Appendix 4A

Attachment 1: Model Assumptions

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4A-1.1 Introduction

The following model simulations were prepared to evaluate the impacts of different scenarios:

- Baseline Conditions
- Proposed Project

Sections 4A-1.2 and 4A-1.3 describe the assumptions used for each model simulation. Section 4A-1.4 lists references cited.

The assumptions for all model simulations are also summarized in table format in the following attachments:

- Attachment 2, " CalSim 3 Model Assumptions Callouts "
- Attachment 3, " DSM2 Model Assumptions Callouts "
- Attachment 4, " DSM2 PTM Documentation "
- Attachment 5, " DSM2 ecoPTM Documentation "
- Attachment 6, " Scenario Related Changes to CalSim 3 and DSM2 "
- Attachment 7, " SWP Proportion "
- Attachment 8, " Model Limitations "

Any use of results of model simulations should observe limitations of the models used as well as the limitations to the modeled scenarios. These results should only be used for comparative purposes. More information regarding limitations of the models used is included Attachment 8.

4A-1.2 Assumptions for the Baseline Conditions

This section presents the assumptions used in developing the CalSim 3 and DSM2 model simulations of the Baseline Conditions considered for the EIR.

The baseline in this ~~DEIR~~ EIR includes the physical conditions that existed at the time of NOP publication on June 16, 2023 as well as implementation of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project, commonly referred to as the "Yolo Bypass Big Notch Project" or "Yolo Notch Project." While the Yolo Notch Project was not operational on June 16, 2023, it is anticipated to be complete before approval of this Project and inclusion of such operation would present a more accurate and understandable representation of conditions for Project comparison purposes.

4A-1.2.1 CalSim 3 Assumptions for the Baseline Conditions

The following is a description of the assumptions tabulated in Attachment 2.

4A-1.2.1.1 Hydrology

Inflows/Supplies

The CalSim 3 model includes ~~the~~ adjusted historical hydrology, consistent with the 2023 SWP Delivery Capability Report (California Department of Water Resources 2024), to provide a reasonable representation of recent climatic conditions. Statistical characteristics of historical rim inflow in California's Central Valley show noticeable and statistically significant changes in the past 100 years. Standard deviations of precipitation and rim inflow from most of the rim watersheds in the early periods of the past 100 years are significantly different from the most recent 30 years. Detailed discussion of the adjusted historical hydrology is provided in the Evaluation and Adjustment of Historical Hydroclimate Data report (California Department of Water Resources 2023). Additional discussion of the adjusted historical hydrology and comparison of model results between the DEIR and FEIR is provided in Appendix 4A, Attachment 10, "CalSim Model Updates Between DEIR and FEIR."

Level of Development

CalSim 3 uses a "level of development" approach to simulate operation of water management facilities and flows in rivers, streams, and channels. In this approach, facilities, land use, contracts, and regulations are held constant over the 100-year period of simulation. Monthly values of unimpaired runoff represent the range of water supply conditions that characterize existing conditions (year 2020).

Demands, Water Rights, CVP/SWP Contracts

CalSim 3 demand inputs are preprocessed monthly time series for a specified level of development (e.g., 2020) and according to climate conditions. Demands are classified as CVP project, SWP project, local project or non-project. CVP and SWP demands are separated into different classes based on the contract type. The detailed listing of CVP and SWP contract amounts and other water rights assumptions are included in the delivery specification tables in Attachment 2.

4A-1.2.1.2 Facilities

All CVP/SWP existing facilities are simulated based on operations criteria under current regulatory environment.

CalSim 3 includes representation of all the existing CVP and SWP storage and conveyance facilities. Assumptions regarding selected key facilities are included in the callout tables in Attachment 2.

CalSim 3 also represents the flood control weirs such as the Fremont Weir located along the Sacramento River at the upstream end of the Yolo Bypass (U.S. Bureau of Reclamation 2017).

The Baseline Conditions also includes the Freeport Regional Water Project, located along the Sacramento River near Freeport and the City of Stockton Delta Water Supply Project (30 million gallons per day capacity).

A brief description of the key export facilities that are located in the Delta and included under the Baseline Conditions run is provided below.

