costa Canal and Rock Slough Intake facilities, Tracy Fish Collection Facility (Tracy Fish Facility) and C. W. “Bill” Jones Pumping Plant (Jones Pumping Plant), and Delta-Mendota Canal.

Reclamation operates and maintains the San Luis Unit of the West San Joaquin Division for M&I and agricultural water supplies, hydroelectric power generation, fish and wildlife protection, recreation, and water quality. The major CVP and SWP features are the O’Neill Forebay, San Luis Reservoir, Bernice Frederic Sisk Dam, William R. Gianelli Pumping-Generating Plant, San Luis Canal, Dos Amigos Pumping Plant, and Los Banos and Little Panoche detention dams and reservoirs. The major CVP-only facilities include the Coalinga Canal O’Neill Pumping-Generating Plant, and Pleasant Valley Pumping Plant.

Reclamation operates the San Felipe Division for M&I and agricultural water supplies, fish and wildlife protection, and recreation. The major CVP features are the Pacheco Pumping Plant, Tunnel, and Conduit.

The Delta-Mendota Canal/California Aqueduct Intertie is used to move water between the California Aqueduct and the Delta-Mendota Canal.

The main SWP-only Delta features are the Barker Slough Pumping Plant (BSPP), Suisun Marsh facilities (including the Suisun Marsh Salinity Control Gate [SMSCG], Roaring River Distribution System [RRDS], Morrow Island Distribution System, Goodyear Slough Outfall Gates), Clifton Court Forebay (CCF), and John E. Skinner Delta Fish Protective Facility

(Skinner Fish Facility), Harvey O. Banks Pumping Plant (Banks Pumping Plant) and the California Aqueduct.

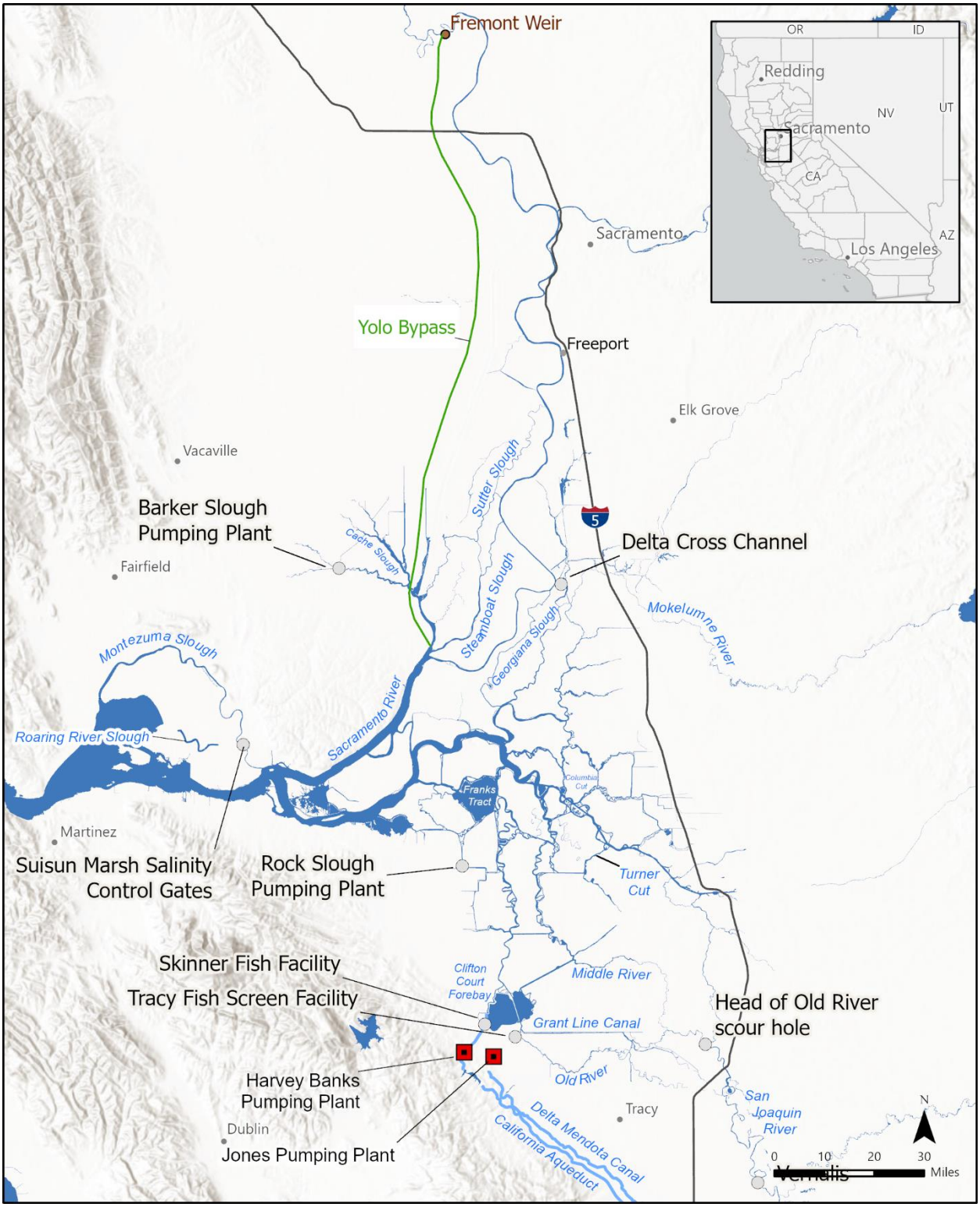


Figure 3-4. Map of the Delta Division Facilities.

3.1.4.1 Seasonal Operations

In the winter and spring, Reclamation and DWR typically export excess water. Excess water conditions occur when releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in-basin uses and exports. Actions to minimize entrainment of listed fish into the south Delta and at the Jones and Banks pumping plants limit the export of excess water. Exports during the winter and spring reduce the reliance on conveying previously stored water in the summer and fall for south-of-Delta water supply needs. In dry conditions, Reclamation and DWR may need to increase releases from upstream reservoirs beyond what is needed to meet minimum flow requirements to meet water quality or outflow requirements in the Delta.

During the summer, the CVP and SWP convey previously stored water through the Delta for export at the Jones Pumping Plant, Banks Pumping Plant, and other Delta facilities. Delta operations during the summer typically focus on maintaining salinity and meeting Delta outflow objectives while maximizing exports with the available water supply. In addition, the CVP and SWP make upstream reservoir releases for water temperature management and instream flows, which may be available for export after outflow, salinity, and in-Delta needs have been met.

In the fall, operations are adjusted to meet salinity, Delta outflow requirements, and peak demands from CVPIA wildlife refuges. Upstream and in-Delta demands typically decrease and accretions within the system typically increase. When water is available and not required for salinity and Delta outflow requirements, late summer and fall provide an opportunity to export water and start filling San Luis Reservoir for the next water year. When conditions are dry, there is little opportunity for exports. Releases from upstream reservoirs generally decrease to conserve water in storage for the next year. On occasion, releases for flood conservation pool or redds protection may occur and result in additional flows into the Delta.

The Banks Pumping Plant pumps water directly from CLC. The CLC radial gates are closed during critical periods of the ebb and flood tidal cycle for water quality and water levels in the south Delta. During July through September, the maximum daily diversion limit from the Delta into the CLC is increased from 6,990 cfs to 7,490 cfs, and the maximum averaged diversion limit over any three days is increased from 6,680 cfs to 7,180 cfs. Except for Alternative 2b, from mid-December through mid-March, diversions into CLC may be increased by one-third of the San Joaquin River flow at Vernalis when those flows exceed 1,000 cfs. Further, the Banks Pumping Plant would pump up to 195,000 acre-feet for the CVP in accordance with the 2018 COA Addendum.

3.1.4.2 Delta Cross Channel Gate Closures

Reclamation operates the Delta Cross Channel (DCC) Gates to reduce juvenile salmonid entrainment risk beyond actions described in D-1641. From October 1 to November 30, Reclamation closes the DCC gates if monitoring indicates a higher risk of fish presence. Reclamation may additionally close the DCC Gates to support Mokelumne River pulse flows and adult Chinook salmon migration. From December 1 to January 31, the DCC Gates are closed, except to prevent exceeding a D-1641 water quality threshold. From February 1 to May 20, the DCC Gates are closed, consistent with D-1641. From May 21 to June 15, Reclamation closes the DCC Gates for a total of 14 days, consistent with D-1641.

3.1.4.3 Tracy Fish Collection Facility

When south Delta hydraulic conditions allow and conditions are within the original design criteria for the Tracy Fish Facility, the secondary channel is operated to achieve water approach velocities for striped bass of approximately 1 to 2.5 feet per second (fps) from June 1 through October 31 and for salmon of approximately 3 fps from November 1 through May 31.

Salvage of fish at the Tracy Fish Facility occurs 24 hours per day, 365 days per year. Fish are salvaged in flow-through holding tanks, monitored by a 30-minute fish count every 120 minutes, and transported by truck to release sites near the confluence of the Sacramento and San Joaquin rivers. Larval smelt sampling commences upon detection of a spent female at the Tracy or Skinner fish facilities or when a water temperature trigger of 53.6°F (12°C) at nearby California Data Exchange Center stations is met. Salvage and operations data necessary to calculate loss are made available daily by 10 a.m.

3.1.4.4 John E. Skinner Delta Fish Protective Facility

DWR would operate the facility to screen fish from the Banks Pumping Plant as described in the Tracy Fish Facility operational description above.

3.1.4.5 Water Transfers

Reclamation and DWR would operate the CVP and SWP to facilitate transfers through providing water in streams for delivery to alternative diversion points, conveying water across the Delta for export, or storing water for delivery at a future time. Seasonal operations describe deliveries up to contract totals. Included in this consultation is transfers of water, up to contract totals, between CVP contractors within counties, watersheds, or other areas of origin (e.g., Accelerated Water Transfers). These transfers do not require demonstration of that water being consumptively used or irretrievably lost to beneficial use.

Transfers not meeting these requirements, including out of basin transfers (e.g. North to South Water Transfers, Exchange Contractors Transfers, Warren Act Transfers), follow the *Draft Technical Information for Preparing Water Transfer Proposals, as updated in 2019* (Water Transfers White Paper). The actions taken by contractors to make water available for these water transfers (i.e., reducing consumptive use by crop idling and shifting, reservoir storage releases, or groundwater substitution) have separate environmental compliance and are **not** a component of this EIS. However, the specific timing and operations associated with the conveyance of the water to be transferred **is** a component to all alternatives analyzed in this EIS. Updated in 2019, the paper provides detailed information on establishing water transfers, and how to complete a particular transfer and document it in a way to prevent harm to other legal users of water.

Reclamation and DWR would provide a transfer window across the Delta from July 1 through November 30. When pumping capacity is needed to move CVP or SWP water, Reclamation and DWR may restrict water transfers.

3.1.4.6 Agricultural Barriers

DWR would continue to operate three agricultural barriers to maintain water levels for agricultural diversions in parts of the South Delta

3.1.4.7 Clifton Court Forebay Weed Management

DWR would apply herbicides and algaecides or would use mechanical harvesters on an as-needed basis to control aquatic weeds and algal blooms in the Clifton Court Forebay. The March 2023 Clifton Court Forebay Aquatic Weed Management Standard Operating Procedures provides the operations manual and details for Clifton Court Forebay Weed Management, including best management practices to minimize adverse effects on listed species.

3.1.4.8 Suisun Marsh – Roaring River Distribution System Fall Flood-Up

The Roaring River Distribution System diversion rates have been controlled to maintain a maximum approach velocity of 0.2 fps at the intake fish screen except for a five-week contiguous period (five-week flood-up window) when Roaring River Distribution System diversion rate would be controlled to maintain a maximum approach velocity of 0.7 fps for fall flood-up operations. The dates of the five-week annual flood-up window may change annually due to waterfowl season dates changing each year and corresponding flood-up needs but would occur during the months of September through November.

3.1.5 Stanislaus River

Reclamation operates and maintains the Eastside Division of the CVP for flood control, M&I and agricultural water supplies, hydroelectric power generation, fish and wildlife protection, recreation, and water quality. Reclamation's facilities include the New Melones Dam, Reservoir (2.4 MAF capacity), and Powerplant.

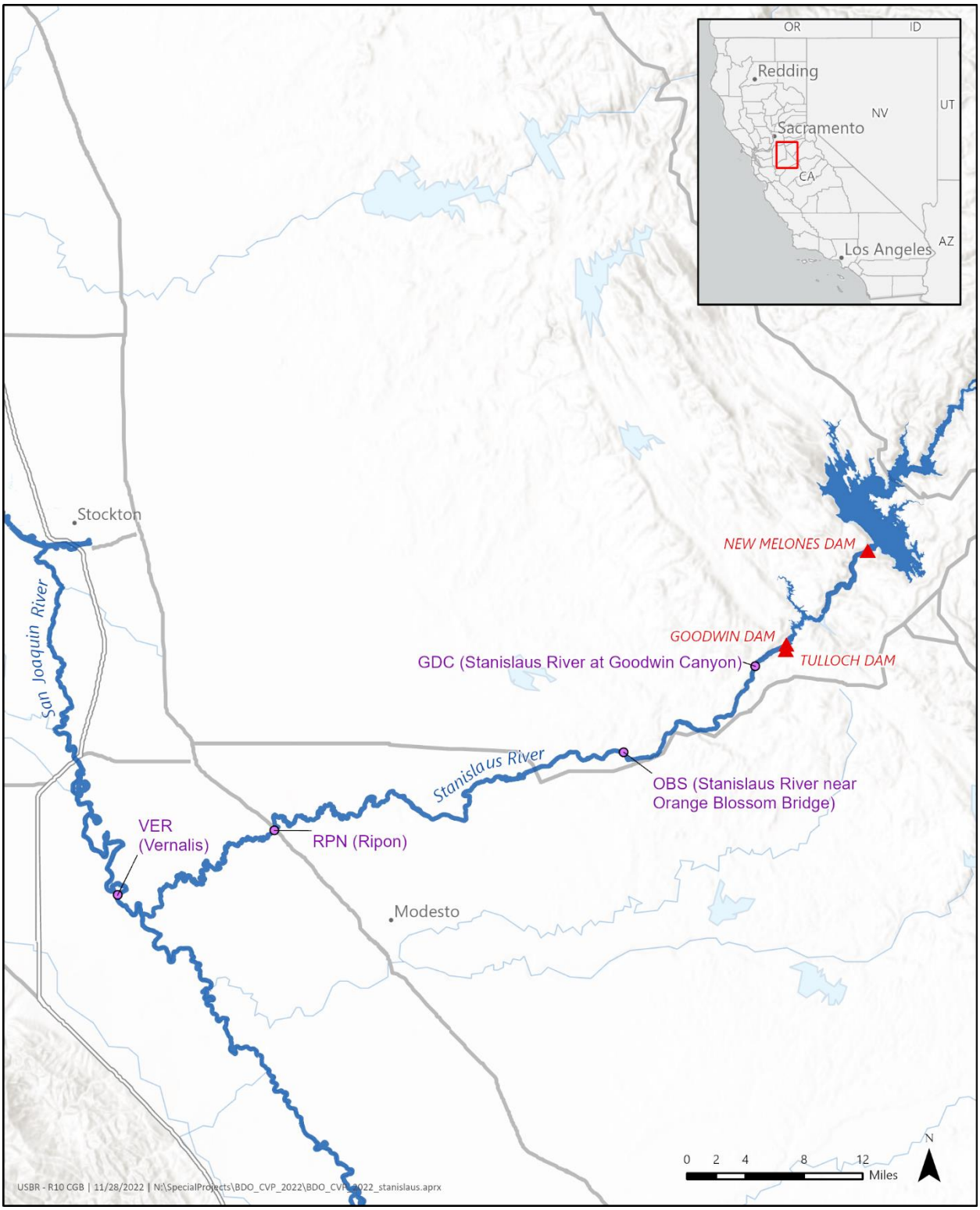


Figure 3-5. Map of the Stanislaus River and Eastside Division.

3.1.5.1 Seasonal Operations

In the winter and spring, Reclamation would operate to D-1641 and for flood control in accordance with the USACE Standard Operation and Maintenance Manual for the Lower San Joaquin River Levees Lower San Joaquin River and Tributaries Project, California (April 1959). Operating to flood control constraints is relatively infrequent because New Melones Reservoir is a larger reservoir relative to its annual inflow. Reclamation seeks to minimize potential redd dewatering, redd scouring, and juvenile stranding for steelhead.

During the summer, Reclamation is required to maintain applicable dissolved oxygen (DO) standards on the lower Stanislaus River for species protection. Reclamation operates to a 7.0 milligrams per liter DO requirement at Ripon from June 1 to September 30.

In the fall, Reclamation operates to a D-1641 fall pulse flow requirement in October for fish attraction. Otherwise, Reclamation operates to base flow requirements in order to rebuild storage. If necessary, releases might be made for DO at Ripon or electrical conductivity concerns at Vernalis, but these types of releases are rare.

3.1.5.2 Ramping Rates

Reclamation would coordinate releases on the Stanislaus River as shown in Table 3-2 using the. "60-20-20" index based on a 90% exceedance forecast.

Table 3-2. Goodwin Dam Ramping Rates.

Goodwin Release Range (cfs)	Standard Rate of Increase (cfs per 2 hours)	Standard Rate of Decrease (cfs per 2 hours)	C and D Rate of Increase (cfs per 2 hours)	C and D Rate of Decrease (cfs per 2 hours)
≥ 4,500	250	250	250	250
2,000 to 4,499	500	250	500	250
500 to 1,999	250	100	500	200
300 to 499	100	50	200	100

cfs = cubic feet per second; C = Critical water year (60-20-20 Index); D = Dry water year(60-20-20 Index).

Reclamation, through the Stanislaus Watershed Team (SWT), may develop a faster down ramping rate on a case-by-case basis.

3.1.6 San Joaquin River

Reclamation operates the Friant Division for flood control, M&I and agricultural water supplies, and fish and wildlife purposes. Friant Dam provides flood control on the San Joaquin River, downstream releases to meet senior water rights requirements above Gravelly Ford, Restoration Flows under Title X of Public Law 111-11, and diversions into the Madera and Friant-Kern Canals. The Friant Division facilities include Friant Dam, Millerton Reservoir, and the Friant-Kern and Madera Canals.

