

DRAFT State Water Project Incidental Take Permit Risk Assessment for Winter-run and Spring-run Chinook Salmon

Section 1: Overview

Date: 5/23/2023

Life Stages Present:

Winter-run Chinook salmon (adult)

Winter-run Chinook salmon (juvenile)

Spring-run Chinook salmon (juvenile)

Spring-run Chinook salmon (adult)

Advice to the Water Operations Management Team (WOMT):

No advice is warranted.

For the week beginning 5/23/2023, available facility capacity is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Combined exports on 5/23/2023 are 10,680 cfs resulting in an Old and Middle River Index (OMRI) of +3,900 cfs and 13.2% of inflow diverted (14-day average). The Delta Cross Channel (DCC) gates are projected to remain closed. The SWP is exporting this week and no outages are planned.

SaMT estimates an overall low risk of entrainment into the central Delta for juvenile natural-origin winter-run Chinook salmon (WR). Flows at Freeport are expected to remain elevated, the DCC gates are closed, and entrainment into Georgiana and Threemile Slough is unlikely with continued elevated Sacramento River flows. SaMT also estimates an overall low entrainment risk of juvenile Young-of-Year (YOY) natural-origin spring-run Chinook salmon (SR) into the central Delta. Current hydrological conditions have a decreased routing risk for any salmonids present in the Delta and the DCC gates are expected to remain closed; therefore, entrainment into the central Delta will remain low this week for SR.

SaMT estimates an overall low risk of entrainment of juvenile WR into the export facilities this week due to 0 LAD WR observed in salvage or in Delta monitoring in the previous week. OMRI is operating to no more negative than -5,000 cfs and hydrological conditions anticipate OMRI to remain positive for the remainder of the week. WR presence in the Delta is low due to seasonal migration timing; therefore, the risk of entrainment into the salvage facilities remains low this week for WR. SaMT estimates an overall medium risk of entrainment of juvenile YOY SR into the export facilities due to many YOY SR being observed in salvage over the past week. However, due to the positive OMRI expected this upcoming week, the entrainment risk into the salvage facilities remains medium this week for YOY SR.

The SWP Incidental Take Permit (ITP) was amended on 1/20/2023 with the following language:

In water year 2023, Permittee shall restrict exports in response to the initial length-at-date identification of natural older juvenile Chinook salmon and the thresholds described above. If genetic analysis of an individual natural older juvenile Chinook salmon observed in salvage at the SWP or CVP indicates that it is not CHNWR, that individual shall not count toward the daily loss threshold and continued export restrictions under this Condition of Approval are not required if the daily loss threshold has consequently not been met. All genetic analyses shall be conducted using CDFW-approved genetic methods.

This amendment was in response to an unexpected error in adipose fin clipping and coded-wire tagging of hatchery produced late-fall run Chinook salmon from the Coleman National Fish Hatchery released in Battle

Creek in December 2022. Because these fish are expected to fall within the older juvenile size classification, they could be mistakenly identified as natural origin older juvenile Chinook salmon if observed in salvage. CDFW concurs that genetic analyses are the most appropriate tool to identify natural origin CHNWR in water year (WY) 2023, given this unexpected error in hatchery operations.

The Interim Operations Plan (IOP) was approved on 2/24/2023 and will be in effect until 12/31/2023. From 2/21/2023 through 12/31/2023, SWP and CVP operations shall comply, as consistent with applicable law, with the interim operations set forth. Reclamation shall adopt the following provisions of DWR’s ITP:

- 8.5.2 Larval and Juvenile Delta Smelt Protection
- 8.6.1 Winter-run Single-year Loss Threshold
- 8.6.2 Early-season Natural Winter-run Chinook Salmon Discrete Daily Loss Threshold
- 8.6.3 Mid- and Late-season Natural Winter-run Chinook Salmon Daily Loss Threshold
- 8.6.4 Daily Spring-run Chinook Salmon Hatchery Surrogate Loss Threshold
- 8.7 OMR Flexibility During Delta Excess Conditions
- 8.8 End of OMR Management

Sections 2: Basis for Advice

Section 2-A: Operations and Fish Distribution Table

Risk Assessment:

A total of 1,766 LAD YOY spring-run Chinook salmon were observed in salvage during the week of May 15-May 21, 2023 for a weekly total loss of 1,754.49. The total loss of LAD YOY natural-origin spring-run Chinook salmon at the fish salvage facilities for WY 2023 is 5,770.42 fish. The total loss of LAD YOY natural-origin winter-run Chinook salmon at the fish salvage facilities for WY 2023 is 109.88 (updated with 5/23/2023 salvage data).

Table 1: Current Juvenile Fish Distribution. The SaMT group agreed to provide distribution estimates in five percent increments when feasible.