The Delta serves as a natural system of channels to transport river flows and reservoir storage to the CVP and SWP facilities in the south Delta, which export water to the projects' contractors through two pumping plants: CVP's C.W. Jones Pumping Plant and SWP's Harvey O. Banks Pumping Plant. Jones and Banks Pumping Plants supply water to agricultural and urban users throughout parts of the San Joaquin Valley, South Lahontan, Southern California, Central Coast, and South San Francisco Bay Area regions.

The Contra Costa Canal and the North Bay Aqueduct supply water to users in the northeastern San Francisco Bay and Napa Valley areas.

Fremont Weir

Fremont Weir is a flood control structure located along the Sacramento River at the head of the Yolo Bypass. The Fremont Weir is notched, as represented in the Yolo Bypass Salmonid Habitat Restoration and Fish Passage EIS/EIR Alternative 1 (preferred alternative).

CVP C.W. Bill Jones Pumping Plant (Tracy PP) Capacity

The Jones Pumping Plant consists of six pumps—one rated at 800 cubic feet per second (cfs), two at 850 cfs, and three at 950 cfs. Maximum pumping capacity is assumed to be 4,600 cfs with the 400-cfs Delta-Mendota Canal–California Aqueduct Intertie that became operational in July 2012.

SWP Banks Pumping Plant Capacity

The Banks Pumping Plant has an installed capacity of about 10,300 cfs. The SWP water rights for diversions specify a maximum of 10,300 cfs, but the U. S. Army Corps of Engineers permit for SWP Banks Pumping Plant allows a maximum pumping of 6,680 cfs. From December 15 through March 15, SWP Banks diversions may increase up to 1/3 of the rate of San Joaquin River flow at Vernalis or 10,300 cfs (whichever is lower) when the San Joaquin River flow at Vernalis exceeds 1,000 cfs. Additional capacity of 500 cfs (pumping limit up to 7,180 cfs) is allowed to reduce impact of the National Marine Fisheries Service (NMFS) Biological Opinion (BO) Action IV.2.1 on the SWP.

Contra Costa Water District Intakes

The Contra Costa Canal originates at Rock Slough, about four miles southeast of Oakley, and terminates after 47.7 miles at Martinez Reservoir. Historically, diversions at the unscreened Rock Slough facility (Contra Costa Canal Pumping Plant No. 1) have ranged from about 50 to 250 cfs. The canal and associated facilities are part of the CVP; but are operated and maintained by the Contra Costa Water District (CCWD). CCWD also operates a diversion on Old River and the Alternative Intake Project, the new drinking water intake at Victoria Canal, about 2.5 miles east of CCWD's intake on the Old River. CCWD can divert water to the Los Vaqueros Reservoir to store good quality water when available and supply to its customers.

Sisk Dam

San Luis Reservoir is impounded by Sisk Dam and has a capacity of 2,027,840 acre-feet.

4A-1.2.1.3 Regulatory Standards

The regulatory standards that govern the operations of the CVP and SWP facilities under the Baseline Conditions are briefly described below. Specific assumptions related to key regulatory standards are also outlined below.

D-1641 Operations

The State Water Resources Control Board (State Water Board) Water Quality Control Plan (WQCP) and other applicable water rights decisions, as well as other agreements are important factors in determining the operations of both the CVP and the SWP.

The December 1994 Accord committed the CVP and SWP to a set of Delta habitat protective objectives that were incorporated into the 1995 WQCP and later, were implemented by D-1641. Significant elements in D-1641 include X2 standards, export/inflow ratios, Delta water quality standards, real-time Delta Cross Channel (DCC) operation, and San Joaquin flow standards.

Coordinated Operations Agreement

The CVP and SWP use a common water supply in the Central Valley of California. Reclamation and DWR have built water conservation and water delivery facilities in the Central Valley in order to deliver water supplies to project contractors. The water rights of the projects are conditioned by the State Water Board to protect the beneficial uses of water within each respective project and jointly for the protection of beneficial uses in the Sacramento Valley and the Sacramento–San Joaquin Delta Estuary. The agencies coordinate and operate the CVP and SWP to meet the joint water right requirements in the Delta.

The Coordinated Operations Agreement (COA), signed in 1986, defines the project facilities and their water supplies, sets forth procedures for coordination of operations, identifies formulas for sharing joint responsibilities for meeting Delta standards as they existed in State Water Board Decision 1485 (D-1485), identifies how unstored flow will be shared, sets up a framework for exchange of water and services between the projects, and provides for periodic review of the agreement.