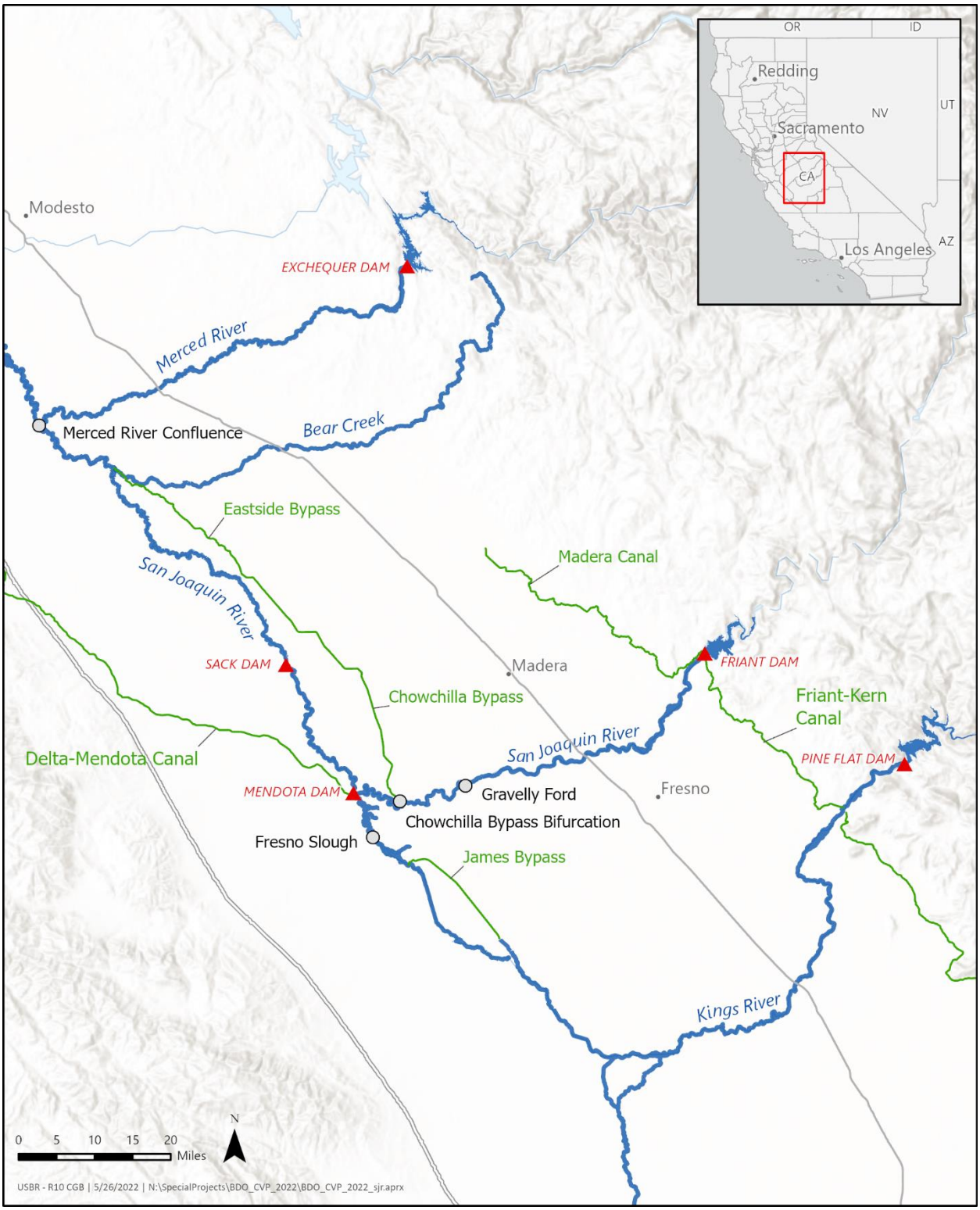


Figure 3-6. Map of the Friant Division and San Joaquin River.

Reclamation would operate the Friant Division consistent with the San Joaquin River Restoration Program Record of Decision.

3.2 No Action Alternative

Under the No Action Alternative, Reclamation would operate the CVP consistent with the 2020 Record of Decision, implementing the Proposed Action consulted upon for the 2019 Biological Opinions and the reasonable and prudent measures in the incidental take statements. DWR would operate the SWP consistent with the 2020 Record of Decision and its 2020 Incidental Take Permit. Pursuant to 43 Code of Federal Regulations Section 46.30, the 2020 Record of Decision for the CVP and SWP and the 2020 Incidental Take Permit for the SWP represent current management direction or intensity for the purposes of the No Action Alternative.

Reclamation would continue to operate each tributary with the same primary purposes as described in the Common Components seasonal operations. The No Action Alternative variable components are summarized below and described in greater detail in Appendix E, *Alternatives*.

3.2.1 Sacramento River

3.2.1.1 Ramping Rates

Ramping rates for Keswick Dam between July 1 and March 31 would be reduced between sunset and sunrise according to Table 3-3.

Table 3-3. Ramping Rates for Keswick Dam, July 1–March 31, Implemented Sunset to Sunrise.

Keswick Release (cfs)	Max per Night	Max per Hour
≥6,000	15%	2.5%
4,000–5,999	200 cfs	100 cfs
3,250–3,999	100 cfs	N/A

Note: Ramping rates do not apply during flood control or if needed for facility operational concerns.
cfs = cubic feet per second.

3.2.1.2 Fall and Winter Refill and Redd Maintenance

Under the No Action Alternative, Reclamation would maintain fall-run Chinook salmon redds in consideration of rebuilding storage and coldwater pool for the subsequent year.

Table 3-4 shows examples of possible Keswick Dam releases based on Shasta Reservoir storage condition; these are refined through future modeling efforts as part of the seasonal operations planning.

Table 3-4. Keswick Dam Example Release Schedule for EOS Storage.

Keswick Release (cfs)	Shasta EOS Storage (MAF)
3,250	≤2.2
4,000	≤2.8
4,500	≤3.2
5,000	>3.2

EOS = end-of-September; cfs = cubic feet per second; MAF = million acre-feet.

Reclamation would minimize adverse effects to shallow late-spawning winter-run Chinook salmon redds by conducting a risk analysis based on the probability of sufficient coldwater in a subsequent year, and a conservative distribution and timing of subsequent winter-run Chinook salmon.

3.2.1.3 Spring Pulse Flows

Reclamation would release spring pulse flows of up to 150 TAF to help spring-run Chinook salmon juvenile out-migration when the projected total May 1 Shasta Reservoir storage indicates a likelihood of sufficient cold water to support summer coldwater pool management, and the pulse does not interfere with the ability to meet performance objectives or other anticipated operations of the reservoir.

3.2.1.4 Water Temperature Management

Reclamation would operate the Shasta Dam TCD to provide water temperature management while minimizing impacts on power generation. Reclamation would address coldwater management using a tiered strategy to target downstream water temperatures based on projected total storage and coldwater pool. The tiered strategy manages limited coldwater resources to achieve desired fisheries objectives by conserving use of the coldwater pool to when egg incubation stages have the highest DO demands. Figure 3-7 provides a decision tree explaining the decision points for Shasta Reservoir temperature management.

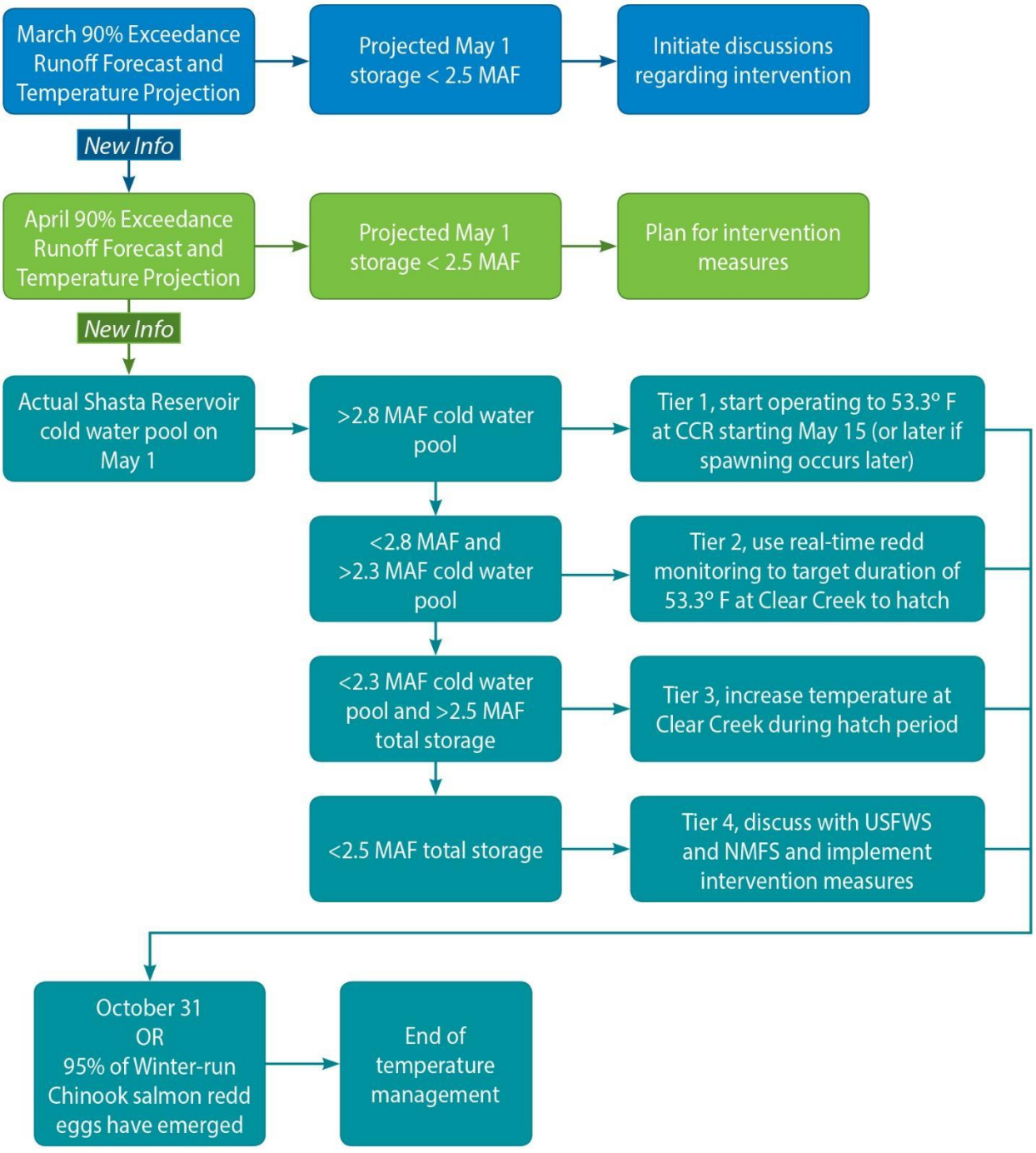


Figure 3-7. Decision Tree for Shasta Reservoir Temperature Management.

Figure 3-8 provides an approximate expected performance for tiers based on total storage and coldwater pool in Shasta Reservoir.

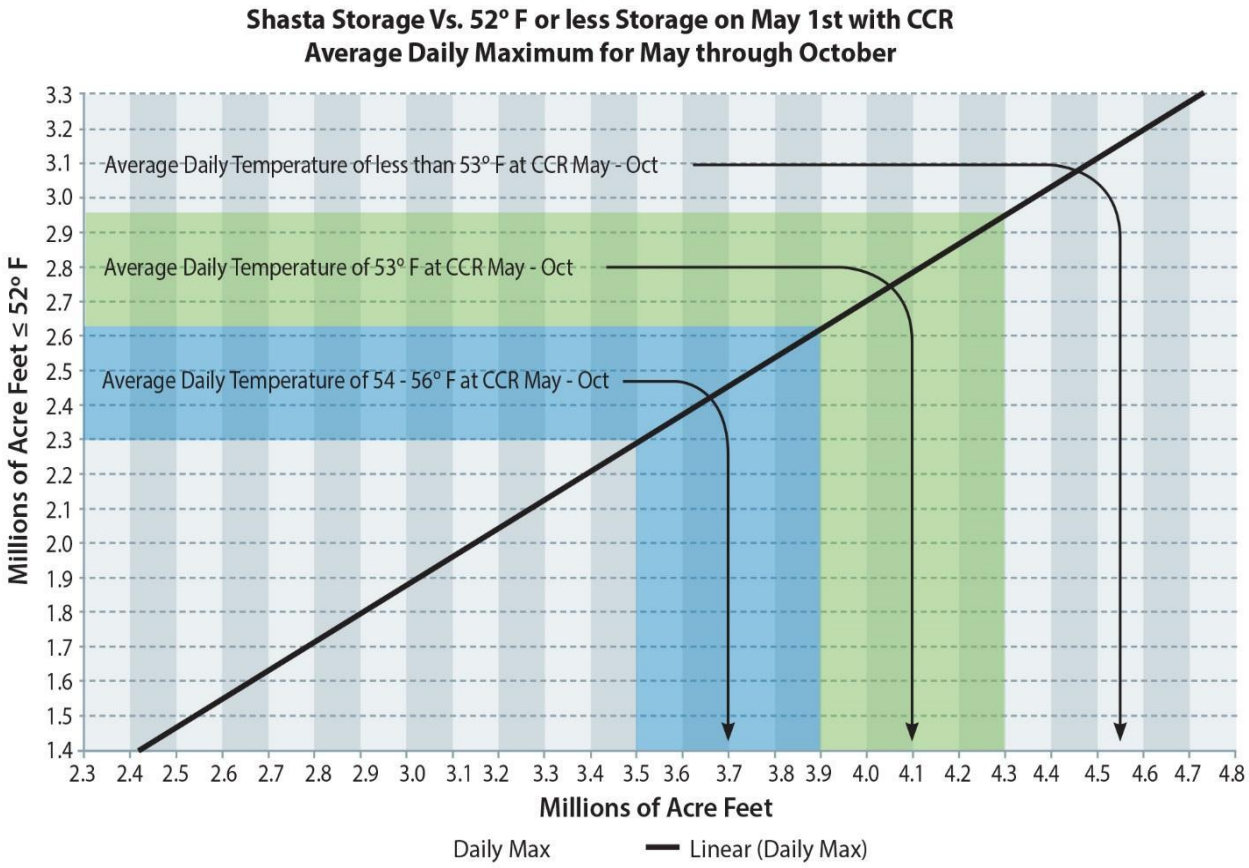


Figure 3-8. Relationship between Temperature Compliance, Total Storage in Shasta Reservoir, and Coldwater Pool in Shasta Reservoir.

3.2.1.5 Winter-Run Chinook Salmon Supplementation

Reclamation would rely upon increased use of Livingston-Stone National Fish Hatchery (NFH) during droughts to increase production of winter-run Chinook salmon. Increased production would aim to offset temperature dependent mortality and low survival on the Sacramento River and in the Delta.

3.2.1.6 Raised Shasta Dam

The No Action Alternative anticipated a separate process and EIS for the Shasta Dam Raise; therefore, no further discussion would be provided in this EIS.

3.2.1.7 Spawning and Rearing Habitat Restoration

The No Action Alternative reflects the 2020 Record of Decision evaluation of habitat restoration in concert with operations. Reclamation's habitat programs would continue through separate environmental compliance and future restoration plans as independent programs; therefore, no further discussion would be provided in this EIS.

3.2.2 Clear Creek

3.2.2.1 Minimum Instream Flows

Reclamation would release Clear Creek flows in accordance with the August 11, 2000 Instream Flow Preservation Agreement between Reclamation, USFWS, and CDFW and the April 15, 2002 Water Board permit. Reclamation would release a minimum base flow in Clear Creek of 200 cfs from October through May and 150 cfs from June through September in all water year types except critical water year types. In critical years, Clear Creek base flows may be reduced below 150 cfs based on available water from Trinity Reservoir. Additional flow may be required for water temperature management during the fall.

3.2.2.2 Pulse Flows

Reclamation would create pulse flows for both channel maintenance and spring attraction flows. For spring attraction flows, Reclamation would release 10 TAF up to the safe release capacity (approximately 900 cfs, depending on reservoir elevation and downstream capacity), in all water year types except for critical water year types. For channel maintenance flows, Reclamation would release 10 TAF from Whiskeytown Dam up to the safe release capacity, in all water year types except dry and critical (based on the Sacramento Valley Index [SVI]).

3.2.2.3 Water Temperature Management

Reclamation would manage Whiskeytown Reservoir releases to meet a daily average water temperature of 60°F at the Igo gage from June 1 through September 15 and 56°F or less at the Igo gage from September 15 to October 31. In critical or dry water year types, Reclamation would operate as close to these water temperatures as possible.

3.2.2.4 Spawning and Rearing Habitat Restoration

The No Action Alternative reflects the 2020 Record of Decision evaluation of habitat restoration in concert with operations. Reclamation's habitat programs would continue through separate environmental compliance and future restoration plans as independent programs; therefore, no further discussion would be provided in this EIS.

3.2.3 American River

3.2.3.1 Minimum Instream Flows (Minimum Release Requirement)

Reclamation would implement the minimum release requirement (MRR) proposed by the Sacramento Area Water Forum in 2017, as modified by the 2020 Record of Decision, based on the month and annual hydrology, Figure 3-9 and Figure 3-10.

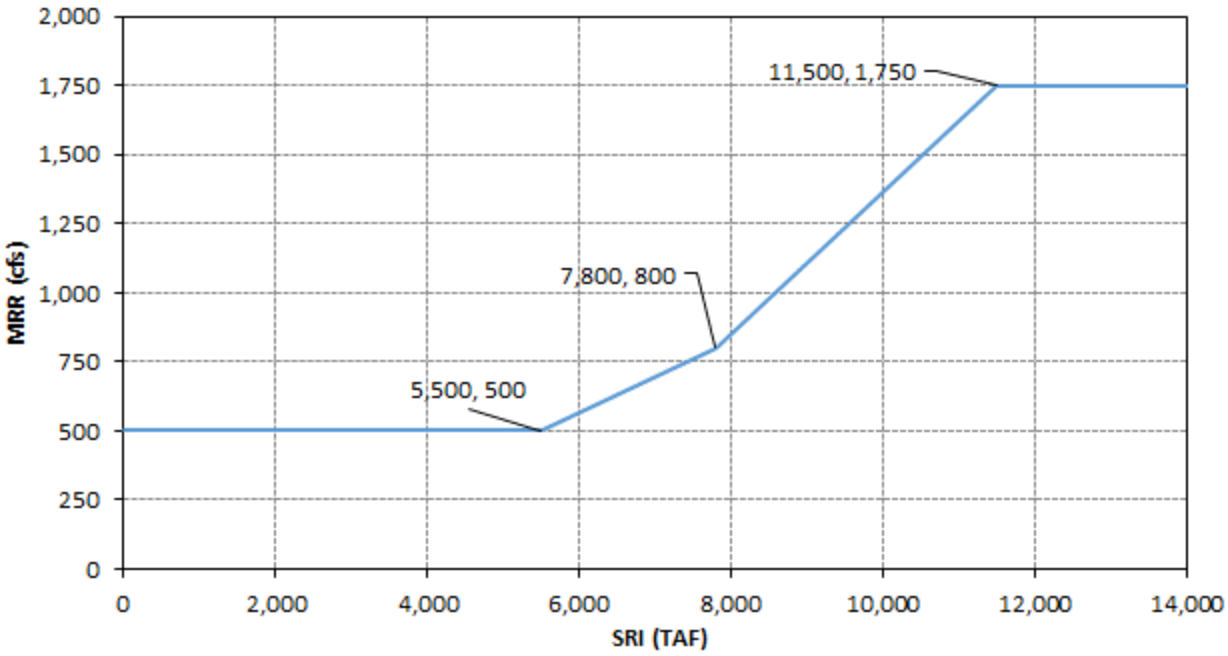


Figure 3-9. January Relationship Between the Sacramento River Index or American River Index and the Minimum Release Requirement.