DWR and Reclamation renegotiated COA in 2018. The amendment stipulates a change in responsibility for making storage withdrawals to meet in-basin use (as noted in Table 4A-1-1) and a change in export capacity when exports are constrained (Table 4A-1-2).

Table 4A-1-1. Sharing of Responsibility for Meeting In-basin Use

Water Year Type	CVP	SWP
W	80%	20%
AN	80%	20%
BN	75%	25%
D	65%	35%
C	60%	40%

Table 4A-1-2. Sharing of Applicable Export Capacity When Exports Are Constrained

Water Conditions	CVP	SWP
Balanced	65%	35%
Excess	60%	40%

Central Valley Project Improvement Act (b)(2) Assumptions

The Baseline Conditions includes a dynamic representation of the Central Valley Project Improvement Act (CVPIA) 3406(b)(2) water allocation, management, and related actions (B2). The selection of discretionary actions for use of B2 water in each year was based on a May 2003 Department of the Interior policy decision. The use of B2 water is assumed to continue in conjunction with the U.S. Fish and Wildlife Service (USFWS) and NMFS BO Reasonable and Prudent Measures (RPM) actions. CalSim 3 does not dynamically account for the use of B2 water, but rather assumes pre-determined upstream fish objectives for Clear Creek. Other B2 actions are assumed to be accommodated by USFWS and NMFS BO RPM actions.

Clear Creek Flows

~~Downstream water rights are representative of the 1963 Reclamation Proposal to USFWS and National Parks Service (NPS). Flows of 200 cfs are modeled for October through May for all non-Critical water years. In Critical years, flows of 150 cfs occur. In June through September, flows of 150 cfs are modeled, in addition to 10 thousand acre-feet (TAF) for channel maintenance in February of Below Normal, Above Normal, and Wet water years. In June of non-Critical years, spring pulse flows of 10 TAF occur; in June of Critical years, a three-day pulse of 900 cfs occurs.~~ Minimum flows for Clear Creek are represented as a seasonally variable hydrograph with annual average flows of 200 cfs that oscillate between 300 cfs in the winter and 100 cfs in the summer. In non-Critical years, spring (May and June) pulse flows of 10 -thousand acre-feet (TAF) occur. In Critical years, these pulse flows are represented as 5 TAF in May. Flows of 150 cfs also occur in Critical years that are not to exceed the safe outflow works capacity of Whiskeytown (840 cfs).

Continued CALFED Agreements

The Environmental Water Account (EWA) was established in 2000 by the CALFED Record of Decision. The EWA was initially identified as a four-year cooperative effort intended to operate from 2001 through 2004 but was extended through 2007 by agreement between the EWA agencies. It is uncertain, however, whether the EWA will be in place in the future and what actions and assets it may include. Because of this uncertainty, the EWA has not been included in the current CalSim 3 implementation.

One element of the EWA available assets is the Lower Yuba River Accord (LYRA) Component 1 water. In the absence of the EWA and implementation in CalSim 3, the LYRA Component 1 water is assumed to be transferred to south-of-Delta SWP contractors to help mitigate the impact of the 2019 BOs and D-1641 on SWP exports during April and May. An additional 500 cfs of capacity is permitted at Banks Pumping Plant from July through September to export this transferred water.

Water Transfers

Lower Yuba River Accord

Acquisitions of Component 1 water under the LYRA, and use of 500 cfs dedicated capacity at Banks Pumping Plant during July–September, are assumed to be used to reduce as much of the impact of the April–May Delta export actions on SWP contractors as possible.

Phase 8 Transfers

Phase 8 transfers are not included in the Baseline Conditions simulation.

Short-term or Temporary Water Transfers

Short-term or temporary transfers such as Sacramento Valley acquisitions conveyed through Banks Pumping Plant are not included in the Baseline Conditions simulation.

4A-1.2.1.4 Specific Regulatory Assumptions

Upper Sacramento Flow Management

Model includes State Water Board WR 90-5 and 2019 BOs achieved as possible through other modeled actions.

Lower Feather Flow Management

Model includes 1983 DWR, California Department of Fish and Game Agreement (minimum flow 750–1,700 cfs, depending on runoff and month).

Lower Feather Land Management

No land fallowing is assumed in the Baseline Conditions.

Lower American Flow Management

Model includes Water Forum's 2017 Lower American Flow Management Standard ~~where the flows range from 500 to 2000 cfs based on time of year and annual hydrology~~ using a 75% exceedance forecast and no reduction for April–-June for March pulse flows. Planning minimum storage is represented in CalSim with a 275 TAF end-of-December storage target in Folsom.

Delta Outflow (Flow and Salinity)

State Water Board D-1641

All Delta outflow requirements per State Water Board D-1641 are included in the Baseline Conditions simulation (State Water Resources Control Board 2000). Similarly, for the February through June period the X2 standard is included in the Baseline Conditions simulation.

Delta Smelt Summer-Fall Habitat Action

Additional Delta outflow to manage X2 in fall months following Wet and Above Normal years to maintain an average X2 for September and October no greater (more eastward) than 80 kilometers.

Additional 100 TAF volume of water to supplement Delta outflow in spring, summer, or fall months of a Wet or Above Normal year. All, or a portion, of the 100 TAF can be deployed in the current year or carried over in Oroville for use in later years. Carryover water can be used in the following ways depending on Sacramento Valley 40-30-30 water year type:

- In Critical years, this volume is returned to the SWP.
- In Dry years, this volume is used to facilitate SMSCG operations.
- In Wet, Above Normal, and Below Normal years, this volume is used to augment outflow, when necessary, to meet X2 requirements.

If the 100 TAF volume of water is deferred for use in the following year, it will be subject to spill and will not be available if spilled.

The last seven-day average Martinez EC from the previous month is compared against threshold values to determine the operation of the Suisun Marsh Salinity Control Gates (SMSCG), is triggered. For May, this threshold is 17.5 microSiemens per centimeter (mS/cm), and for June and July, the threshold is 22.2 mS/cm. SMSCG operations are considered when estimating salinity conditions at D-1641 water quality compliance locations. Gates are operated under the following conditions:

- In Above Normal and Below Normal years, continuous SMSCG operations are modeled for up to 60 days in June through August. If the salinity threshold is triggered in June, the gates are operated in June and July; otherwise, the SMSCG are operated in July and August. CVP and SWP operations compensate for any change to salinity as a result of operation of the SMSCG.
- In Dry years following Wet and Above Normal years, continuous SMSCG operations are modeled for up to 60 days in June through August. If the salinity threshold is triggered in June, the gates are operated in June and July; otherwise, the SMSCG are operated July and August and limited to 100 TAF water carried over from the previous year to compensate for increased salinity costs. CVP and SWP operations compensate for any change to salinity as a result of the SMSCG operations.
- In Dry years following Below Normal years, continuous SMSCG operations are modeled for up to 30 days in June through August. If the salinity threshold is triggered in June or July, the gates are operated for the entire month. If operation is not triggered in neither June nor July, gates are operated for the entirety of August. SWP operations compensate for any change to salinity as a result of the SMSCG operations.

Spring Outflow Requirement

Spring Maintenance Flow, modeled as maximum allowable SWP export is the maximum of 600 cfs or up to 40% of the total permittable export under the following San Joaquin River Inflow to Export ratio (SJR:IE) regulations. SWP export limitations only occur when Delta Outflow is less than 44,500 cfs. The following SJR:IE regulations are in effect from April to May when San Joaquin River flow is less than 21,750 cfs:

- For Wet and Above Normal years, SJR:IE is modeled as a 4 to 1 ratio.
- For Below Normal years, SJR:IE is modeled as a 3 to 1 ratio.
- For Dry years, SJR:IE is modeled as a 2 to 1 ratio.
- For Critical years, SJR:IE is modeled as a 1 to 1 ratio.

The Spring Outflow requirement may limit SWP exports by up to 150 TAF in San Joaquin Valley 60-20-20 Wet years.

Interim Operations Plan

Per the Interim Operations Plan, the CVP also operates to the Spring Outflow Requirement as described in the Baseline Conditions in April and May when Delta Outflow is less than 44,500 cfs. However, the CVP export is the maximum of 900 cfs or up to 60% of the total permittable export under the same SJR:IE regulations listed above for Below Normal, Dry, and Critical years.

The SWP does not operate to this outflow requirement.