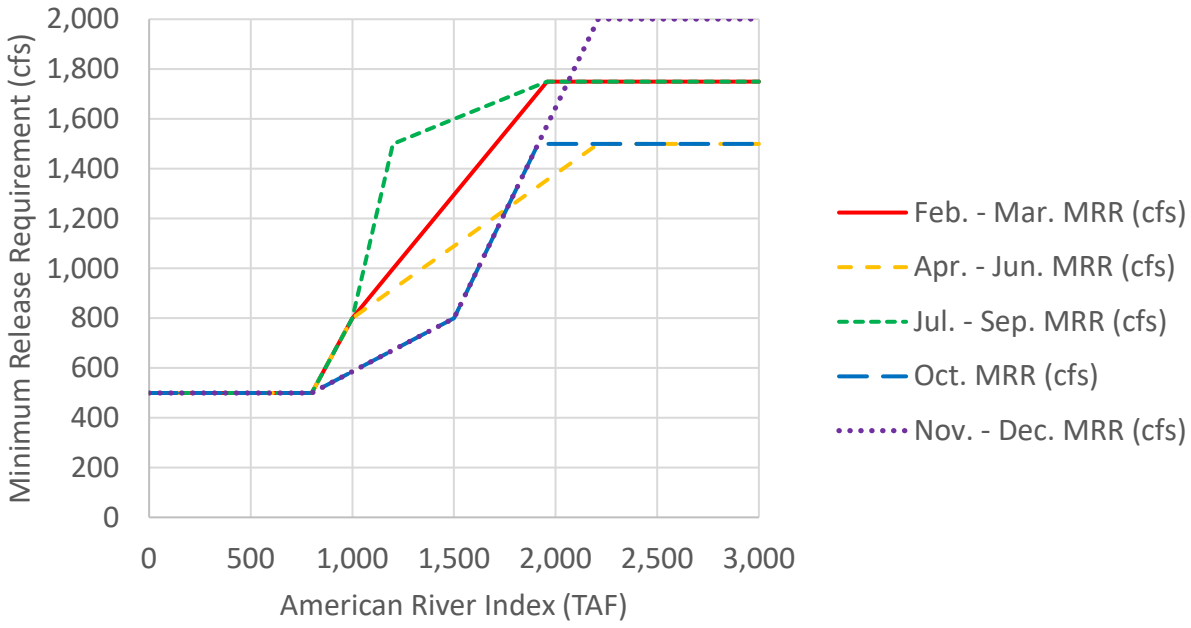


Figure 3-10. February through December Relationship Between the American River Index and the Minimum Release Requirement.

Reclamation would use the 90% exceedance from the Sacramento River Index in January and the American River Index in February through December to develop the MRR (with certain spills subtracted).

3.2.3.2 Spring Pulse Flows

Reclamation would implement a spring pulse in years that the MRR for March is between 1,000 cfs and 1,500 cfs. The peak flow of the pulse flow would be three times the March MRR, even if implemented in April or May, but no higher than 4,000 cfs and lasting two days.

Reclamation, through ARG, would develop a pulse flow schedule and may facilitate an additional spring pulse flow event if water is made available from non-CVP sources, or if there is flexibility to shape planned releases in a more variable schedule.

3.2.3.3 Redd Dewatering Adjustments

Reclamation, through Governance, would schedule MRR releases consistent with the implementation of redd dewatering protective adjustments to limit potential redd dewatering January through May. Table 3-5, with linear interpolation, shows the minimum flow for steelhead redds through May.

Table 3-5. Steelhead Redd Dewatering Protective Adjustment-based MRR for February through May.

January or February MRR (cfs)	Steelhead Redd MRR through May (cfs)
≤700	500
800	520
900	580
1,000	640
1,100	710
1,200	780
1,300	840
1,400	950
1,500	1,030
1,600	1,100
1,700	1,180
1,800	1,250

cfs= cubic feet per second; MRR = minimum release requirement.

3.2.3.4 Water Temperature Management

Reclamation would implement the Automated Temperature Selection Procedure (ATSP), Appendix M of the Initial Alternatives Report in developing the Temperature Management Plan (TMP). Each ATSP schedule determines a monthly series of water temperature targets (for daily average water temperature) at the Watt Avenue bridge. Schedule 1 has a water temperature upper limit of 63°F from May through September, and 56°F in October and November. Schedules 2 through 77 each represent a change in a single month's upper temperature limit by 1.0°F. Schedule 78 has a water temperature upper limit of 72°F from May through November. The ATSP may be modified as follows:

- For Schedule 28 or higher (greater than 65°F at Watt Avenue Bridge, May through September), the TMP may consider a water temperature location at Hazel Avenue.
- For greater than 65°F at Hazel Avenue bridge for May through September, the TMP would include an evaluation of whether modified Folsom Reservoir operations could support an improved temperature schedule (e.g., an alternate release schedule over the summer).
- For greater than 68°F at Hazel Avenue for May through September, the TMP would include an evaluation of whether modified Folsom Reservoir operations could support an improved temperature schedule (e.g., an alternate release schedule over the summer) and evaluate a power bypass during the summer and/or fall.
- For greater than 56°F at Hazel Avenue in November, the TMP would evaluate a power bypass.

3.2.3.5 Spawning and Rearing Habitat Restoration

The No Action Alternative reflects the 2020 Record of Decision evaluation of habitat restoration in concert with CVP operations. Reclamation's habitat programs would continue through separate environmental compliance and future restoration plans as independent programs; therefore, no further discussion would be provided in this EIS.

3.2.4 Delta

3.2.4.1 Old and Middle River Reverse Flow Management

From the onset of old and middle river (OMR) management to the end, Reclamation and DWR would operate to an OMR index no more negative than a 14-day moving average of -5,000 cfs unless a storm event occurs. Onset occurs after a "First Flush" event or after January 1 if more than 5% of listed salmonid species are present. Reclamation and DWR would manage to more positive OMR for turbidity bridge avoidance, larval and juvenile Delta smelt protections, cumulative loss thresholds, and single year loss thresholds. DWR would additionally manage to daily loss thresholds and additional smelt protections. OMR would end when salmonids have exited the Delta and/or upon exceeding water temperature thresholds.

Reclamation and DWR would maximize exports by incorporating real-time monitoring of fish distribution, turbidity, temperature, hydrodynamic models, and entrainment models into the decision support for OMR management to focus protections for fish when necessary and provide flexibility where possible.

3.2.4.2 Start of OMR Management

Reclamation and DWR would start OMR management when one or more of the following conditions have occurred:

- **Integrated Early Winter Pulse Protection (First Flush Turbidity Event):** Reclamation and DWR would reduce exports for 14 consecutive days so that the 14-day averaged OMR index for the period would not be more negative than -2,000 cfs, in response to "First Flush" conditions in the Delta. "First flush" may be triggered between December 1 and January 31 and include:
    - Running 3-day average of the daily flows at Freeport is greater than 25,000 cfs; and
    - Running 3-day average of the daily turbidity at Freeport is 50 Nephelometric Turbidity Unit (NTU) or greater; or
    - Real-time monitoring indicates a high risk of migration and dispersal into areas at high risk of future entrainment.
- This "First Flush" may only be initiated once during the December through January period and would not be required if:
    - Spent female Delta smelt are collected in a monitoring survey.
- **Salmonids Presence:** After January 1, if more than 5% of any one or more salmonid species (wild young-of-year winter-run Chinook salmon, wild young-of-year spring-run Chinook salmon, or Central Valley steelhead) are estimated to be present in the Delta as determined by their appropriate monitoring working group.

3.2.4.3 Additional Real-Time OMR Restrictions and Performance Objectives

Reclamation and DWR would manage to a more positive OMR than -5,000 cfs based on the following conditions:

- **Turbidity Bridge Avoidance (South Delta Turbidity):** After the Integrated Early Winter Pulse Protection or February 1 (whichever comes first) and until a ripe or spent female is detected or April 1 (whichever is first), Reclamation and DWR would manage exports in order to maintain daily average turbidity in Old River at Bacon Island at a level of less than 12 Formazin Nephelometric Units (FNU). This action seeks to avoid the formation of a turbidity bridge from the San Joaquin River shipping channel to the south Delta fish facilities. If the daily average turbidity at Bacon Island could not be maintained at less than 12 FNU, Reclamation and DWR would manage exports to achieve an OMR no more negative than -2,000 cfs until the daily average turbidity at Bacon Island drops below 12 FNU. However, if five consecutive days of OMR less negative than -2,000 cfs do not

reduce turbidity at Bacon Island below 12 FNU, Reclamation and DWR could determine that OMR restrictions to manage turbidity are infeasible, and would instead implement an OMR target that is deemed protective, based on turbidity, adult Delta smelt distribution, and salvage, but no more negative than -5,000 cfs.

- **Larval and Juvenile Delta Smelt:** Reclamation and DWR operationalized the USFWS Delta Smelt lifecycle model through the use of real-time monitoring for the spatial distribution of Delta smelt.
- **Cumulative Loss Threshold:** Reclamation and DWR would avoid exceeding 10-year cumulative loss thresholds over the duration of the 2019 Biological Opinions for:
    - Natural winter-run Chinook salmon (cumulative loss = 8,738)
    - Hatchery winter-run Chinook salmon (cumulative loss = 5,356)
    - Central Valley Steelhead from December through March (cumulative loss = 6,038)
    - Natural Steelhead from April 1 through June 15 (cumulative loss = 5,826)
    - Natural steelhead would be separated into two time periods to protect San Joaquin origin fish that historically appear in the Mossdale trawls later than Sacramento origin fish. The loss threshold and loss tracking for hatchery winter-run Chinook salmon does not include releases into Battle Creek. Loss for Chinook salmon are based on length-at-date criteria.
    - The cumulative loss thresholds would be based on cumulative historical loss from 2010 through 2018. Reclamation's and DWR's performance objectives are intended to avoid loss such that this cumulative loss threshold (measured as the 2010-2018 average cumulative loss multiplied by 10 years) would not be exceeded by 2030.
- **Single-Year Loss Threshold:** In each year, Reclamation and DWR would avoid exceeding an annual loss threshold equal to 90% of the greatest salvage loss that occurred in the historical record from 2010 through 2018 for each of:
    - Natural winter-run Chinook salmon (loss = 1.17% of juvenile production estimate [JPE])
    - Hatchery winter-run Chinook salmon (loss = 0.12% of JPE)
    - Natural Steelhead from December through March (loss = 1,414)
    - Central Valley Steelhead from April through June 15 (loss = 1,552)
    - During the year, if Reclamation and DWR would exceed the annual loss from 2010 through 2018, Reclamation and DWR would review recent fish distribution information and operations at the Water Operations Management Team (WOMT) and seek technical assistance on future planned operations. Any agency could elevate from WOMT to a Directors discussion, as appropriate.

- During the year, if Reclamation and DWR exceed 50% of the annual loss threshold, Reclamation and DWR would restrict OMR to a 14-day moving average OMR index of no more negative than -3,500 cfs, unless Reclamation and DWR determine that further OMR restrictions are not required to benefit fish movement because a risk assessment shows that the risk is no longer present based on real-time information. The -3,500 cfs OMR operational criterion adjusted and informed by this risk assessment would remain in effect for the rest of the season. Reclamation and DWR would seek NMFS technical assistance on the risk assessment and real-time operations.
- During the year, if Reclamation and DWR exceed 75% of the annual loss threshold, Reclamation and DWR would restrict OMR to a 14-day moving average OMR index of no more negative than -2,500 cfs, unless Reclamation and DWR determine that further OMR restrictions are not required to benefit fish movement because a risk assessment shows that the risk is no longer present based on real-time information. The -2,500 cfs OMR operational criterion adjusted and informed by this risk assessment would remain in effect for the rest of the season. Reclamation and DWR would seek NMFS technical assistance on the risk assessment and real-time operations.
- Risk assessments (identified above): Reclamation and DWR would evaluate and adjust OMR restrictions under this section by preparing a risk assessment that considers several factors including, but not limited to, real-time monitoring, historical trends of salmonids exiting the Delta, entering the south Delta, fish detected in salvage, and relevant environmental conditions. Risks would be measured against the potential to exceed the next single year loss threshold. Reclamation and DWR would share its risk assessment and supporting documentation with USFWS and NMFS, seek their technical assistance, discuss the risk assessment and future operations with WOMT at its next meeting, and elevate to the Directors as appropriate.

Reclamation and DWR would continue monitoring and reporting the salvage at the Tracy and Skinner fish facilities. Reclamation and DWR would continue the release and monitoring of yearling Coleman NFH Late-fall-run Chinook salmon as yearling spring-run Chinook salmon surrogates.

3.2.4.4 Real-Time Decision-Making and Salvage Thresholds

When real-time monitoring demonstrates that criteria in "Additional Real-Time OMR Restrictions and Performance Objectives" are not supported, then Reclamation and DWR may confer with the Directors of NMFS, USFWS, and CDFW to operate to a more negative OMR. Upon mutual agreement, the Directors of NMFS and USFWS may authorize Reclamation and DWR to operate to a more negative OMR than the Additional Real-Time OMR Restrictions, but no more negative than -5,000 cfs. This process would be separate from the risk analysis process referenced above.

Figure 3-11 shows OMR management in a decision tree.

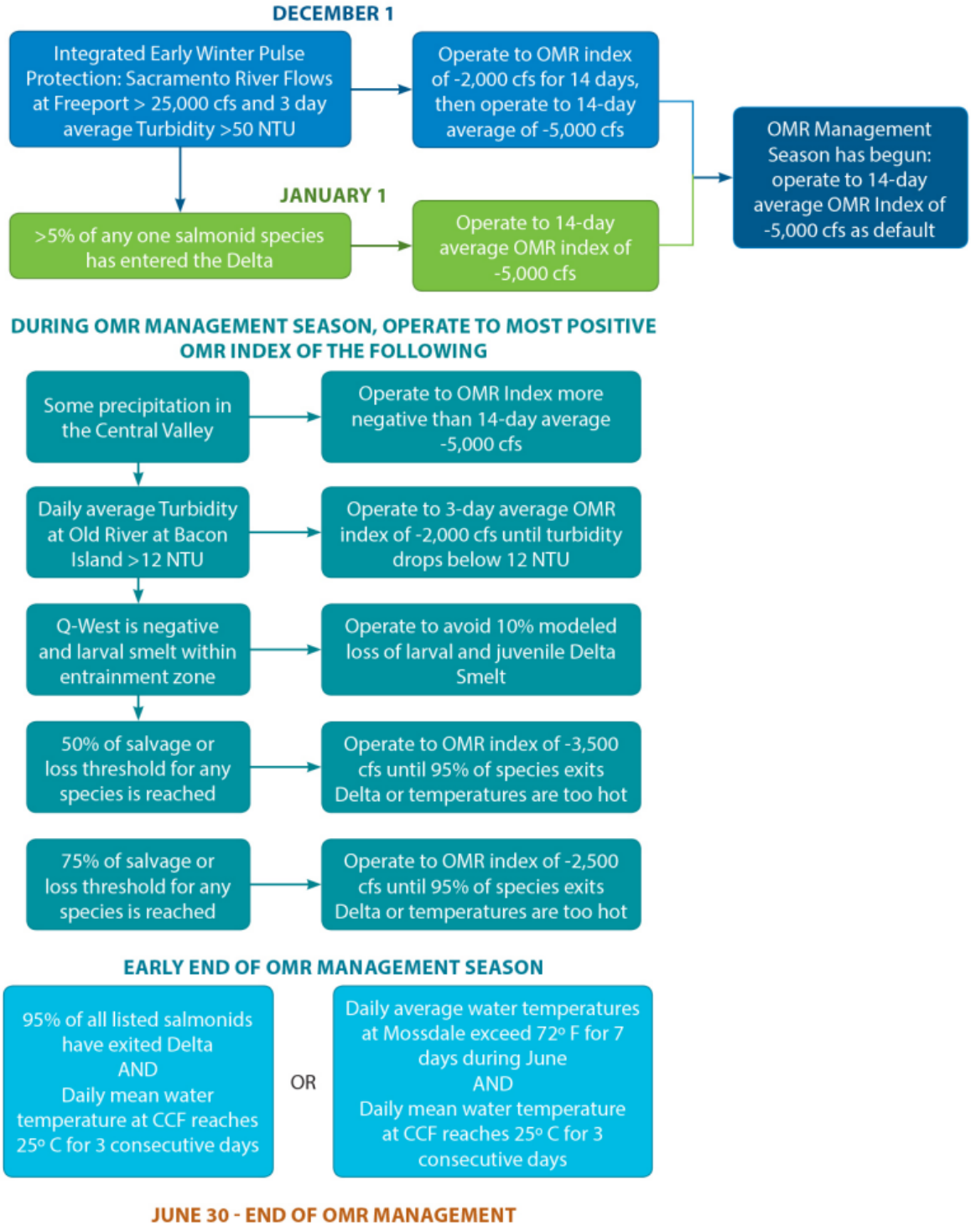


Figure 3-11. Decision Tree for OMR Reverse Flow Management.

3.2.4.5 Storm-Related OMR Flexibility

Reclamation and DWR could operate to a more negative OMR up to a maximum (otherwise permitted) export rate of 14,900 cfs (which could result in a range of OMR values) at Banks and

Jones pumping plants to capture peak flows during storm-related events. Reclamation and DWR would continue to monitor fish in real-time and would operate in accordance with the Additional Real-Time OMR Restrictions thresholds.

Under the following conditions, Reclamation and DWR would not pursue storm-related OMR flexibility for capturing peak flows from storm-related events:

- Integrated Early Winter Pulse Protection (above) or Additional Real-Time OMR Restrictions (above) are triggered. Under such conditions, Reclamation and DWR would have already determined that more restrictive OMR is required.
- An evaluation of environmental and biological conditions indicates more negative OMR would likely cause Reclamation and DWR to trigger an Additional Real-Time OMR Restriction (above).
- Salvage of yearling Coleman NFH late-fall-run Chinook salmon (as yearling Spring-Run Chinook Salmon surrogates) exceeds 0.5% within any of the release groups.
- Reclamation and DWR identify changes in spawning, foraging, sheltering, or migration behavior beyond those anticipated to occur under OMR management.

Reclamation and DWR would continue to monitor conditions.

3.2.4.6 End of OMR Management

OMR criteria may control operations until June 30 (for Delta smelt and Chinook salmon), until June 15 (for Steelhead/Rainbow Trout), or when the following species-specific off ramps have occurred, whichever is earlier:

- **Delta Smelt:** When the daily mean water temperature at the CLC reaches 77°F for 3 consecutive days.
- **Salmonids:**
    - When more than 95% of salmonids have migrated past Chipps Island, as determined by their monitoring working group, or
    - After daily average water temperatures at Mossdale exceed 71.6°F for 7 days during June (the 7 days do not have to be consecutive).

3.2.4.7 Spring Delta Outflow

Reclamation would operate to D-1641, subject to entrainment protections. DWR would operate to the SWP 2020 Incidental Take Permit.

3.2.4.8 Barker Slough Pumping Plant

The BSPP would continue to operate and maintain under applicable regulatory requirements and remove sediment and aquatic weeds as needed. The annual maximum diversion is 125 TAF and the maximum daily diversion rate for the BSPP is 175 cfs. Reclamation and DWR would implement Delta smelt entrainment minimization measures in coordination with USFWS.

3.2.4.9 Delta Smelt Supplementation

Reclamation proposes to continue to fund a two-phase process that would lead to annual supplementation of the wild Delta smelt population with propagated fish within three to five years starting in 2019.

The University of California, Davis Fish Conservation and Culture Laboratory (FCCL), which maintains the refugial population of Delta smelt and generates additional captive-bred fish for research, and keeps enough progeny alive to repeat the process for multiple generations.

3.2.4.10 Delta Smelt Summer and Fall Habitat

Reclamation and DWR would improve Delta smelt food supply and habitat through Delta smelt summer and fall habitat actions (SFHAs) that manage X2 to 80 kilometer (km) in September and October of wet and above normal years, operate the SMSCG in below normal and above normal years, and undertake food enhancement actions developed through structured decision making. DWR would operate the SMSCG based on 4 parts per thousand at Belden's Landing.