Combined Old and Middle River Flows

Old and Middle River (OMR) management is modeled as follows. More details are available in Attachment 6.

Projects operate to an OMR index no more negative than a 14-day moving average of -5,000 cfs between January 1 and June 30 except for the following conditions:

- Integrated Early Winter Pulse Protection: After December 1, and when the three-day average turbidity is 50 Nephelometric Turbidity Units (NTU) or greater at Sacramento River at Freeport and Sacramento River at Freeport flow is 25,000 cfs or greater, Reclamation and DWR propose to operate to -2,000 cfs of the 14-day average OMR index for 14 days. Unimpaired Sacramento River Runoff (SRR) is used in the model to determine when the turbidity exceeds 50 NTU.
- Turbidity Bridge Avoidance: For January and February in any water year type, if the turbidity trigger is reached (SRR greater than or equal to 20,000 cfs), projects operate to 14-day average OMR Index of -2000 cfs for five days.
- OMR Flexibility: It is assumed that there may be storm-related OMR management flexibility in January and February. To operate OMR flexibility in the model, the Delta must be in excess conditions, X2 is less than 81 km, SRR is less than 20,000 cfs, and Qwest is greater than 1,000 cfs.
- Species-specific single-year loss threshold and species-specific criteria are detailed in Attachment 6.

Exports at the South Delta Intakes

Exports at Jones and Banks Pumping Plants are restricted to their permitted capacities per State Water Board D-1641 requirements. In addition, the south Delta exports are subjected to Vernalis flow-based export limits during April and May as required by Action 4.2.1. Additional 500 cfs pumping is allowed to reduce the impact of 2019 BOs and D-1641 on SWP during the July through September period.

Under D-1641 the combined export of the CVP Tracy Pumping Plant and SWP Banks Pumping Plant is limited to a percentage of Delta inflow. The percentage ranges from 35 to 45% during February depending on the January eight-river index and is 35% during March through June months. For the rest of the months 65% of the Delta inflow is allowed to be exported.

Delta Water Quality

The Baseline Conditions simulation includes State Water Board D-1641 salinity requirements. However, not all salinity requirements are included as CalSim 3 is not capable of predicting salinities in the Delta. Instead, empirically based equations and models are used to relate interior salinity conditions with the flow conditions. DWR's Artificial Neural Network trained for salinity is used to predict and interpret salinity conditions at the Emmaton, Jersey Point, and Rock Slough stations. Emmaton and Jersey Point standards are for protecting water quality conditions for agricultural use in the western Delta and they are in effect from April 1 to August 15. The EC requirement at Emmaton varies from 0.45 millimhos per cm (mmhos/cm) to 2.78 mmhos/cm, depending on the water year type. The EC requirement at Jersey Point varies from 0.45 to 2.20 mmhos/cm, depending on the water year type. The Rock Slough standard is for protecting water quality conditions for municipal and industrial use for water exported through the Contra Costa Canal. It is a year-round standard that requires a certain number of days in a year with chloride concentration less than 150 micrograms per liter. The number of days requirement is dependent upon the water year type.

San Joaquin River Restoration Program

Friant Dam releases and lower San Joaquin River recapture required by the San Joaquin River Restoration Program are included in the Baseline Conditions. More detailed description of the San Joaquin River Restoration Program is presented in the Appendix 3A, *No Action Alternative: Central Valley Project and State Water Project Operations*, of the LTO EIS (U.S. Bureau of Reclamation 2015a).

4A-1.2.1.5 Operations Criteria

Delta Cross Channel Gate Operations

State Water Board D-1641 DCC standards provide for closure of the DCC gates for fisheries protection at certain times of the year. From November through January, the DCC may be closed for up to 45 days. From February 1 through May 20, the gates are closed every day. The gates may also be closed for 14 days during the May 21 through June 15 time period. Reclamation determines the timing and duration of the closures after discussion with USFWS, California Department of Fish and Wildlife, and NMFS.