Reclamation and DWR would use structured decision-making to implement SFHAs. In the summer and fall (June through October) of below normal, above normal, and wet years, based on the SVI, the environmental and biological goals are, to the extent practicable, the following:

- Maintain low salinity habitat in Suisun Marsh and Grizzly Bay when water temperatures are suitable;
- Manage the low salinity zone to overlap with turbid water and available food supplies; and
- Establish contiguous low salinity habitat from Cache Slough Complex to Suisun Marsh.

Measures include operation of the SMSCG and various food enhancement actions.

3.2.4.11 Bernice Frederic Sisk Dam Raise and Reservoir Expansion

The No Action Alternative does not include the Sisk Dam Raise and Reservoir Expansion as an operational component of the CVP.

3.2.4.12 Tidal Habitat Restoration

Reclamation and DWR would complete the 8,000 acres required by the 2020 Record of Decision and additional 396.3 acres as required by the Incidental Take Permit for the SWP.

DWR and Reclamation have or would carry out tidal habitat restoration acre targets identified from the 2008 and 2019 USFWS Biological Opinions (8,000 acres) and the 2020 State Incidental Take Permit (396.3) to complete mitigation requirements for Delta smelt and longfin smelt (per the 2020 Incidental Take Permit). Currently, twelve restoration projects have been identified to satisfy the total acreage requirement of 8,396.3 acres (Table 3-6). The twelve projects are in different phases of completion: (1) constructed (3,584 acres), (2) in construction (3.490 acres) or (3) planned (1,662 acres). All twelve restoration projects are located in the northern arc of the upper estuary (area of highest Delta smelt occupation) and are designed to enhance food

production and rearing habitat for delta smelt and longfin smelt (per the 2020 Incidental Take Permit for the SWP).

Table 3-6. Tidal Habitat Restoration.

Project	Estimated Acres	Phase
Arnold Slough	138	Constructed
Decker Island	113	Constructed
Lower Yolo Ranch	1,713	Constructed
Tule Red	590	Constructed
Winter Island	544	Constructed
Wings Landing	190	Constructed
Yolo Flyway Farms	296	Constructed
Bradmoor Island	490	Under construction
Lookout Slough	3,000	Under construction
Prospect Island	1,500	Construction planned in 2024
Chipps Island	687	Construction planned in 2024

All planned actions presented in Table 3-6 have separate environmental compliance (either programmatically or site-specific) and no further analysis of impacts would be performed in this document. State and Federal agencies would analyze impacts for the site specific and programmatic tidal habitat restoration compliance separate from the Long-Term Operation of CVP and SWP.

3.2.5 Stanislaus River

Reclamation has worked with water users and related agencies to develop an operating plan for New Melones Reservoir to meet the multiple objectives on the system.

3.2.5.1 3.2.5.1 Minimum Instream Flows

Reclamation would operate to the New Melones Stepped Release Plan (SRP) with the default schedule shown in Figure 3-12. SRP flows would be Reclamation's contribution to D-1641's Vernalis standards.

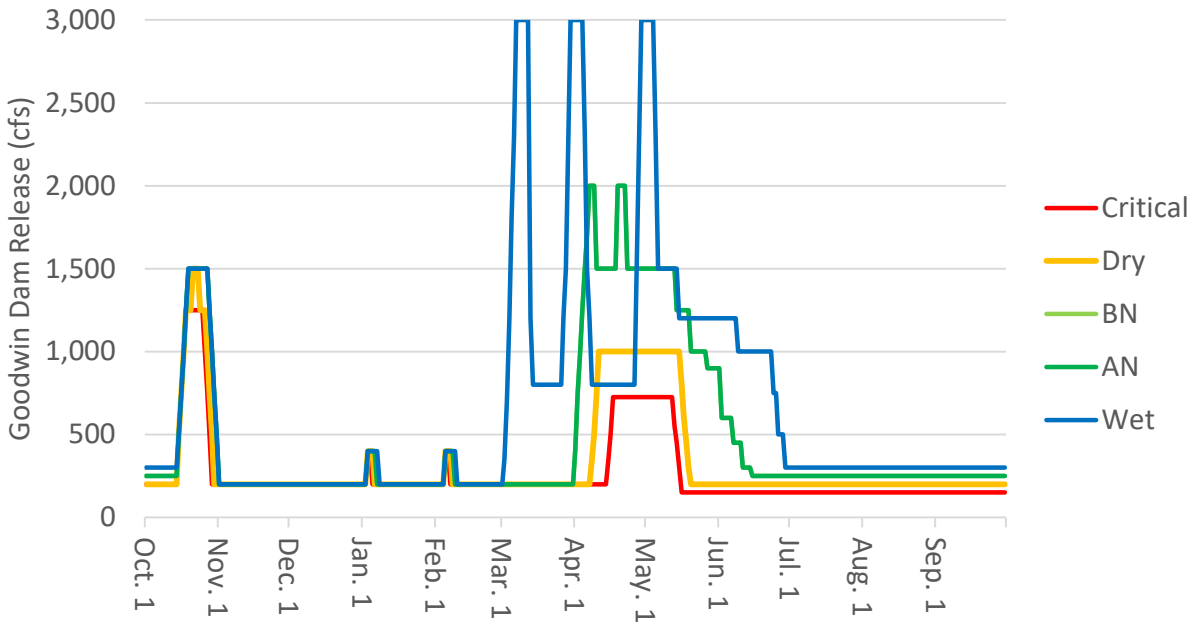


Figure 3-12. 2019 New Melones Stepped Release Plan by San Joaquin River Index.

Reclamation would operate New Melones Reservoir (as measured at Goodwin Dam) in accordance with an SRP that varies by hydrologic condition and water year type as shown in Table 3-7.

Table 3-7. New Melones Stepped Release Plan Annual Releases by Water Year Type.

Water Year Type	Annual Release (TAF)
Critically Dry	184.3
Dry	233.3
Below Normal	344.6
Above Normal	344.6
Wet	476.3

TAF = thousand acre-feet.

3.2.5.2 Winter Instability Flows

Reclamation releases additional flow in January and February to simulate natural variability in the winter hydrograph and to enhance access to varied rearing habitats. Reclamation, through Governance, schedules the winter instability flow volume in consideration of timing flows to coincide with a natural storm event which may naturally cue outmigration.

3.2.5.3 Spring Pulse Flows

Reclamation would release additional flows starting as early as March through as late as June. Reclamation, through Governance, would schedule spring pulse flow volumes consistent with volumes in the SRP.

3.2.5.4 Fall Pulse Flows

Reclamation would release additional flows in October. Reclamation, through Governance, would schedule fall pulse flow volumes consistent with the volumes in the SRP.

3.2.5.5 Spawning and Rearing Habitat Restoration

The No Action Alternative reflects the 2020 Record of Decision evaluation of habitat restoration in concert with operations. Reclamation's habitat programs would continue through separate environmental compliance and future restoration plans as independent programs; therefore, no further discussion would be provided in this EIS.

3.2.6 San Joaquin River

The No Action Alternative reflects the 2020 Record of Decision evaluation of habitat restoration in concert with operations. Reclamation's habitat programs would continue through separate environmental compliance and future restoration plans as independent programs; therefore, no further discussion would be provided in this EIS.

3.2.7 Monitoring

The 2020 Record of Decision included a list of anticipated real-time monitoring and programs permitted through other efforts (Bureau of Reclamation 2020).

3.2.8 Special Studies

The No Action Alternative includes studies that are now ongoing or completed programs. Examples include:

- DCC Gate Improvements
- San Joaquin Basin Steelhead Telemetry Study
- San Joaquin Basin Steelhead Collaborative
- San Joaquin River Scour Hole Predation Reduction
- Shasta TCD Performance Evaluation
- Water Temperature Modeling Platform
- Temperature Management Study
- Yellow-Billed Cuckoo Baseline Surveys

3.2.9 Drought

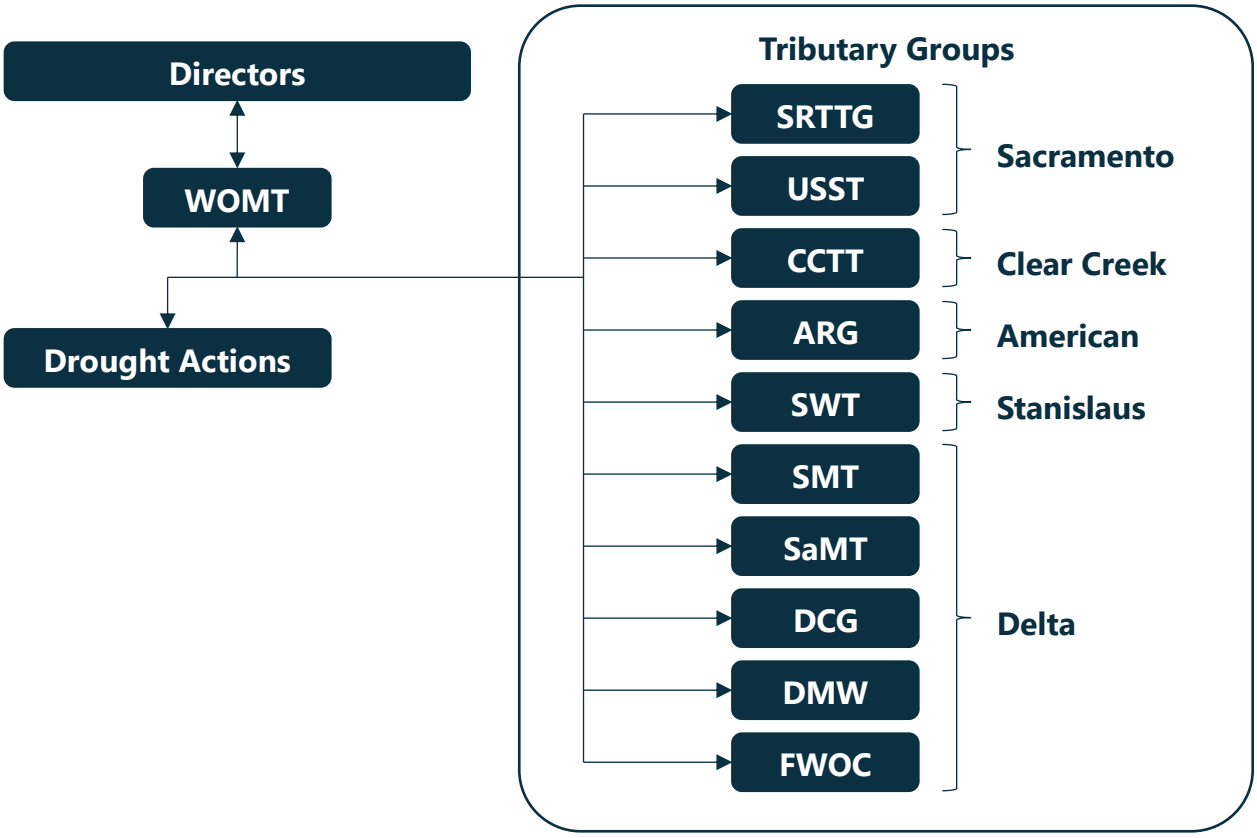
The 2020 Record of Decision included actions to address drought (Bureau of Reclamation 2020). These include:

- Drought and Dry Year Planning Toolkit (Drought Toolkit)
- Agency Directors Meeting

- Agency Meet and Confer
- SRS Contractors Meet and Confer

3.2.10 Governance

The No Action Alternative includes a WOMT supported by tributary groups that developed plans for scheduling flows and targeting water temperatures.



WOMT = Water Operations Management Team; SRTTG = Sacramento River Temperature Task Group; USST = Upper Sacramento River Scheduling Team; CCTT = Clear Creek Technical Team; ARG = American River Group; SWT = Stanislaus Watershed Team; SMT = Smelt Monitoring Team; SaMT = Salmon Monitoring Team; DCG = Delta Coordination Group; DMW = Delta Monitoring Workgroup; FWOC = Fish and Water Operations Call.

Figure 3-13. No Action Alternative Governance Structure.

3.3 Alternative 1 – Water Quality Control Plan

Alternative 1 (Water Quality Control Plan) operates the CVP and SWP to D-1641 and tributary specific water right requirements and agreements. Alternative 1 does not include the operational restrictions in the USFWS and NMFS 2008 and 2009 Biological Opinions Reasonable and Prudent Alternatives or 2019 Biological Opinions for the management of exports, Delta salinity, and releases from upstream facilities. Comparisons using analyses of Alternative 1 inform the effectiveness of non-flow measures versus addressing stressors by restrictions on water

operations. Large investments in habitat restoration have occurred and continue, yet long-lead times for landscape level changes and salmonid lifecycles mean that many projects remain in progress with few generations of fish to assess benefits, except on Clear Creek.

Reclamation would continue to operate each tributary with the same primary purposes as described in the Common Components seasonal operations. This alternative differs from No Action as summarized below and described in greater detail in Appendix E, *Alternatives*.

3.3.1 Sacramento River

3.3.1.1 Ramping Rates

Under WRO 90-5, the release rate (ramping) from Keswick Dam from September through February should not decrease more than the following rates to minimize stranding of salmon.

- Releases should not be decreased more than 15% in a 12-hour period.
- Releases should not be decreased more than 2.5% in a 1-hour period.

3.3.1.2 Minimum Instream Flows

Reclamation would operate to the minimum flows set forth in WRO 90-5 as follows:

- March 1 through August 31 – minimum flows of 2,300 cfs
- September 1 through February 28 – minimum flows of 3,250 cfs

In addition, the agreement contains a schedule providing for flow reductions in critically dry years.

However, releases may be greater since Reclamation operates Shasta and Keswick dams in coordination with other CVP and SWP facilities to comply with D-1641's minimum flow requirements near Rio Vista and Delta outflow requirements.

3.3.1.3 Winter and Spring Pulse Flows

Alternative 1 does not include specific winter or spring pulse flows.

3.3.1.4 Water Temperature Management

Under Alternative 1, Reclamation would make releases based on Delta requirements under D-1641, settlement contracts, and making use of available water supply for deliveries to CVP water service contractors while reducing the potential for spill. Reclamation would operate the TCD on Shasta Dam, consistent with WRO 90-5, to target 56°F at the most downstream location feasible from May 15 through October 30 each year.

3.3.2 Clear Creek

3.3.2.1 Minimum Instream Flows

Reclamation would release minimum flows per the August 11, 2000 Instream Flow Preservation Agreement executed by Reclamation, USFWS, and CDFW are shown below in Table 3-8.

Table 3-8. Minimum Instream Flows.

Period	Normal Year (cfs)	Critical Year (cfs)
January–October	50	50
November–December	100	70

cfs = cubic feet per second.

3.3.2.2 Pulse Flows

Alternative 1 does not include specific winter or spring pulse flows.

3.3.2.3 Water Temperature Management

Under Alternative 1, while there is no specific requirement in any Water Board WROs, Reclamation would target Whiskeytown Dam releases to not exceed the mean daily temperatures at Igo gauge of:

- 61°F from June 1 through August 15.
- 60°F from August 16 through September 15.
- 56°F from Sept 15 through Nov 15.

In dry, critical, or import curtailment years, Reclamation may not be able to meet these water temperatures and would operate Whiskeytown Dam as close to these water temperatures as practicable within the constraints of minimum instream flows.

3.3.3 American River

3.3.3.1 Minimum Instream Flows

D-893 established that the minimum allowable flows in the lower American River at H Street Bridge, in the interest of fish conservation, should not ordinarily fall below 250 cfs between January 1 and September 15 or below 500 cfs at other times.

3.3.3.2 Spring Pulse Flows

Alternative 1 does not include spring pulse flows.

3.3.3.3 Redd Dewatering Adjustments

Alternative 1 does not include redd dewatering adjustments.

3.3.3.4 Water Temperature Management

Reclamation would operate the Folsom Dam temperature control shutters in the same manner as in the No Action Alternative.

3.3.4 Delta

3.3.4.1 Old and Middle Flow Management

Alternative 1 does not include OMR criteria.

3.3.4.2 Spring Delta Outflow

Under Alternative 1, Reclamation and DWR would operate to D-1641. The absence of OMR flow management would result in lower Delta outflows under Alternative 1. Additionally, DWR would not operate to the spring outflow in the 2020 Incidental Take Permit for the SWP.

3.3.4.3 Delta Smelt Summer and Fall Habitat

Alternative 1 does not include SFHA. Reclamation and DWR would operate to achieve X2 westward locations required by D-1641's outflow and salinity objectives. Reclamation and DWR would operate the SMSCG per the Suisun Marsh Preservation Agreement.

3.3.4.4 Delta Smelt Supplementation

Alternative 1 does not include Delta Smelt Supplementation.

3.3.4.5 Sisk Dam Raise and Reservoir Expansion

Upon completion of construction, Reclamation would operate an expanded San Luis Reservoir in accordance with D-1641. The raising of the Bernice Frederic Sisk Dam would increase reservoir storage capacity by 130 TAF. Reclamation and San Luis and Delta-Mendota Water Authority completed a final Supplemental EIS/Environmental Impact Report in December 2020 to raise the dam crest by 10 feet and increase the maximum water surface elevation in the reservoir by 10 feet. The Department of Interior Principal Assistant Secretary for Water and Science executed a Record of Decision for the project in October 2023.

3.3.5 Stanislaus River

3.3.5.1 Minimum Instream Flows

Under Alternative 1, Reclamation would operate to the 1987 Stipulation with CDFW, as shown in Figure 3-14.

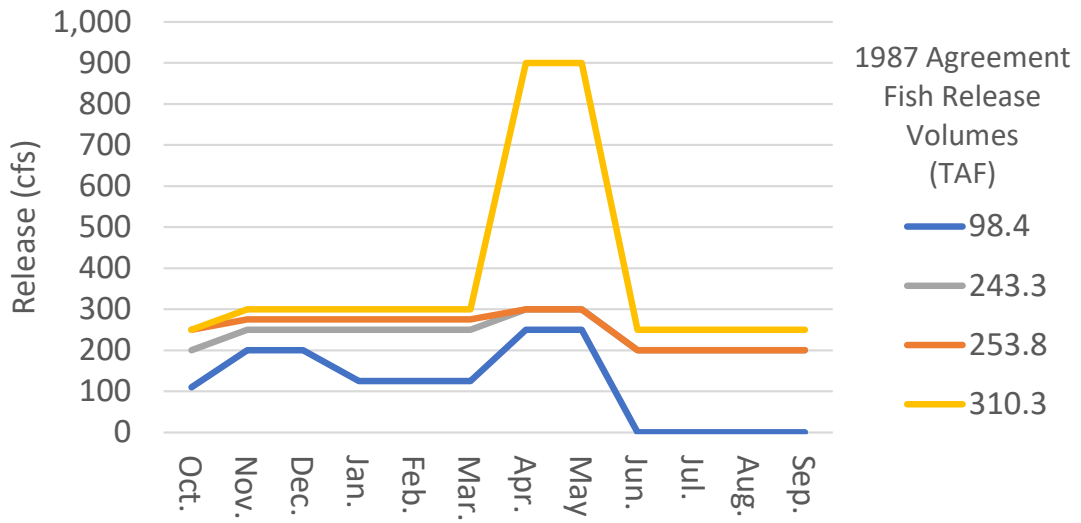


Figure 3-14. Minimum Instream Flows under the CDFW Agreement.