NMFS BO Action 4.1.2 requires gates to be operated as described in the BO based on the presence of salmonids and water quality from October 1 through December 14; and gates to be closed from

December 15 to January 31, except for short-term operations to maintain water quality. CalSim 3 includes the NMFS BO DCC gate operations in addition to the D-1641 gate operations. When the daily flows in the Sacramento River at Wilkins Slough exceed 7,500 cfs (flow assumed to flush salmon into the Delta), DCC is closed for a certain number of days in a month as described in Appendix 5A of the LTO EIS (U.S. Bureau of Reclamation 2015b). During October 1–December 14, if the flow trigger condition is such that additional days of DCC gates closure are called for, but water quality conditions are a concern and the DCC gates remain open, then Delta exports are limited to 2,000 cfs for each day in question.

Allocation Decisions

CalSim 3 includes allocation logic for determining deliveries to north-of-Delta and south-of-Delta CVP and SWP contractors. The delivery logic uses runoff forecast information, which incorporates uncertainty in the hydrology, and standardized rule curves (i.e., Water Supply Index versus Demand Index Curve). The rule curves relate forecasted water supplies to deliverable "demand," and then use deliverable "demand" to assign subsequent delivery levels to estimate the water available for delivery and carryover storage. Updates of delivery levels occur monthly from January 1 through May 1 for the SWP and March 1 through May 1 for the CVP as runoff forecasts become more certain. The south-of-Delta SWP delivery is determined based on water supply parameters and operational constraints. The CVP system-wide delivery and south-of-Delta delivery are determined similarly upon water supply parameters and operational constraints with specific consideration for export constraints.

San Luis Operations

CalSim 3 sets targets for San Luis storage each month that are dependent on the current south-of-Delta allocation and upstream reservoir storage. When upstream reservoir storage is high, allocations and San Luis fill targets are increased. During a prolonged drought when upstream storage is low, allocations and fill targets are correspondingly low. For the Baseline Conditions simulation, the San Luis rule curve is managed to minimize situations in which shortages may occur due to lack of storage or exports.

4A-1.2.2 DSM2 Assumptions for Baseline Conditions

The following is a description of the assumptions listed in Attachment 3.

4A-1.2.2.1 River Flows

For DSM2 simulation, the river flows at the DSM2 boundaries are based on the monthly flow time series from CalSim 3.

4A-1.2.2.2 Tidal Boundary

The tidal boundary condition at Martinez is based on an adjusted astronomical tide normalized for sea level rise (Ateljevich and Yu 2007).

4A-1.2.2.3 Water Quality

Martinez EC

The Martinez EC boundary condition in the DSM2 planning simulation is estimated using the G-model based on the net Delta outflow simulated in CalSim 3 and the pure astronomical tide (Ateljevich 2001), as modified to account for the salinity changes related to the sea level rise using the correlations derived based on the three-dimensional (UnTRIM) modeling of the Delta with sea-level rise at Year 2030.

Vernalis EC

For the DSM2 simulation, the Vernalis EC boundary condition is based on the monthly San Joaquin EC time series estimated in CalSim 3.

4A-1.2.2.4 Morphological Changes

No additional morphological changes were assumed as part of the Baseline Conditions.

4A-1.2.2.5 Facilities

Delta Cross Channel

DCC gate operations are modeled in DSM2. The number of days in a month the DCC gates are open is based on the monthly time series from CalSim 3.

South Delta Temporary Barriers

South Delta Temporary Barriers are included in the Baseline Conditions simulation. The three agricultural temporary barriers located on Old River, Middle River, and Grant Line Canal are included in the model; however, the fish barrier at the Head of Old River is not included in the model.

Clifton Court Forebay Gates

Clifton Court Forebay gates are operated based on the Priority 3 operation, where the gate operations are synchronized with the incoming tide to minimize the impacts on low water levels in nearby channels. The Priority 3 operation is described in the 2008 Operations Criteria and Plan Biological Assessment, Appendix F, Section 5.2 (U.S. Bureau of Reclamation 2008).

4A-1.2.2.6 Operations Criteria

South Delta Temporary Barriers

South Delta Temporary Barriers are operated based on San Joaquin flow conditions. The agricultural barriers on Old and Middle Rivers are assumed to be installed starting from May 16 and the one on Grant Line Canal from June 1. All three agricultural barriers are allowed to operate until November 30. The tidal gates on Old and Middle River agricultural barriers are assumed to be tied open from May 16 to May 31. Head of Old River Barrier would not be installed.

Suisan Marsh Salinity Control Gates

The radial gates in the SMSCG structure are assumed to be tidally operating based on the operational time series outputs from CalSim 3.