Monthly flows are linearly interpolated from the annual volume (the lines in Figure 3-14). June through September flows would be higher due to releases for DO, which are assumed to be approximately 255 cfs in June, 265 cfs in July, 283 cfs in August, and 249 cfs in September.

Reclamation would release water from New Melones Reservoir to meet D-1641 salinity and flow objectives at Vernalis (not including the pulse flows during the April 15 – May 16 period). The flow requirement is based on the required location of X2 and the 60-20-20 Index as summarized in Table 3-9.

Table 3-9. D-1641 Vernalis Flow Objectives (average monthly cfs).

60-20-20 Index	Flow Required if X2 is West of Chipps Island	Flow Required if X2 is East of Chipps Island
Wet	3,420	2,130
Above Normal	3,420	2,130
Below Normal	2,280	1,420
Dry	2,280	1,420
Critical	1,140	710

3.3.5.2 Winter Instability Flows

Alternative 1 does not include winter instability flows.

3.3.5.3 Spring Pulse Flows

Alternative 1 does not include spring pulse flows.

3.3.5.4 Fall Pulse Flows

Alternative 1 does not include fall pulse flows.

3.3.6 San Joaquin River

Same as the No Action Alternative. Reclamation would continue implementation of the San Joaquin River Restoration Program as an independent related activity.

3.3.7 Monitoring

Under Alternative 1, Reclamation and DWR would undertake monitoring to address water quality control plan requirements and incidental take of federally listed species.

Alternative 1 includes the monitoring of the CVP and Delta SWP facilities into the Long-Term Operation. This allows subsequent changes to existing monitoring programs to be coordinated and included in future consultations of the long-term operation of the CVP and SWP to allow for a more uniform analysis and improved accounting of impacts associated with the operation of the CVP and SWP.

3.3.8 Special Studies

This alternative does not identify specific species studies; however, Reclamation's science enterprise would continue through separate environmental compliance and future plans as independent programs.

3.3.9 Drought

Under Alternative 1, Reclamation and DWR would implement elements of a drought toolkit such as the Drought Barrier on West False River. Reclamation and DWR may request a Temporary Urgency Change Petitions (TUCP) to meet public health and safety needs when dry conditions prevent meeting D-1641. Reclamation and DWR would not apply for TUCPs to preserve storage in upstream reservoirs beyond water required to maintain public health and safety.

3.3.10 Governance

Under Alternative 1, the Directors would meet as necessary to administer a drought toolkit. Reclamation and DWR would still participate in other programs (e.g., Collaborative Science and Adaptive Management Program, Delta Plan Interagency Implementation Committee), all of which include CDFW, USFWS, and NMFS.

3.4 Alternative 2 – Multi-Agency Consensus

Alternative 2 (Multi-Agency Consensus) represents actions and tradeoffs made to reach consensus among Reclamation, CDFW, DWR, NMFS, and USFWS. It includes actions and approaches identified by the state and federal fish agencies.

Reclamation would continue to operate each tributary with the same primary purposes as described in the Common Components seasonal operations.

Alternative 2 is analyzed in phases to accommodate voluntary flow contributions and state board decisions which are outside Reclamation's direct control. It should be noted that the early implementation of Delta export reductions (*Alt2woTUCPDeltaVA*) phase of Alternative 2 serves as the Proposed Action in Reclamation's Biological Assessments. This alternative differs from No Action as summarized below and described in greater detail in Appendix E, *Alternatives*.

3.4.1 Sacramento River

3.4.1.1 Ramping Rates

Ramping rates are the same as the No Action with the additional requirement of operational coordination with a Shasta Operations Team (SHOT) and deviations would be initially discussed through the Sacramento River Group (SRG) prior to coordination through the SHOT.

3.4.1.2 Fall and Winter Baseflows for Shasta Refill and Redd Maintenance

Alternative 2 updates the table for December through February releases to require more storage in Shasta Reservoir for higher release as shown in Table 3-10.

Table 3-10. Keswick Dam December through February Default Release Schedule determined by EOS Storage.

Keswick Release (cfs)	Shasta EOS Storage (MAF)
3,250	≤2.4
4,000	≤2.8
4,500	≤3.2
5,000	>3.2

EOS = end-of-September; cfs = cubic feet per second; MAF = million acre-feet. These may be refined through future modeling and/or analysis efforts as part of the seasonal operations planning.

Alternative 2 additionally includes governance that may modify releases through the SRG and SHOT. Alternative 2 additionally includes coordination with the SRG to consider planned summer flows that are smoothed out to minimize the net difference between the flow at spawning versus emergence.

3.4.1.3 Minimum Instream Flows

In response to major storm events, Reclamation, after coordination through the SRG and SHOT, and also through adaptive management, may determine that lower flows achieve the same biological effects as the minimum flow of 3,250 cfs at Keswick Dam. If these flows are determined to meet the same biological intent, Reclamation may temporarily reduce below 3,250 cfs to preserve storage.

3.4.1.4 Sacramento River Pulse Flows

To increase outmigration survival of Chinook salmon, Reclamation would release up to 150 TAF in pulse flow(s) each water year, typically in the spring, to benefit Chinook salmon in the

Sacramento River watershed when the pulse does not interfere with the ability to meet water temperature objectives or other anticipated operations of the reservoir.

3.4.1.5 Sacramento River Settlement Contractors Voluntary Agreement Spring Pulse Flows

Alternative 2 includes advancing up to 100 TAF in releases from Shasta Reservoir for a spring-pulse in consideration of actions by SRS Contractors to make the water available later in the year.

3.4.1.6 Adult Migration and Holding Temperature Objectives

Under a circumstance where conditions may cause water temperatures to rise to concerning levels prior to the final TMP, Reclamation would begin water temperature management as early as March 1 to target water temperatures of 58.0° F daily average at the Sacramento River above the Clear Creek Gage (CCR).

3.4.1.7 Water Temperature and Storage Management Framework

Reclamation is proposing to change the balance between risks of flood control releases for Shasta Reservoir and place a higher priority on maintaining storage for drought protection. The strategy is framed around a framework adapted from the multi-year drought sequence experienced in Victoria, Australia (Mount et al. 2016, "Victorian Objectives") that establishes different objectives depending on hydrologic conditions and identifies actions that can be taken for fishery management and drought protection.

The framework establishes management "Bins" to manage water temperature and storage to meet the Victorian Objectives described above with the general characteristics described below.

- **Bin 1 Enhance:** ≥3.7 MAF End-of-April (EOA) Shasta Reservoir Storage
    - **Bin 1A:** ≥3.0 MAF End-of-September (EOS) Shasta Reservoir Storage
        - Minimal restrictions on water supply
        - Target 53.5°F water temperatures downstream of CCR
        - Rebalancing of CVP reservoirs with light impacts to the rest of the system to achieve up to 3.0 MAF EOS storage in Shasta Reservoir
        - Target of 53.5°F water temperatures downstream of CCR
- **Bin 2 Recover and Maintain:** ≥3.0 MAF EOA Shasta Reservoir Storage
    - **Bin 2A:** ≥2.2 MAF EOS Shasta Reservoir Storage
        - Target of 53.5°F water temperatures at CCR
    - **Bin 2B:** ≥2.0 MAF EOS Shasta Reservoir Storage
        - Rebalancing of CVP reservoirs with moderate impacts to the rest of the system to achieve up to 2.2 MAF EOS Shasta Reservoir storage

        - Potential water transfer modifications to meet temperature and storage goals to achieve up to 2.2 MAF EOS Shasta Reservoir storage
        - Situation-specific adjustments to D-1641 and other drought toolkit actions
        - Target of 53.5°F water temperatures at CCR during the winter-run Chinook salmon spawning and egg incubation period
- **Bin 3 Protect:** <3.0 MAF EOA Shasta Reservoir Storage
    - **Bin 3A:** ≥2.0 MAF EOS Shasta Reservoir Storage
        - Reduce CVP water supply with the storage objective of 2.0 to 2.2 MAF
        - Rebalancing of CVP reservoirs with moderate impacts to the rest of the system to achieve at least 2.0 MAF EOS Shasta Reservoir storage
        - Potential water transfer modifications to meet temperature and storage goals to achieve at least 2.0 MAF EOS Shasta Reservoir storage
        - Situation-specific adjustments to D-1641 and other drought toolkit actions
        - Target of 53.5°F water temperatures upstream of CCR for the most critical period during the winter-run Chinook salmon spawning and egg incubation period to avoid critical loss of winter-run Chinook salmon population
    - **Bin 3B:** ≤2.0 MAF EOS Shasta Reservoir Storage
        - Reduce Shasta releases for water supply (CVP allocations) to only that needed for meeting public health and safety demands, including minimum salinity levels in the Delta
        - Target of 53.5°F water temperatures upstream of CCR for the most critical period during the winter-run spawning and egg incubation period to avoid critical loss of winter-run population
        - Rebalancing of CVP reservoirs with moderate impacts to the rest of the system to achieve up to 2.0 MAF EOS Shasta Reservoir storage
        - Potential water transfer modifications to meet temperature and storage goals to achieve up to 2.0 MAF EOS Shasta Reservoir storage
        - Requesting significant relaxations to D-1641, limitations in water available under contract and other actions from the drought toolkit
        - There is confidence that a TMP would include a strategy to provide winter-run Chinook spawning temperatures that avoid critical losses of egg and fry production, maintain key spawning refuges in upstream areas and avoid catastrophic impacts to the brood year.

Each bin may include a range of actions determined through the SHOT such as: reducing the minimum Wilkins Slough flow to improve biological goals while meeting obligation to senior

water right holders; limitations on October and November releases; changes to fall-run redd maintenance flows; temperature target locations, temperature shaping; rebalancing of CVP reservoirs; flows and timing that may increase the likelihood of a bin 2 or 3 year the following year.

3.4.1.8 Sacramento River Settlement Contractors Resolution

Pursuant to *A Resolution Regarding Salmon Recovery Projects in the Sacramento River Watershed, Actions Related to Shasta Reservoir Annual Operations, and Engagement in the Ongoing Collaborative Sacramento River Science Partnership Effort*, the SRS Contractors would continue to participate in, and act as project champions for future Sacramento Valley Salmon Recovery Program projects, subject to the availability of funding, regulatory approvals, acceptable regulatory assurances, and full performance of the SRS Contracts.

The SRS Contractors would meet and confer with Reclamation, NMFS, and other agencies as appropriate to determine if there are any role for the SRS Contractors in connection with Reclamation's operational decision-making for Shasta Reservoir annual operations in those years. This determination would include consideration of what actions are feasible, consistent with the terms of the SRS Contracts. In addition to the 25% reduction during Shasta critical years as set forth in the SRS Contracts, the types of actions that may be considered include, but are not necessarily limited to: (1) the scheduling of spring diversions by the SRS Contractors; (2) voluntary, compensated water transfers by the SRS Contractors subject to Reclamation approval; and (3) smoothed SRS Contractor diversion for rice straw decomposition during the fall months.

Decisions related to implementation of these Shasta-related voluntary actions would be carried out through SHOT.

3.4.2 Clear Creek

3.4.2.1 Minimum Instream Flows (Seasonally Variable Hydrograph)

Reclamation would release water through Whiskeytown Dam to provide intra-annual variation to emulate natural processes. As provided in Figure 3-15 and Table 3-11, flows would oscillate over a one-year period, with releases transitioning from 300 cfs in the winter, down to 100 cfs in the summer, and back to 300 cfs by the following winter. In critical years, Reclamation would target an average 150 cfs based on available water from Trinity Reservoir and attempt to maintain above 100 cfs.

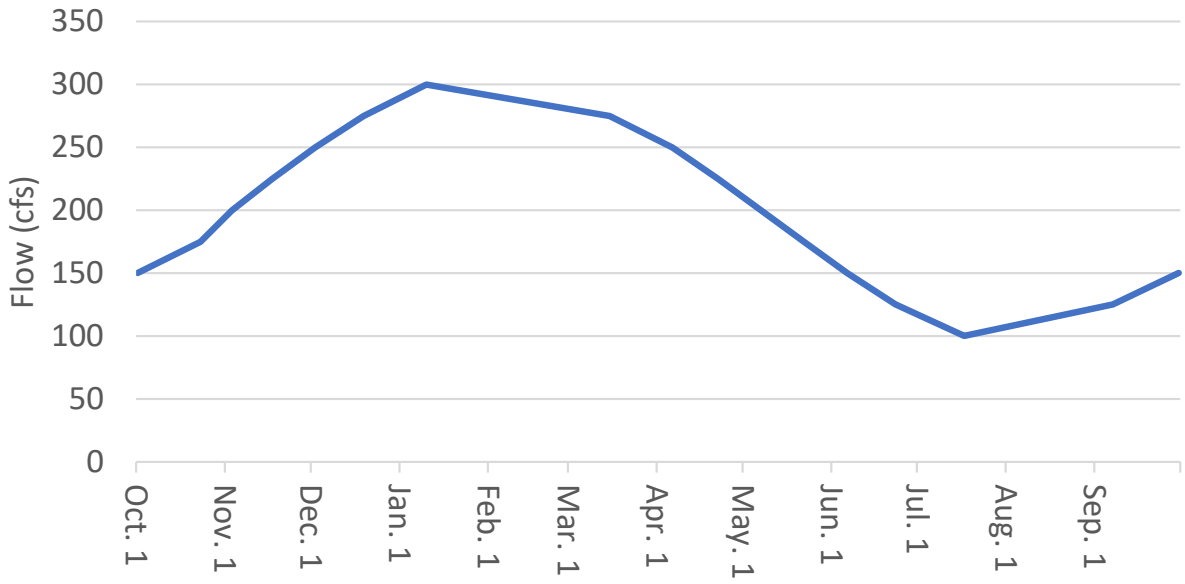


Figure 3-15. Clear Creek Seasonally Variable Hydrograph Minimum Flows, Except Critical Years.

Table 3-11. Proposed Annual Clear Creek Flows Changes.

Date	From (cfs)	To (cfs)
October 1	125	150
October 23	150	175
November 3	175	200
November 17	200	225
December 2	225	250
December 19	250	275
January 10	275	300
March 15	300	275
April 6	275	250
April 22	250	225
May 7	225	200
May 22	200	175
June 6	175	150
June 23	150	125
July 17	125	100
September 7	100	125

cfs = cubic feet per second.

Reclamation, through the Clear Creek Technical Team (CCTT) , may modify the timing and flow rates provided in Figure 3-15 and Table 3-11 by February 1 and updated through May on a case-by-case basis. The flow schedule is subject to agreement by Redding Electric Utility for use of their facilities.

3.4.2.2 Pulse Flows

Except in years with significant uncontrolled spill, Reclamation would release up to 10,000 acre-feet from Whiskeytown Dam for channel maintenance, spring attraction flows, and to meet other physical and biological objectives. In critical years, Reclamation would release up to 5,000 acre-feet. Reclamation, through CCTT, would develop pulse flow schedules.

Due to unknowns in winter precipitation, Clear Creek pulse flows are not to occur prior to the February Sacramento Valley Index (SVI) reporting. The full pulse flow volume (10,000 acre-feet) would be available if the SVI is greater than 5.4, at the SVI updates (i.e., dry or wetter years). If the SVI updates are equal to or less than 5.4 (critical years), Reclamation would limit releases of pulse flows to 5,000 acre-feet.

3.4.2.3 Water Temperature Management

Reclamation would target Whiskeytown Dam releases to not exceed the mean daily temperatures at Igo gauge:

Table 3-12. Igo Guage Mean Daily Temperature Target

Daily Temperature Target	Timing
61°F	June 1 through August 15
60°F	August 16 through September 15
56°F	September 16 through November 15

Reclamation may not be able to meet these water temperatures and would operate Whiskeytown Dam as close to these water temperatures as practicable.

3.4.3 American River

Operations on the American River are the same as the No Action Alternative.

3.4.4 Delta

3.4.4.1 Clifton Court Forebay Operations

DWR proposes to extend the CCF operation period to December 1 through March 31.

3.4.4.2 Old and Middle River Flow Management

OMR would be calculated using the equation provided in Hutton 2008. If an equation is developed that results in a better representation of OMR flows, and Reclamation, CDFW, DWR, NMFS, and USFWS agree, then that equation would be updated in calculating the OMR index.

If neither the “First Flush” Action occurs nor the Adult Delta Smelt Entrainment Protection Action is reached, the OMR management season starts automatically on January 1. Once

initiated, the OMR index on a 14-day running average would be no more negative than -5,000 cfs until the end of the OMR management season.

3.4.4.3 Winter-Run Early Season Migration

DWR and Reclamation would reduce exports to achieve a 7-day average OMR value no more negative than -5,000 cfs for seven consecutive days when the genetically verified 7-day rolling sum of winter-run Chinook salmon loss, calculated daily, exceeds the following thresholds:

- From November 1–November 30: 0.0044% (e.g., water year 2023) of the Red Bluff juvenile winter-run Chinook salmon Brood Year Total at the end of the second biweekly period in October, whereby the November Multiplier is:

  November Multiplier = 0.0011 x 0.25 x Survival*Fry-to-Smolt* x Survival*Smolt*

- From December 1–December 31: 0.0084% (e.g., water year 2023) of the Red Bluff juvenile winter-run Chinook salmon Brood Year Total at the end of the second biweekly period in November, whereby the December Multiplies is:

  December Multiplier = 0.0021 x 0.25 x SurvivalFry-to-Smolt x SurvivalSmolt

3.4.4.4 Spring-Run Chinook Salmon

Reclamation and DWR, through SaMT, would use real-time monitoring data, relevant tools, and new science gained through ongoing efforts to develop a spring-run juvenile production estimate and life cycle model to inform weekly risk assessments (October through June) for natural-origin juvenile spring-run Chinook salmon. If the risk assessment identifies a more positive OMR flow requirement is needed to minimize take of natural-origin juvenile spring-run Chinook salmon, the WOMT may consider a more positive OMR flow requirement.

3.4.4.5 Start of OMR Management

The OMR management season starts any time after December 1 if an Adult Longfin Smelt Entrainment Protection Action, if appropriate (see below), or First Flush Action occurs (i.e., immediately following completion of the First Flush Action) or any time after December 20 if the turbidity threshold in the Adult Delta Smelt Entrainment Protection Action is reached.

Reclamation and DWR would reduce CVP and SWP exports for 14 consecutive days, assessed on the seventh day of the averaging period, anytime between December 1 and the last day of February, to maintain a 14-day average of the OMR index no more negative than -2,000 cfs within three days of when the same No Action criteria are met.

- Three-day running average of daily flows at Freeport is greater than, or equal to, 25,000 cfs, and
- Three-day running average of daily turbidity at Freeport is greater than, or equal to, 50 FNU

Real-time Adjustments

Reclamation and DWR would manage to a more positive OMR than -5,000 cfs on a 14-day average under the following conditions:

Delta Smelt Adult Entrainment Protection Action (Turbidity Bridge)

If after a "First Flush" Action or after December 20, whichever occurs first, daily average turbidity remains or becomes elevated to 12 FNU or higher at each of three turbidity sensors in the OMR corridor creating a continuous bridge of turbidity from the lower San Joaquin River to the CVP and SWP export facilities, Reclamation and DWR would manage exports to achieve a five-day average OMR flow that is no more negative than -3,500 cfs to be assessed on the seventh day of the averaging period after initiating operational changes in response to the OMR trigger, until the daily average turbidity in at least one of the three turbidity sensors is less than 12 FNU for two consecutive days, thereby indicating a break in the continuous Turbidity Bridge.

If the three turbidity sensors remain over 12 FNU at the end of a High Flow Off-Ramp or any time after five consecutive days, then Reclamation and DWR, through WOMT, may prepare an assessment to determine if another Turbidity Bridge Action is warranted.

The Turbidity Bridge Action ends when the three-day continuous average water temperatures at Jersey Point or Rio Vista reach 53.6ºF (12ºC).

When daily average San Joaquin River flows at Vernalis are greater than 10,000 cfs, the Turbidity Bridge is off ramped. While off ramped, the OMR Index would be managed to no more negative than -5,000 cfs on a 14-day average. The Turbidity Bridge would be reinstated when daily average San Joaquin River flows at Vernalis drop below 8,000 cfs.

Delta Smelt Larval and Juvenile Protection Action

Larval and juvenile Delta smelt protections start upon the end of the Adult Delta Smelt Entrainment Protection Action. Reclamation and DWR would operate south Delta exports to a 7-day average of the OMR index no more negative than -5,000 cfs when the average Secchi disk depth in the most recent survey is greater than one meter. If the average Secchi disk depth in the most recent survey is less than one meter, then Reclamation and DWR would operate to a 7-day average of the OMR index no more negative than -3,500 cfs until the average Secchi depth has increased to more than one meter.

Longfin Smelt Adult Entrainment Protection Action

If cumulative water year salvage of Longfin smelt with fork length ≥60 millimeter (mm) at the CVP and SWP facilities exceeds the savage threshold, then:

- From December 1 to the start of the OMR management season, Reclamation and DWR should adjust export to achieve an OMR flow no more negative than -5,000 cfs on a seven-day average for seven consecutive days, to be assessed on the seventh day of the averaging period after initiating operational changes in response to the OMR trigger, and then, if appropriate, initiate the start of OMR management season. During the 7-day period, WOMT may convene and determine if initiation of OMR management season is warranted. If WOMT determines initiating OMR management is not warranted, the OMR management season does not begin at the conclusion of the 7-day period. If salvage of Longfin smelt ≥ 60 mm continues following the 7-day period where OMR is no more negative than -5,000 cfs, then Reclamation and DWR, through WOMT, may prepare an assessment to determine if additional longfin smelt entrainment protection action is warranted based on continued entrainment risk, as informed by available quantitative

tools and real-time data. WOMT may determine if OMR management should be initiated. If WOMT does not meet, then protections would be initiated.

- From the start of the OMR management season to the end of February, Reclamation and DWR would operate to an OMR flow no more negative than -3,500 cfs on a seven-day average for seven consecutive days, to be assessed on the seventh day of the averaging period after initiating operational changes in response to the OMR trigger. If salvage of Longfin smelt ≥60 mm continues following the 7-day period where OMR is no more negative than -3,500 cfs, then Reclamation and DWR, through WOMT, may prepare an assessment to determine if additional Longfin smelt entrainment protection action is warranted, as informed by available quantitative tools and real-time data.

Longfin Smelt Larval and Juvenile Protection Action

From January 1 through the end of OMR management season (see below), if:

- The seven-day average QWEST (the average daily flow traveling past Jersey Point, which represents the net flow in the lower San Joaquin River) is < +1,000 cfs, and;
- Larval and juvenile longfin smelt catch in the most recent Smelt Larval Survey (SLS) and 20-mm survey at stations 809 and 812 exceeds the catch threshold set by Age 1 + LFS Index as described in Table 3.4-7, for catch thresholds.

Reclamation and DWR would restrict the 7-day average OMR flow to no more negative than -3,500 cfs for seven days, to be assessed on the seventh day of the averaging period after initiating operational changes in response to the OMR trigger. Upon initiation of the action DWR and Reclamation, through WOMT, may prepare an assessment to determine if the 7-day action can be adjusted or offramped based on larval and juvenile LFS entrainment risk, as informed by available quantitative tools and real-time data. If offramped, the Larval and Juvenile Longfin Smelt Protection Action shall later be retriggered if conditions warrant.

If the Water Year cumulative juvenile longfin smelt salvage at the CVP and SWP facilities exceeds 50% of the average annual salvage observed from 2009 through the water year preceding the current water year, then Reclamation and DWR would adjust to a seven-day average OMR of -3,500 cfs for 14 days.

If the Water Year cumulative juvenile Longfin smelt salvage at the CVP and SWP facilities during this period exceeds 75% of the average annual salvage observed from 2009 through the water year preceding the current water year, then Reclamation and DWR would adjust to a seven-day average OMR of -2,500 cfs for 14 days.

Table 3.4-7. San Francisco Bay Study Longfin Smelt Index Catch Threshold.

San Francisco Bay Study Longfin Smelt Index	Catch Threshold at 809 & 812
0–149	10
150–299	20
300–499	30
500–999	40

San Francisco Bay Study Longfin Smelt Index	Catch Threshold at 809 & 812
≥1000	50

Source: California Department of Fish and Game 1999.

High-flow Offramps for Larval and Juvenile Delta Smelt and Longfin Smelt

When the daily average Sacramento River flows at Rio Vista are greater than 55,000 cfs, or San Joaquin River flows at Vernalis are greater than 8,000 cfs, then the Larval and Juvenile Delta smelt and Longfin smelt Protection Actions are off ramped.

Winter-Run Chinook Salmon Annual Loss Thresholds

Reclamation and DWR would manage OMR to avoid exceeding the following annual loss thresholds:

- Natural winter-run Chinook salmon (loss = 0.5% of JPE)
- Hatchery winter-run Chinook salmon (loss = 0.12% of JPE)

If cumulative loss of natural or hatchery winter-run Chinook salmon in a brood year exceeds 50% of the annual loss thresholds, then DWR and Reclamation would adjust south Delta exports to maintain a seven-day average OMR value no more negative than -3,500 cfs for seven consecutive days, to be assessed on the seventh day of the averaging period after initiating operational changes in response to the OMR trigger. Once exceeded, each winter-run Chinook salmon observed in salvage would trigger another operation to an OMR limit of -3,500 cfs for seven days.

If the cumulative loss of natural or hatchery winter-run Chinook salmon in a brood year exceeds 75% of the annual loss thresholds, then DWR and Reclamation would adjust south Delta exports to maintain a 7-day average OMR value no more negative than the -2,500 cfs for seven consecutive days, to be assessed on the seventh day of the averaging period after initiating operational changes in response to the OMR trigger, when the Winter-run Chinook Salmon Machine Learning Model and associated OMR Conversion Tool predict that the change to -2,500 cfs would shift the model output to a classification of absence with a minimum probability of absence prediction of 0.559 for 1 of 30 sub-models for any of the seven most recent prediction days.

If the cumulative loss of either natural or hatchery-origin winter-run Chinook salmon in a brood year exceeds 100 percent of the annual loss thresholds, then DWR and Reclamation would immediately convene the Salmon Monitoring Team (SaMT) to review recent fish distribution information and operations and provide advice regarding future planned SWP and CVP operations to minimize subsequent loss during that year.

If genetic analysis of natural older juvenile Chinook salmon observed in salvage at the SWP or CVP indicates that any given Chinook salmon is not genetically winter-run or spring-run Chinook salmon, these fish would not count towards the loss threshold exceedance.

Winter-Run Chinook Salmon Weekly Distributed Loss Threshold

If the weekly distributed loss threshold is exceeded on any single day by the 7-day rolling sum of winter-run Chinook salmon loss, then DWR and Reclamation would adjust exports to achieve a 7-day average of the OMR no more negative than -3,500 cfs for seven consecutive days. Weekly thresholds will be based on historical distribution (Table 3-13, Column E) of genetically-identified winter-run Chinook salmon from 2017-2021 and change every week (e.g., January 1-7, January 8-15).

Table 3-13. Historical (Water Years 2017–2021) Presence of Winter-run Chinook Salmon Entering the Delta (Column B), Exiting the Delta (Column C), in the Delta (Column D = Column B–Column C) and in the Delta Scaled to 100% (Column E).

Week (starting January 1) (A)	Historical Cumulative entering the Delta (Sherwood Harbor) (B)	Historical Cumulative exiting the Delta (Chipps Island) (C)	Historical Present in Delta (D)	Historical Present in Delta (Scaled to 100%) (E)
1/1–1/7	2.47%	1.65%	0.82%	0.32%
1/8–1/14	2.47%	1.65%	0.82%	0.32%
1/15–1/21	4.94	1.65%	3.29%	1.30%
1/22–1/28	4.94%	1.65%	3.29%	1.30%
1/29–2/4	19.75%	2.20%	17.55%	6.91%
2/5–2/11	38.27%	4.95%	33.32%	13.13%
2/12–2/18	43.21%	5.49%	37.72%	14.86%
2/19–2/25	46.91%	9.89%	37.02%	14.59%
2/26–3/4*	50.62%	18.13%	32.49%	12.80%
3/5–3/11	55.56%	30.77%	24.79%	9.77%
3/12–3/18	77.78%	38.46%	39.32%	15.49%
3/19–3/25	85.19%	64.84%	20.35%	8.02%
3/26–4/1	93.83%	90.11%	3.72%	1.47%
4/2–4/8	98.77%	99.45%	0%	0%
4/9–4/15	100.00%	100.00%	0.00%	0.00%
4/16-End of Winter–run OMR Season	100.00%	100.00%	0.00%	0.00%

Notes: Data from genetically identified winter-run Chinook salmon entering the Delta (Sherwood Harbor Trawl) and exiting the Delta (Chipps Island Trawl) are used to estimate the percentage of winter-run Chinook salmon present in the Delta each week. Presence prior to January 1 each year is included in the first week of presence.

OMR = old and middle river.

[a] The week of February 26–March 4 includes 8 days during leap years

Steelhead Annual Threshold

In each year, Reclamation and DWR would manage exports to reduce loss at the CVP and SWP salvage facilities. Reclamation and DWR would manage OMR to avoid exceeding the 3,000

unclipped juvenile California Central Valley Steelhead at CVP and SWP salvage facilities through the weekly distributed loss threshold described below.

Annual loss of unclipped juvenile California Central Valley steelhead at the CVP and SWP salvage facilities will be counted cumulatively for each Brood Year, starting July 1 of the calendar year through June 30th of the following calendar year.

Steelhead Weekly Distributed Loss Thresholds

DWR and Reclamation would reduce exports to achieve a seven-day average OMR value no more negative than -3,500 cfs for seven consecutive days when the seven-day rolling sum of steelhead salvage, calculated daily, exceeds the weekly loss threshold of 120 fish.

Spring-Run Chinook Salmon and Surrogate Threshold

From November 1 through the end of the OMR flow management period of each water year, if a cumulative loss threshold is exceeded for surrogate release group, Reclamation and DWR would reduce south Delta exports to achieve a 7-day average OMR index of no more negative than -5,000 cfs in November and December, and no more negative than -3,500 cfs beginning January 1 (or whenever the OMR management begins) through the end of OMR flow management season, or June 30, whichever occurs first. The cumulative loss threshold for coded wire tagged spring-run Chinook salmon surrogate groups at the CVP and SWP salvage facilities is 0.25% for each release group from Coleman National Fish Hatchery and the Feather River Fish Hatchery.

Storm-Flex

During the OMR management season, Reclamation and DWR, through WOMT, may prepare an assessment to evaluate operating to an OMR index no more negative than -6,250 cfs between the start of OMR management season and the larval and juvenile delta smelt Protection Action onramp or the last day of February, whichever occurs first, to capture peak flows during storm-related events.

If conditions indicate an additional real-time OMR protection is likely to trigger, Reclamation and DWR would adjust south Delta exports to achieve a 14-day average OMR index no more negative than -5,000 cfs, unless a further reduction in exports is required. If an entrainment protection condition is triggered, Reclamation and DWR would cease storm-flex and implement the entrainment protection condition.

3.4.4.6 End of OMR Management Season

OMR Management season for Delta smelt and Longfin smelt would conclude when the three consecutive days of daily mean water temperature at CLC is 77.0°F (25°C) or higher, or on June 30, whichever occurs first.

Reclamation and DWR would conclude the management of OMR for salmonids on June 30 or when the following conditions have occurred, whichever occurs first:

- Daily mean water temperature at Mossdale has exceeded 71.96°F (22.2°C) for 7 non-consecutive days (does not have to be consecutive) in June; and

- Daily mean water temperature at Prisoner's Point has exceeded 71.96°F (22.2°C) for 7 non-consecutive days (does not have to be consecutive) in June.

Each year Reclamation and DWR would conduct an annual assessment.

3.4.4.7 Spring Delta Outflow

Reclamation and DWR would take actions intended to supplement Delta outflow per the terms of the voluntary agreements (VA). Reclamation and DWR would operate consistent with the VAs approved by the Water Board and executed agreements by VA Parties.

Actions that would support the additional Delta outflow include: (1) Reclamation and DWR south of Delta export modifications; (2) Reclamation reoperating upstream reservoirs to advance and allow for scheduling of water made available by contractors in CVP watersheds; and (3) passing Delta inflow from water made available by VA Parties. Volumes are reflected in the Memorandum of Understanding signed by VA parties in March 2022.

3.4.4.8 Delta Smelt Summer and Fall Habitat

Fall X2

Similar to the No Action Alternative, Reclamation and DWR would maintain a 30-day average X2 ≤80 km for September through October in above normal and wet years.

Suisun Marsh Salinity Control Gates

Under Alternative 2, DWR would operate SMSCG for 60 days, to maximize the number of days that Belden's Landing three-day average salinity is equal to, or less than, 4 practical salinity units (psu) to maximize the spatial and temporal extent of Delta smelt low salinity zone habitat in Suisun Marsh and Grizzly Bay. Operation of the SMSCG would occur between June 1 and October 31 in years which operation of the SMSCG is required. In dry years following below normal years, DWR would operate SMSCG for 30 days to maximize the number of days Belden's Landing three-day salinity is equal to, or less than 6 psu to maximize the spatial and temporal extent of Delta smelt low salinity zone habitat in Suisun Marsh and Grizzly Bay.

3.4.4.9 Delta Smelt Supplementation

Reclamation and DWR would support a minimum production of 150,000 fish by water year 2025, and a minimum of 200,000 fish by water year 2026, if feasible, that are at least 200 days post-hatch or equivalent.

Reclamation and DWR, through the Culture and Supplementation of Smelt Steering Committee, would continue to collaborate on the development of a program consistent with USFWS' Supplementation Strategy (U.S. Fish and Wildlife Service 2020).

3.4.4.10 Barker Slough Pumping Plant

In addition to the No Action description, DWR proposes additional protective measures for Delta and longfin smelt at the BSPP in combination with other diversions. Cumulative BSPP diversions for the January 1 to March 31 period, at design capacity, are limited to approximately 26 TAF.

- Maximum Spring Diversions: Cumulative BSPP diversions for the March to June period, at design capacity, is 42 TAF.
- From January 1 to March 31 of dry and critical water years, DWR proposes to operate to a maximum seven-day average diversion rate at BSPP less than 100 cfs.
- DWR, at its sole expense, from March 1 to April 30 of dry and critical water years, if catch of larval Delta smelt (length less than 25 mm) in 20-mm Survey at station 718 exceeds 14% of the total catch of larval Delta smelt across the North Delta (20-mm Survey stations 716, 718, 719, 720, 723, 724, and 726), then DWR proposes to operate to a maximum seven-day average diversion rate at BSPP less than 60 cfs.
- DWR, at its sole expense, from May 1 to June 30 of dry and critical water years, if catch of larval Delta smelt (length less than 25mm) in 20-mm Survey at station 716 exceeds 5% of the total catch of larval Delta smelt across the North Delta (20-mm Survey stations 716, 718, 719, 720, 723, 724, and 726), then DWR proposes to operate to a maximum seven-day average diversion rate at BSPP less than 100 cfs.

3.4.4.11 Bernice Frederic Sisk Dam Raise and Reservoir Expansion

Same as Alternative 1.

3.4.4.12 Tidal Habitat Restoration

Tidal habitat restoration is a commitment from the 2009 Biological Opinion, carried into the 2020 Record of Decision. All planned actions, as described in the No Action Alternative, have separate environmental compliance (either programmatically or site-specific) and no further analysis of impacts would be performed in this document. State and Federal agencies would analyze impacts for the site specific and programmatic tidal habitat restoration compliance separate from the Long-Term Operation of CVP and SWP.

3.4.4.13 Longfin Smelt Culture Program

DWR would continue to fund the Longfin Smelt culture program to achieve the following objectives: 1) fully close the Longfin Smelt life cycle in captivity, 2) initiate and maintain a genetically managed refugial population, and 3) produce fish to meet the needs of research and management projects as coordinated with the Longfin Smelt Science Plan.

3.4.5 Stanislaus River

3.4.5.1 Minimum Instream Flows

Minimum instream flows (i.e., Goodwin Dam releases) would be in accordance with the 2023 New Melones SRP (2023 SRP, Figure 3-8 Appendix AB, Attachment N) to increase the potential outmigration response of juvenile steelhead and increase the annual total volume of water for all year types, as shown in Figure 3-16. The SRP includes the ability to shape monthly and seasonal flow volumes.

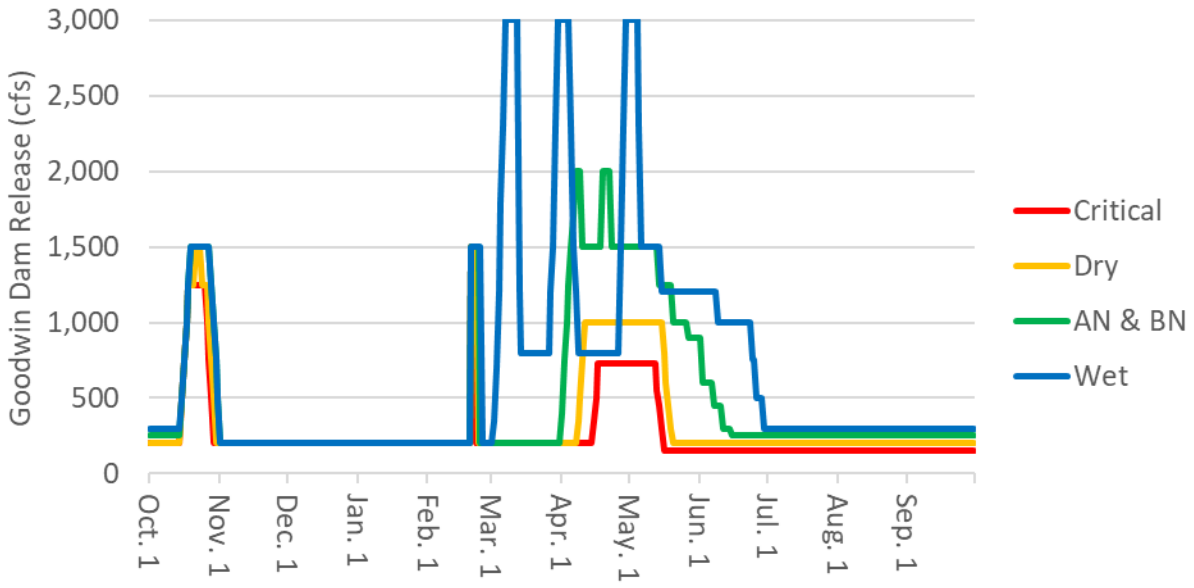


Figure 3-16. 2019 New Melones Stepped Release Plan with Modified Winter Instability Flows.