When operating, gates open when upstream water level is 0.3 foot above downstream water level. Gates close when current is less than -0.1 foot per second. When not operating, gates are held open.

4A-1.3 Assumptions for Proposed Project

This section presents the assumptions used in developing the CalSim 3 and DSM2 simulations of the Proposed Project.

4A-1.3.1 CalSim 3 Assumptions for Proposed Project

The following is a description of the assumptions listed in Attachment 2.

4A-1.3.1.1 Hydrology

Inflows/Supplies

Same as the Baseline Conditions.

Level of Development

Same as the Baseline Conditions.

Demands, Water Rights, CVP/SWP Contracts

Same as the Baseline Conditions.

4A-1.3.1.2 Facilities

Fremont Weir

Same as the Baseline Conditions.

CVP C.W. Bill Jones Pumping Plant (Tracy PP) Capacity

Same as the Baseline Conditions.

SWP Banks Pumping Plant Capacity

Same as the Baseline Conditions. The Banks diversion window is expanded to December 1 through March 31 (from December 15 through March 15) depending on the same San Joaquin River at Vernalis conditions described for the Baseline Conditions.

CCWD Intakes

Same as the Baseline Conditions.

Sisk Dam

Same as the Baseline Conditions.

4A-1.3.1.3 Regulatory Standards

D-1641 Operations

Same as the Baseline Conditions.

Coordinated Operations Agreement (COA)

Same as the Baseline Conditions.

CVPIA (b)(2) Assumptions

Same as the Baseline Conditions.

Clear Creek Flows

Same as the Baseline Conditions.

Continued CALFED Agreements

Same as the Baseline Conditions.

Water Transfers

Same as the Baseline Conditions.

4A-1.3.1.4 Specific Regulatory Assumptions

Upper Sacramento Flow Management

Same as the Baseline Conditions.

Lower Feather Flow Management

Same as the Baseline Conditions.

Lower Feather Land Management

Land fallowing is modeled in Above Normal, Below Normal, and Dry water years. This results in a 50 TAF total increase to Delta inflow between March and May that is dedicated to Delta outflow. The distribution of the 50 TAF volume across these months depends on water year type as follows:

- For Above Normal water years, 25 TAF is applied in March, 12.5 TAF in April, and 12.5 TAF in May.
- For Below Normal water years, 12.5 TAF is applied in March, 25 TAF in April, and 12.5 TAF in May.
- For Dry water years, 16.66 TAF is applied in March, 16.67 TAF in April, and 16.67 TAF in May.

The 50 TAF volume is assumed to originate from water purchases made possible through the collection of diversion fees from SWP contractors. For modeling purposes, the 50 TAF is introduced at Freeport.

Lower American Flow Management

Same as the Baseline Conditions.

Delta Outflow (Flow and Salinity)

SWRCB D-1641:

Same as the Baseline Conditions.

Delta Smelt Summer-Fall Habitat Action:

Additional Delta outflow to manage X2 in fall months following Wet and Above Normal years to maintain an average X2 for September and October no greater (more eastward) than 80 km.

The additional 100 TAF of outflow during spring, summer, or fall months of Wet and Above Normal years is not operated under the Proposed Project.

The salinity trigger for operation of the SMSCG under the Proposed Project follows the same thresholds as the Baseline Condition. SMSCG gate operations are modeled as follows:

- In Above Normal and Below Normal water years, SMSCG are operated for seven days on and seven days off for up to 60 days in June through October. If the salinity threshold is triggered in June, gates are operated in June through September. If the salinity threshold is not triggered in June, gates are operated in July through October. CVP and SWP operations compensate for any change to salinity as a result of these SMSCG operations.
- In Dry years following Wet and Above Normal years, SMSCG are operated for seven days on and seven days off for up to 60 days in June through October. If the salinity threshold is triggered in June, gates are operated in June through September. If the salinity threshold is not triggered in June, gates are operated in July through October. CVP and SWP operations compensate for any change to salinity as a result of these SMSCG operations.
- In Dry years following Below Normal years, SMSCG are operated for seven days on and seven days off for up to 30 days in June through September. If the salinity threshold is triggered in June or July, gates are operated for two months. If operation is triggered in neither June nor July, gates are operated in August and September. CVP and SWP operations compensate for any change to salinity as a result of SMSCG operations.