3.4.5.2 Winter Instability Flows

Reclamation, through the Stanislaus Watershed Team, schedules the winter instability flow volume, including combining the additional January and February releases, in consideration of timing flows to coincide with a natural storm event which may naturally cue outmigration. Modifications would use a single pulse and increase peak releases from 400 cfs to 1,500 cfs.

3.4.5.3 Fall Pulse Flows

In addition to description of the No Action Alternative, Reclamation may release additional flows in October and/or November.

3.4.6 San Joaquin River

Same as the No Action Alternative. Reclamation would continue implementation of the San Joaquin River Restoration Program as an independent related activity.

3.4.7 Monitoring

Alternative 2 addresses future changes to monitoring needs through specific monitoring actions described in Appendix E, Section E.5.11 *Special Studies*.

3.4.8 Special Studies

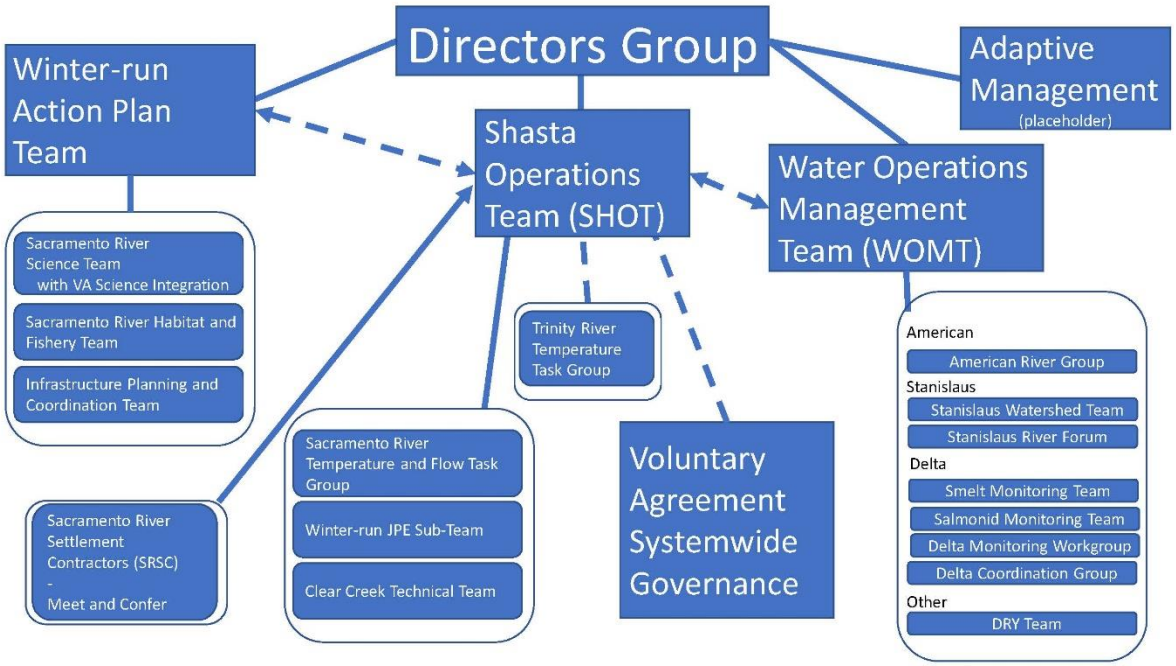
Alternative 2 identifies special studies similar to the No Action Alternative and adds additional studies described in Appendix E *Alternatives*.

3.4.9 Drought

Starting each October, Reclamation and DWR, through the Drought Relief Year (DRY) Team, would meet at least monthly to determine whether it would be appropriate to pursue actions described in a drought toolkit to respond to current or anticipated drought and dry year conditions. Similar to the No Action Alternative, the drought toolkit would list the minimum decisions required each month and Reclamation and DWR expect a more focused review of the drought toolkit in times when resources to meet required operations and goals are limited. Reclamation and DWR, through the DRY Team, may update the drought toolkit.

3.4.10 Governance

CVP/SWP Governance is structured such that a 5 Agency Directors Group oversees the ongoing authorities of each respective agency and serves as the final decision-making body for operational matters. The Directors Group directly interfaces with four management level groups (Winter-run Action Plan Team, SHOT, WOMT, and Adaptive Management), whose Federal and State agency representatives discuss the actions in Alternative 2 when implementation may have biological, system conditions or water supply impacts or tradeoffs. See Appendix E for the full description of governance and the adaptive management program. These policy groups work with numerous technical groups that coordinate on seasonal and real-time operations for specific divisions or watersheds. Figure 3-17 shows the identified groups and relationships.



Solid lines indicate a direct relationship for elevation and decision making, the dashed arrow between Winter-run Action Plan Team and SHOT indicates a direct line of communication and regular coordination, the dashed arrow between WOMT and SHOT indicates a direct line of communication and regular coordination, the dashed line between SHOT and the Trinity River Temperature Task Group indicates seasonal communication and coordination on an as-needed basis. The solid arrow between SHOT and the SRS Contractors indicates SRS Contractor integration into SHOT.

Figure 3-17. Governance Structure for CVP and SWP Water Operations.

3.4.11 Framework Programmatic Outline for Sites Reservoir Project and Delta Conveyance Project

Alternative 2 includes a framework for the development of future Federal actions related to Delta Conveyance Project (DCP) and Sites Reservoir Project (Sites) that would be authorized, funded, or carried out at a later time and would be subject to future project-specific consultations because of these subsequent Federal actions. A full description of activities addressed programmatically provided in Appendix E would be subject to a subsequent consultation.

Alternative 2 includes a framework programmatic outline for the operations of the Sites and the operations of the proposed DCP. The analysis for DCP (Appendix Z) and Sites (Appendix AA) provides information, to the extent possible given the information available today, to assess how these projects would operate along with broadly assessing the impacts of the operations of these projects in the context of the LTO of the CVP and SWP. The intended use of for the programmatic discussion of these two projects is to provide information, to the extent possible, on how these key projects would be implemented in conjunction with the LTO operations in the future and would support subsequent regulatory processes and coordinated operations planning.

3.4.12 Other Activities (Winter-run Action Plan)

This Winter-run Action Plan has been developed collaboratively among representatives from the Reclamation, NMFS, USFWS, DWR, CDFW, and the Sacramento River Settlement Contractors to improve the survival and viability of winter-run that functions alongside planned operation of Shasta Reservoir. These components are not specifically proposed by Reclamation and may be implemented by other parties with separate NEPA efforts. See Appendix E *Alternatives* for more detail related to the Winter-run Action Plan.

3.5 Alternative 3 – Modified Natural Hydrograph

Alternative 3 (Modified Natural Hydrograph) represents actions informed by discussions with some of the environmental NGOs involved in state-wide water projects. It combines additional Delta outflow with measures to improve drought protection and temperature management through increased reservoir carryover storage.

Alternative 3 applies the following priority order for meeting downstream demands:

1. Meet D-1641;
2. Meet minimum reservoir release and instream flow requirements;
3. Divert water for human health and safety as defined by California Code of Regulations, Title 24, Section 878;
4. Meet storage requirements further described in Appendix E for Shasta, Folsom, Oroville, and New Melones reservoirs;
5. Meet Delta outflow requirements as proposed in this alternative – limit water diversions by CVP and SWP water service contractors, settlement contractors, and exchange contractors under SWP and CVP water rights to human health and safety if outflow

requirements are not achieved, and limit releases of stored water beyond releases necessary to meet D-1641 in most months to prioritize achieving reservoir storage requirements;

6. Meet Delta operational requirements as described below (e.g., OMR, 2:1 San Joaquin import/export flow ratio);
7. Divert and deliver water for wildlife refuges;
8. Divert and make water available for diversions for settlement, and exchange contractor demands. Diversions/deliveries may be reduced by more than contract terms currently allow to meet operational requirements to protect listed species.
9. Divert water for CVP and SWP water service contractors.

Reclamation would continue to operate each tributary with the same primary purposes as described in the Common Components seasonal operations. This alternative differs from No Action Alternative as summarized below and described in greater detail in Appendix E - *Alternatives*.

3.5.1 Sacramento River

3.5.1.1 Ramping Rates

This component is the same as Alternative 2.

3.5.1.2 Winter and Spring Pulses and Delta Outflow

This component replaces the Spring Pulse flow component seen in the other alternatives.

Subject to modeling demonstrating that operations are reasonably likely to meet the Shasta Reservoir storage requirements for water temperature management described below, Alternative 3 bypasses 55% of unimpaired inflow to Shasta Reservoir from December through May to achieve the monthly Delta Outflow criteria in Table 3-14, as described below for the Delta. When the monthly Delta Outflow criteria in Table 3-14 is met, then releases from Shasta Reservoir that month may be reduced to 45% of unimpaired inflows from December to May.

3.5.1.3 Water Temperature Management

Reclamation would reduce deliveries from stored water releases from Shasta Reservoir to meet the storage requirements below. In addition, Reclamation would release unstored water to meet Delta outflow requirements described in Section 3.5.5.2 from December through May to the extent modeling indicates doing so was consistent with meeting these storage requirements.

Reclamation would release stored water to meet Delta outflow requirements from May through November. These storage requirements are designed to achieve water temperatures that protect winter-run Chinook salmon, and protect the salmon fishery, including fall-run Chinook salmon, pursuant to WRO 90-5:

- EOA Storage
    - Critical Year: 3.6 MAF

    - All other Years: 3.9 MAF
- EOS Storage
    - Critical Year: 1.9 MAF
    - All other Years: 2.2 MAF

Reclamation would not make water available for delivery until operational plans show the targets described below are likely to be met or exceeded. When those targets can be met, Reclamation would then make releases for deliveries in the priority identified above (first to CVPIA wildlife refuges, then to the SRS Contractors, then water service contractors).

Reclamation may develop an annual TMP, consistent with WRO 90-5 and these criteria. The TMP would be reviewed and approved by NMFS on or before April 15, and would be approved before Reclamation releases water from Shasta Dam for delivery to or diversion by any contractor.

In water years classified as wet, above normal, below normal, or dry, the TMP may achieve daily average water temperatures of 53.5°F at the Clear Creek gage from the earlier of the onset of spawning of winter-run Chinook salmon or May 15 until October 31. In water years classified as critical, the TMP may achieve daily average water temperatures of 54.5°F or cooler at the Clear Creek gage from the earlier of the onset of spawning of winter-run Chinook salmon or May 15 until October 31, to the maximum extent possible. In addition, Reclamation's operations should not result in seven-day average of daily maximum water temperatures at the Jelly's Ferry gage that exceed 61°F from March 1 to May 15. Shasta Dam operations described in the TMP should include modeling of water temperature dependent mortality using the Martin et al. model, and modeled estimates of water temperature dependent mortality of winter-run Chinook salmon should not exceed 30% in a critically dry year, 8% in a dry year, or 3% in other water year types. Reclamation would consider and implement warmwater and/or coldwater power bypasses at Shasta Dam when necessary to achieve these water temperature criteria.

If Reclamation, NMFS, and Water Board jointly determine that reservoir storage is inadequate to achieve these water temperature criteria and comply with WRO 90-5, Reclamation, NMFS and Water Board would jointly develop or revise the TMP that maximizes water temperature benefits for salmon spawning below Shasta Dam, provides a reasonable likelihood to achieve storage targets in the following year if that year is dry, documents water deliveries to contractors, and is disclosed to the public. This plan would be approved by NMFS before Reclamation releases water from Shasta Reservoir for its deliveries.

3.5.2 Clear Creek

All components for this watershed are the same as Alternative 2, except that Reclamation would manage Whiskeytown Dam releases to not exceed mean daily water temperatures of 60°F at the Igo gauge from June 1 through September 15 and 56°F from September 15 through November 15.

3.5.3 American River

3.5.3.1 Minimum Instream Flows (Minimum Release Requirements)

This component is the same as Alternative 2, except that Reclamation would incorporate the following Folsom Reservoir storage requirements:

- EOS: 300 TAF (230 TAF in a second consecutive dry or critical water year type)
- EOD: 300 TAF

Reclamation would prioritize minimum flows under the MRR, then storage, then additional Delta outflow in the winter and spring, then water deliveries.

3.5.3.2 Winter and Spring Pulses and Delta Outflow

This component replaces the Spring Pulse flow component seen in the other alternatives.

Subject to annual modeling demonstrating that operations are reasonably likely to meet the storage requirements described above, Alternative 3 bypasses 55% of unimpaired inflows to Folsom Reservoir from December through May to achieve the monthly Delta Outflow criteria in Table 3-14, as described in Winter and Spring Delta Outflow. Subject to achieving the storage requirements described above, Reclamation may release stored water from May to November to meet the Delta Outflow criteria described in Table 3-14. If the monthly Delta Outflow criteria in Table 3-14 is met, then releases from Folsom Reservoir that month may be reduced to 45% of unimpaired inflows from December through May.

3.5.4 Feather River

DWR would address Oroville Dam operations separately.

3.5.5 Delta

Alternative 3 assumes a single unit operation is feasible for exports to meet public health and safety and would be shared between the CVP and SWP.

3.5.5.1 Old and Middle River Reverse Flows

Reclamation and DWR would coordinate operations of the CVP and SWP to meet the following requirements that are different from the No Action Alternative.

From the earlier of January 1 or the onset of OMR management, until the earlier of June 30 or the offramp of OMR Management, flows should not exceed -5,000 cfs on a 14-day running average. These requirements do not apply when San Joaquin River flows at Vernalis are greater than 20,000 cfs. In addition, when the SVI has been classified as a critically dry year for a second (or more) consecutive year, OMR flows should not exceed -2,500 cfs on a 14-day running average.

From April 1 to May 31, Reclamation and DWR would operate to achieve a 2:1 ratio of San Joaquin River inflow at Vernalis to combined CVP/SWP exports in all water year types.

3.5.5.2 Winter and Spring Delta Outflow

This component replaces the Spring Pulse flow component seen in the No Action Alternative, and Alternatives 1, 2, and 4.

In addition to the requirements under D-1641, and consistent with modeling demonstrating that operations are reasonably likely to meet storage requirements described above, on a monthly basis, Reclamation and DWR would operate to meet the Delta Outflow criteria in Table 3-14 for the months of July to November. For the months of December through June, on a monthly basis, Reclamation and DWR would operate to meet Delta Outflow that is the lesser of 65 percent of unimpaired Delta inflow or the Delta Outflow criteria in Table 3-14.

Table 3-14. Maximum Required Delta Outflow Criteria by Month and Water Year Type.

Month	Water Year Type							
	Wet	**Above Normal**	**Below Normal**	**Dry**	**Second Consecutive Dry**	**Critical**	**Second Consecutive Critical**	**Third or more Consecutive Critical**
January	90,000 cfs	42,800 cfs	29,000 cfs	20,000 cfs	11,400 cfs	11,400 cfs	7,100 cfs + OMR -2,500 cfs	NC
February	90,000 cfs	42,800 cfs	29,000 cfs	20,000 cfs	11,400 cfs	11,400 cfs	7,100 cfs + OMR -2,500 cfs	NC
March	90,000 cfs	42,800 cfs	29,000 cfs	20,000 cfs	11,400 cfs	11,400 cfs	7,100 cfs + OMR -2,500 cfs	NC
April	90,000 cfs	42,800 cfs	29,000 cfs	20,000 cfs	11,400 cfs	11,400 cfs	7,100 cfs + OMR -2,500 cfs	NC
May	90,000 cfs	42,800 cfs	29,000 cfs	20,000 cfs	11,400 cfs	11,400 cfs	7,100 cfs + OMR -2,500 cfs	NC
June	D-1641	D-1641	D-1641	8,000 cfs	8,000 cfs	8,000 cfs	7,100 cfs to June 15 then July criteria	4,000 cfs
July	8,000 cfs	8,000 cfs	7,100 cfs	6,500 cfs	NC	5,000 cfs	NC	4,000 cfs
August	7,100 cfs	7,100 cfs	6,900 cfs	6,900 cfs	NC	5,000 cfs	4,000 cfs	4,000 cfs
September	8,100 cfs	7,100 cfs	5,000 cfs	4,000 cfs	NC	3,000 cfs	NC	NC
October	8,100 cfs	7,100 cfs	5,000 cfs	4,000 cfs	NC	3,000 cfs	NC	NC
November	≤7,100 cfs [a]	≤7,100 cfs [a]	5,000 cfs	4,500 cfs	NC	3,500 cfs	NC	NC
December	65% UIF	65% UIF	65% UIF	65% UIF	NC	65% UIF	NC	NC

Note: Lesser of 65% of unimpaired flow or maximum required Delta outflow for months of December through June.

cfs = cubic feet per second; OMR = old and middle river; UIF = unimpaired flow; NC = no change.

[a] Reservoir inflow

To meet the Delta outflow in Table 3-14, consistent with annual modeling demonstrating that storage requirements are reasonably likely to be achieved, for the months of December through May, Reclamation and DWR would bypass 55% of unimpaired inflow to Shasta, Folsom reservoirs and 40% of unimpaired inflow to New Melones Reservoir. If the storage requirements and monthly Delta Outflow criteria in Table 3-14 are met, then releases from Shasta, Folsom reservoirs that month may be reduced to 45% of unimpaired inflows from December through May. Reclamation and DWR may release stored water to meet Delta outflow criteria in May through November.

Reclamation and DWR would prioritize meeting the storage requirements described herein before making additional reservoir releases beyond what is required to meet D-1641 and human health and safety.

3.5.5.3 Delta Smelt Summer and Fall Habitat

Alternative 3 is the same as Alternative 2, except releases from upstream reservoirs are constrained to a Delta outflow of 7,100 cfs in November of wet and above normal years as described in Table 3-14 above. Fall salinity may vary based on the ability of export reductions to achieve Fall X2 subject to public health and safety.

3.5.5.4 Bernice Frederic Sisk Dam Raise and Reservoir Expansion

Same as under Alternative 1.

3.5.6 Stanislaus River

3.5.6.1 Minimum Instream Flows

Consistent with the 2018 Bay-Delta Water Quality Control Plan, this component is consistent with the No Action Alternative in the summer and fall. Alternative 3 requires reservoir releases to meet 40% of unimpaired inflow on a 7-day running average to the confluence with the San Joaquin in February through June.

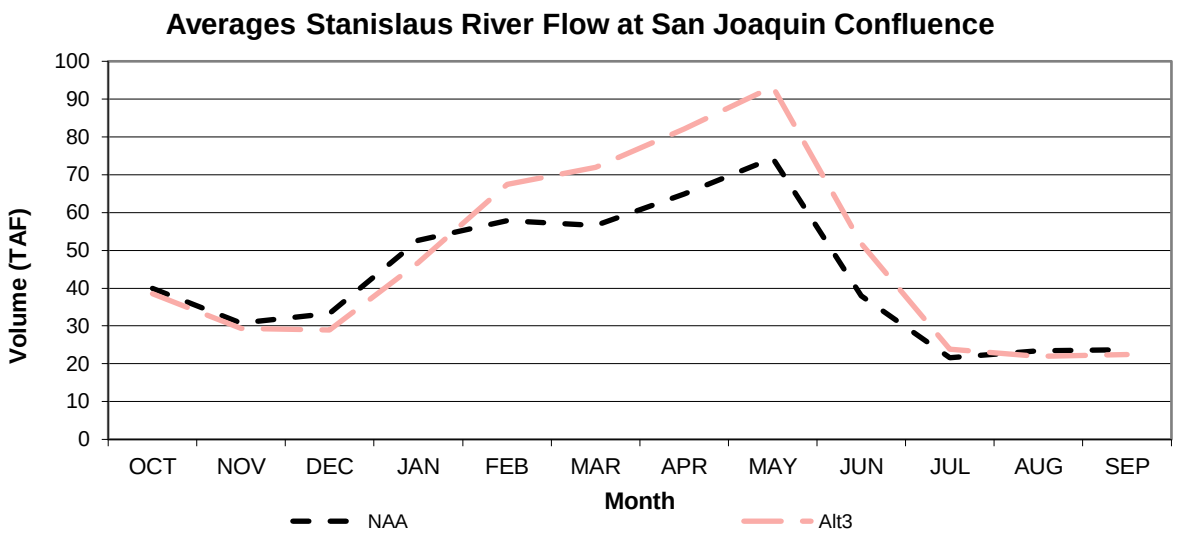


Figure 3-18. Stanislaus River Flow at Confluence with San Joaquin River.

In the months of February through June, Reclamation also would make releases from New Melones as necessary to contribute its share (29%) of meeting the 1,000 cfs minimum flow at Vernalis required in the Bay-Delta Water Quality Control Plan.

Reclamation would reduce deliveries to all CVP contractors to achieve a minimum EOS storage in New Melones Reservoir of 700 TAF.

3.5.6.2 Winter Instability Flows

This component is replaced by unimpaired inflow as minimum instream flows.

3.5.6.3 Spring Pulse Flows

This component is replaced by unimpaired inflow as minimum instream flows.

3.5.6.4 Fall Pulse Flows

This component is the same as Alternative 2.

3.5.7 San Joaquin River

This is the same as the No Action Alternative. Reclamation would continue implementation of the San Joaquin River Restoration Program as an independent related activity.

3.5.8 Monitoring

This component is the same as Alternative 1.

3.5.9 Special Studies

This component is the same as Alternative 1.

3.5.10 Drought

Alternative 3 prohibits the use of a TUCP. Alternative 3 does not include construction nor operation of the Drought Barrier in West False River.

Key drought measures analyzed from the drought toolkit include:

- Delta Cross Channel Gate Openings
- Winter-run Chinook salmon Hatchery Increased Adult Intake
- Curtailment Conditions
- SRS Contractors Meet and Confer Provisions
    - Delayed Rice Floodup
    - Delayed Water Transfers
- Spring Warmwater Power Bypass at Shasta Reservoir
- Summer/fall coldwater power bypass at Shasta Reservoir
- Fall Coldwater Power Bypass at Folsom Reservoir

3.5.11 Governance

This component is generally the same as Alternative 2, except that: (1) the management teams (e.g., Shasta Water Interagency Management Team, WOMT, Sacramento River Temperature and Flow Task Group) would be comprised solely of staff from federal and state agencies and Native American tribes; (2) fishery agencies (NMFS, USFWS, CDFW) would make final decisions regarding water project operations if the issue is not resolved in the management team process.

3.6 Alternative 4 – Risk Informed Operation

Alternative 4 provides alternative criteria for Shasta Reservoir and incorporates improved real-time information to support water deliveries in the Delta while limiting effects on listed species.

Reclamation would continue to operate each tributary with the same primary purposes as described in the Common Components seasonal operations. This alternative differs from No Action as summarized below and described in greater detail in Appendix E*, Alternatives*.

3.6.1 Sacramento River

3.6.1.1 Water Temperature Management

Reclamation would manage planned releases from Shasta Reservoir for water service contract deliveries to achieve an EOS storage of 2.0 MAF in Shasta Reservoir based on the 90% forecast unless a less conservative forecast requires more releases.

To address early season hydrologic uncertainty, Reclamation would limit the use of water under North of Delta Agricultural water service contractor allocations to no more than 30 TAF prior to the temperature management season and completion of a TMP.

If reductions to water service contracts would not achieve 2.0 MAF of storage in Shasta Reservoir by EOS, Reclamation would reduce releases for the Project Water component of the SRS Contractors' Contracts, resulting in diversions of ~60% of contract totals.

Alternative 4 includes drought toolkit actions such as Wilkins Slough Relief and relaxation of D-1641 water quality requirements that may improve the volume of coldwater pool and level of drought protection in Shasta Reservoir.

Reclamation would coordinate through governance to implement a water temperature management strategy that considers:

1. EOS Coldwater Pool
2. Minimization of modeled Temperature Dependent Mortality.

The water temperature management strategy would start with a 53.5°F temperature target at or downstream of CCR from May 15 through October 30 while preserving a projected EOS coldwater pool of 400 TAF. If projections show EOS coldwater pool cannot be achieved, the water temperature management strategy would relax water temperatures in the following order:

1. Target ≤56°F at CCR starting May 15 and delay the ≤53.5°F target to no later than June 15
2. Target June 16 temperatures ≤54°F at CCR through October 30
3. Relax end-of-October temperatures to ≤56°F daily to as early as October 1 and reduce the EOS coldwater pool target to 200 TAF
4. Increase June 16 through September 30 temperatures to ≤56°F
5. Reduce the EOS coldwater pool target and confer on additional drought toolkit actions.

Reclamation, through governance, would prepare a TMP consistent with requirements in WRO 90-5 and update the plan throughout the water temperature management season to improve water temperature conditions on or after June 16.

3.6.1.2 Fall and Winter Instream Flows

Fall and Winter Instream Flows under Alternative 4 are implemented as follows:

Table 3-15. Keswick Dam December through February Default Release Schedule determined by EOS Storage.

Keswick Release (cfs)	Shasta EOS Storage (MAF)
3,250	<2.4
4,000	≥2.4

Keswick Release (cfs)	Shasta EOS Storage (MAF)
4,500	≥2.8
5,000	≥3.2

EOS = end-of-September; cfs = cubic feet per second; MAF = million acre-feet.

3.6.2 Clear Creek

3.6.2.1 Minimum Instream Flows (Seasonally Variable Hydrograph)

Same as Alternative 2

3.6.2.2 Pulse Flows

Same as Alternative 2.

3.6.2.3 Water Temperature Management

Reclamation would target Whiskeytown Dam releases to not exceed the mean daily water temperatures at Igo gauge:

- 61°F from June 1 through August 15.
- 60°F from August 16 through September 15.
- 56°F from September 15 through November 15.

Water temperature management on Clear Creek is implemented through changes in guard gate configurations and flow manipulations. In dry, critical, or import curtailment years, Reclamation may not be able to meet these water temperatures and would operate Whiskeytown Dam as close to these temperatures as practicable.

3.6.3 American River

Reclamation, with support from the Water Forum, would adjust how the initial American River Index (ARI) is calculated in February and March and would use the 90 percent exceedance criteria for calculation of the ARI and corresponding monthly MRR.

3.6.3.1 Minimum Instream Flows (Minimum Release Requirement)

Reclamation would adopt the minimum flow schedule outlined in the "2023 Updates and Refinements to the Lower American River 2017 Flow Management Standard Technical Memorandum" ("2023 MFMS"). The 2023 MFMS includes MRR ranges from 500 to 2000 cfs based on time of year and annual hydrology. The flow schedule is intended to improve coldwater pool and habitat conditions for steelhead and fall-run Chinook salmon.

Reclamation and the Water Forum would continue to review and update Folsom Reservoir's end-of-year Planning Minimum.

3.6.3.2 Water Temperature Management

By June 15, Reclamation, through Governance, would annually prepare a TMP as described under the No Action Alternative.

Reclamation would implement the ATSP described in the 2023 MFMS. Each ATSP schedule determines a monthly series of water temperature targets (for daily average water temperature) at the Watt Avenue Bridge. Schedule 1 has a water temperature upper limit of 63°F from May through September, and 56°F in October and November. Schedule 75 has a water temperature upper limit of 72°F from May through September, 65°F in October, and 58°F in November. Schedules 2 through 75 each represent a change in a single month's upper temperature limit by 1.0°F. The ATSP may be modified as described in Appendix E, *Alternatives*.

3.6.4 Delta

3.6.4.1 Old and Middle River Flow Management

Reclamation and DWR would operate to the Hutton (2008) OMR index to allow for operational planning and real-time adjustments.

3.6.4.2 Start of OMR Management

Reclamation and DWR would reduce exports to achieve OMR no more negative than -5,000 cfs when one or more of the following conditions have occurred:

"First Flush"

In addition to the reduction in exports described in the No Action Alternative, Reclamation and DWR may initiate the "first flush" if, through Governance, monitoring indicates a high risk of migration and dispersal of smelt into areas at high risk of future entrainment. "First Flush" may be offramped to OMR no more negative than -5,000 cfs if the San Joaquin River at Vernalis is flowing at 10,000 cfs or more.

Delta Smelt Salvage

After December 1 if the Enhanced Delta Smelt Monitoring Program observes Delta smelt in the lower San Joaquin River and Southern Delta region or if any salvage of Delta smelt occurs. Reclamation and DWR, through Governance, may cease OMR restrictions related to this trigger or adjust the trigger requirements if hatchery release and monitoring data indicate that Delta smelt catch within the south Delta represent less than 5% of the overall catch.

Adult Longfin Salvage

After December 1 if monitoring data indicates that longfin smelt catch within the south Delta represent greater than or equal to 5% of the overall catch or if any salvage of longfin smelt occurs. Reclamation and DWR, through Governance, may cease OMR restrictions related to this trigger if monitoring data (e.g., Enhanced Delta Smelt Monitoring Program, Bay Study, Fall Midwater Trawl) indicate that longfin smelt catch within the south Delta represent <5% of the overall catch.

Juvenile Salmonid Salvage

After December 1, Reclamation and DWR, through Governance, may incorporate additional or different predictive models as necessary to improve the onset of OMR management season for salmonid species if any of the following occurs:

- Gaeta et al.'s (2023) machine learning model predicts one week in advance the presence of winter-run length-at-date juvenile Chinook salmon across all 30 submodels, or
- salvage of genetically confirmed juvenile winter-run or spring-run Chinook salmon, or
- annual cumulative loss total reaches 60 or above for wild Central Valley steelhead.

3.6.4.3 Real-time Adjustments

In addition to "First Flush", additional restrictions use real-time monitoring to identify an increased risk of entrainment. Reclamation and DWR would manage to a more positive OMR than -5,000 cfs under the following conditions:

Adult Delta Smelt Turbidity Protection

Reclamation and DWR would manage exports to OMR no more negative than -2,000 cfs when daily average turbidity at both Holland Cut, and Old River at Bacon Island are at or above 12 FNU. Reclamation and DWR would maintain OMR at no more negative than -2,000 cfs for one week, and then no more negative than -3,500 cfs until measured daily average turbidity at both sensors are less than 12 FNU, or as revised through Governance.

Adult Delta smelt protection would off-ramp when three-day average water temperature at Jersey Point reaches 59ºF. This off ramp would be based on data from the San Joaquin River at Jersey Point averaged over three days.

Delta Smelt Larvae and Juveniles Protection

Larval and juvenile Delta smelt management period would initiate when detected within the entrainment zone based on real-time sampling, or adult Delta smelt protection has off-ramped based on water temperature, whichever comes first. The presence of Delta smelt larvae and juveniles can also be identified through a detection of spent adult females in survey or salvage.

Reclamation and DWR would restrict exports to allow OMR no more negative than -3,500 cfs when Secchi depth average measurement is equal or less than one meter.

Longfin Smelt Larvae and Juveniles Protection

Recent studies indicated that regulations limiting Delta export for salmonids and Delta smelt since 2008-2009 have been protective for populations of longfin smelt.

Winter-Run Annual Cumulative Loss Thresholds

Reclamation and DWR would manage OMR to remain below the total annual loss thresholds for genetically-verified winter-run Chinook salmon at the Tracy and Skinner fish facilities:

- Natural Winter-run Chinook salmon: Salvage Loss <0.5% of JPE (same as the No Action Alternative)

- Hatchery Winter-run Chinook salmon: Salvage Loss <0.5% of JPE

JPE would be calculated using O'Farrell et al. (2018). Reclamation and DWR would use then-current monitoring of juvenile passage at Red Bluff Diversion Dam. Reclamation and DWR may update the JPE through Governance. Loss may be calculated using the equation provided in CDFW (2018).

During the brood year, if at any time cumulative loss of natural or hatchery winter-run Chinook salmon exceed the total annual loss threshold, DWR and Reclamation may restrict south Delta exports to maintain an OMR value of no more negative than -3,500 cfs for 14 days. Reclamation and DWR, through Governance, would also develop, implement, and update weekly an OMR schedule for the rest of the OMR management season to avoid further exceeding the annual loss thresholds using entrainment prediction tools and documented in an assessment.

Winter-Run Chinook Salmon High Salvage Avoidance

Reclamation and DWR would reduce exports to achieve OMR of no more negative than -3,500 cfs for at least seven days when Gaeta et al.'s (2023) machine learning model predicts one week in advance the high presence of winter-run length-at-date juvenile Chinook salmon across all 30 submodels. High presence is defined as seven-day moving average of more than 4.29 winter-run Chinook salmon expanded salvage at the salvage facilities. This action can only occur in the months of February, March, and April. OMR would continue to be managed to be no more negative than -3,500 cfs for longer than seven days until Gaeta et al.'s (2023) model no longer predicts high presence across all submodels.

Spring-Run Chinook Salmon Surrogate Thresholds

Reclamation and DWR would reduce exports to achieve OMR no more negative than -3,500 cfs for seven days the first instance cumulative salvage loss of a release group equals or exceeds 0.5% of the releases group at Delta entry.

Reclamation and DWR, through Governance, would develop the locations and times of in-river surrogate releases to best represent natural juvenile spring-run Chinook salmon migration into the Sacramento River and Delta. The percentage of the release group at Delta entry would be determined by survival from the release site to the Delta, similar to the development of the winter-run Chinook salmon JPE.

Steelhead Salvage Loss Thresholds

Same as Alternative 2.

3.6.4.4 Stormflex

Reclamation and DWR may operate to an OMR no more negative than -6,250 cfs to capture peak flows during storm-related events when no backstop conditions are triggered and following conditions are met:

- The Delta is in excess conditions as defined in 2018 amendment to the COA, and
- QWEST is greater than 0.

DWR and Reclamation, through Governance, would use estimates of the real-time distribution of winter-run Chinook salmon, Particle Track Model, and prediction tool output to assess potential winter-run Chinook salmon entrainment risk differences using OMR inputs of -5000, and -6250 cfs. If the assessment indicates that additional entrainment protections are unlikely to be triggered, Reclamation and DWR may operate to OMR no more negative than -6,250 cfs and would update the assessment no less than weekly.

If conditions indicate a backstop condition is likely to trigger, Reclamation and DWR would resume OMR no more negative than -5,000 cfs. If a backstop condition is triggered, Reclamation and DWR would cease storm-flex and implement the backstop.

3.6.4.5 End of OMR Management

Same as Alternative 2

3.6.4.6 Spring Delta Outflow

Same as Alternative 2.

3.6.4.7 Barker Slough

Same as Alternative 2.

3.6.4.8 Delta Smelt Summer and Fall Habitat

Through adaptive management, Alternative 4 would implement an X2 action based on the results of an ongoing study (Polansky et al. 2024) currently underway. Reclamation modeled 'Summer X2' in the FEIS, which is an increase in delta outflow in early June with a volume of water equivalent to that used in the past to meet Fall X2 (prescribed in the No Action Alternative) and increased delta outflow to locate X2 at 85 km in September and October.

3.6.4.9 Delta Smelt Supplementation

Same as Alternative 2.

3.6.4.10 Bernice Frederic Sisk Dam Raise and Reservoir Expansion

This component is the same as Alternative 1.

3.6.5 Stanislaus River

This alternative differs from the No Action Alternative as described below.

3.6.5.1 Minimum Instream Flows

This component is the same as Alternative 2.

3.6.5.2 Fall Pulse Flows

This component is the same as Alternative 2.

3.6.5.3 Fall Pulse Flows

This component is the same as Alternative 2.

3.6.6 San Joaquin River

This is the same as the No Action Alternative. Reclamation would continue implementation of the San Joaquin River Restoration Program.

3.6.7 Monitoring

This component is the same as Alternative 1.

3.6.8 Special Studies

This alternative does not include species studies; however, Reclamation's science enterprise would continue through separate environmental compliance and future plans as independent programs.

3.6.9 Drought

Same as the No Action Alternative.

3.6.10 Governance

Reclamation and DWR would coordinate with CDFW, NMFS, USFWS, tribes, and interested parties specific to the operation of the CVP and SWP through two main processes, as shown in Figure 3-18.

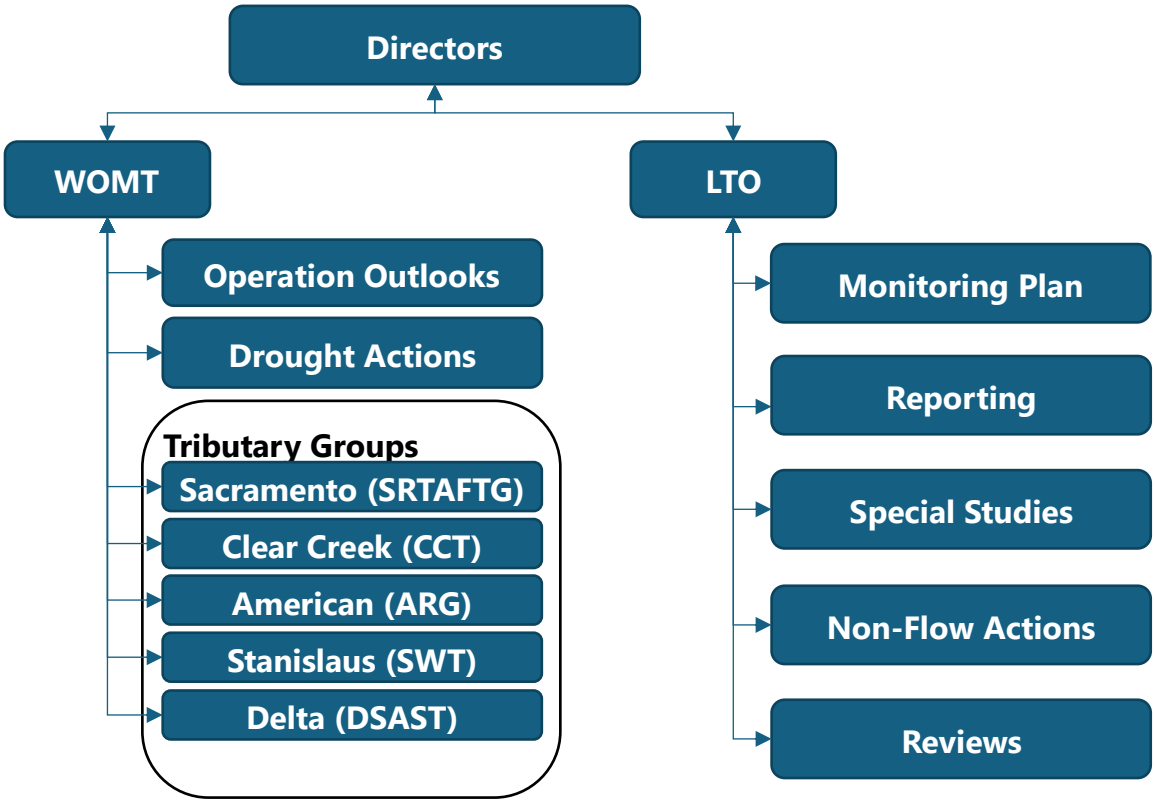


Figure 3-18. Governance Structure

3.7 References

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