Spring Outflow Requirement

Under the Proposed Project, SWP exports are reduced to increase Delta Outflow during either Delta excess (or restricted) conditions or balanced conditions when unstored water for export (UWFE) is greater than zero. The SWP export reduction is modeled as 0, 117.5, 92.5, 92.5, and 0 TAF for Wet, Above Normal, Below Normal, Dry, and Critical years, respectively. The reduction decision is based on the dynamic monthly Sacramento Valley 40-30-30 water year type using a 90% exceedance forecast in March ~~and~~ , 75% in April , and ~~a~~ 50% ~~exceedance~~ in May.

Interim Operations Plan

Same as the Baseline Conditions.

Combined Old and Middle River Flows

In modeling the Proposed Project, OMR management begins in December and ends in June with the OMR index no more negative than -5,000 cfs unless the OMR flexibility action is initiated. OMR management under the Proposed Project is modeled as follows:

- Winter-Run Chinook Salmon Early Season Migration: This action is not explicitly modeled. Historical data indicated that the action did not trigger, and there was not enough data to develop an assumption for CalSim 3.
- Integrated Early Winter Pulse Protection: Same as the Baseline Conditions; however, this action was extended to include February.
- Turbidity Bridge Avoidance: For January and February in any water year type, if the turbidity trigger is reached (SRR greater than or equal to 20,000 cfs), Projects operate to 14-day average OMR Index of -3500 cfs for ~~ten~~ 12 days. A Highflow Offramp is assumed to occur when Vernalis flow is greater than 10,000 cfs.
- OMR Flexibility: Same as the Baseline Conditions ; however, the Qwest flow threshold has been updated to 1,500 cfs .
- Winter-Run Chinook Salmon and Steelhead Weekly and Annual Loss Thresholds: The OMR restriction for this condition is modeled as an OMR index of -3,500 cfs based on the historical (i.e., 2010–2022) monthly percentage of observed salvage by water year type. Additional details on this approach are described in Attachment 6. The Steelhead Annual Loss Threshold was not explicitly modeled as it was assumed to be captured by the Steelhead Weekly Loss Threshold.
- Spring-Run Chinook Salmon and Surrogate Thresholds: The OMR restriction for this condition is modeled as an OMR index of -3,500 cfs based on the historical monthly percentage by water year type approach.
- Adult Longfin Smelt Entrainment Protection: The OMR restriction for this condition is modeled as an OMR index of -3,500 cfs based on the historical monthly percentage by water year type approach.
- Larval and Juvenile Delta and Longfin Smelt Criteria: The OMR restriction for this condition is modeled as an OMR index of -3,500 cfs based on the historical monthly percentage by water year type approach. A Highflow Offramp is assumed to occur when Rio Vista or Vernalis flows are greater than 55,000 or 8,000 cfs, respectively.

Exports at the South Delta Intakes

Same as the Baseline Conditions.

Delta Water Quality

Same as the Baseline Conditions.

San Joaquin River Restoration Program

Same as the Baseline Conditions.

4A-1.3.1.5 Operations Criteria

Delta Cross Channel Gate Operations

Same as the Baseline Conditions.

Allocation Decisions

Same as the Baseline Conditions.

San Luis Operations

Same as the Baseline Conditions.

4A-1.3.2 DSM2 Assumptions for Proposed Project

The following is a description of the assumptions listed in Attachment 3.

4A-1.3.2.1 River Flows

Same as the Baseline Conditions.

4A-1.3.2.2 Tidal Boundary

Same as the Baseline Conditions.

4A-1.3.2.3 Water Quality

Martinez EC

Same as the Baseline Conditions.

Vernalis EC

Same as the Baseline Conditions.

4A-1.3.2.4 Morphological Changes

Same as the Baseline Conditions.

4A-1.3.2.5 Facilities

Delta Cross Channel

Same as the Baseline Conditions.

South Delta Temporary Barriers

Same as the Baseline Conditions.

Clifton Court Forebay Gates

Same as the Baseline Conditions.

4A-1.3.2.6 Operations Criteria

South Delta Temporary Barriers

Same as the Baseline Conditions.

Suisan Marsh Salinity Control Gate

Same as the Baseline Conditions.

4A-1.4 References

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