Location	Yet to Enter Delta	In the Delta	Exited the Delta
YOY winter-run Chinook salmon	Current 0% Last week 0-1%	Current 1-2% Last Week 1-3%	Current 98-99% Last Week 97-98%
YOY spring-run Chinook salmon	Current 5-10% Last week 5-10%	Current 10-25% Last Week 15-30%	Current 70-80% Last Week 65-75%
Hatchery origin winter-run Chinook salmon	Current 0% Last week 0%	Current 0% Last Week 0%	Current 100% Last Week 100%

Section 2-B: Sacramento River and Confluence

Assessment of risk of entrainment into the central Delta for WR and SR in the Sacramento River: (8.1.5.1 C ii, iii, iv and 8.1.5.1 B iii)

- Exposure Risk:
 - WR: Low
 - SR: Medium
- Routing Risk:
 - WR: Low
 - SR: Low

- Overall Entrainment Risk:
 - WR: Low
 - SR: Low
- Change in risk of entrainment into the central Delta (increased/decreased risk compared to last week):
 - WR: Similar to previous week
 - SaMT estimates WR presence in the Delta is decreasing as more WR are detected at the Chipps Island trawls; therefore, exposure risk is low this week. Routing Risk remains low this week based on hydrological conditions. Freeport flows remain elevated around 50,000 cfs and the DCC gates are closed for the season. The STARS Model predicts 11% entrainment into Georgiana and Threemile Slough, which is similar to the previous few weeks. Due to WR presence in the Delta decreasing (1-2%), WR have a decreased likelihood of being entrained into the central Delta; therefore, the overall entrainment into the central Delta is estimated to remain low this week.
 - SR: Similar to previous week
 - Exposure Risk is estimated as medium this week due to 10-25% of YOY SR estimated in the Delta and SR moving through the Delta due to seasonal timing. Routing Risk remains low this week based on hydrological conditions. Freeport flows remain around 50,000 cfs and the DCC gates are closed. The STARS Model predicts 19% entrainment this week, which is similar to the previous few weeks. Due to the elevated flows on the Sacramento River and other hydrological conditions, the overall entrainment into the central Delta this week remains low.

Section 2-C: Facilities Risk

Central Valley Project/State Water Project (CVP/SWP) facilities entrainment risk for WR and SR in the central Delta over the next week (8.1.5.1 D iii, iv, v)

- Exposure Risk:
 - WR: Low
 - SR: High
- Reporting OMR/Export Risk:
 - Baseline OMR (+3,900 cfs)
 - WR: Low
 - SR: Low
 - Scenario 1 OMR: (+2,500 cfs)
 - WR: Low
 - SR: Low
 - Scenario 2 OMR: (+6,000 cfs)
 - WR: Low
 - SR: Low
- Overall Entrainment Risk:
 - WR: Low
 - SR: Medium
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
 - WR: Similar to previous week
 - Exposure risk remains low due to 0 LAD WR observed in salvage in the previous few weeks. Reporting OMR/Export Risk remains low this week due OMRI expected to remain positive for the upcoming week. There is a likelihood of more exceedances to occur in the upcoming week due to the low thresholds for COA 8.6.3; however, OMRI is expected to remain positive for the upcoming week and even if COA 8.6.3 was exceeded, no action would be taken due to OMRI expected be more positive than -3,500 cfs for the

upcoming week. Due to seasonal migration and low estimation of WR in the Delta at this time, the overall entrainment risk into the export facilities remains low this week.

- SR: Similar to previous week
 - Reporting OMR/Export Risk remains low due to OMRI values expected to be between +2,500 cfs and +6,000 cfs. Exposure Risk remains high this week due to increased presence of YOY SR at the salvage facilities and expected increases in salvage of SR due to seasonal timing. However, due to OMRI values expected to remain more positive than -3,500 cfs due to hydrological conditions, the overall entrainment risk into the facilities is estimated as medium.

Section 2-D: Annual Loss Threshold Risk

- Annual loss threshold risk and Alternative Actions
 - Loss at the SWP and CVP facilities compared to the estimated remaining population in the Delta and upstream of the Delta: Salvage of California Endangered Species Act (CESA)-listed Chinook salmon has occurred.
 - COA 8.6.1 Winter-run Single year Loss Threshold:
 - Natural-origin WR: 584.11 [1.17% of the natural-origin WR Juvenile Production Estimate (JPE)]
 - Current Annual Loss: 109.88
 - 50% Threshold based on natural-origin WR JPE: 292.06
 - Risk of exceeding threshold: Low
 - 75% Threshold based on natural-origin WR JPE: 438.08
 - Risk of exceeding threshold: Low
 - 100% Threshold based on natural-origin WR JPE: 584.11
 - Risk of exceeding threshold: Low
 - Hatchery-origin WR: 229.15 [0.12% of the Livingston Stone National Fish Hatchery (LSNFH) hatchery release JPE]
 - Current Annual Loss: 0
 - 50% Threshold based on hatchery WR JPE: 114.58
 - Risk of exceeding threshold: Low
 - 75% Threshold based on hatchery WR JPE: 171.86
 - Risk of exceeding threshold: Low
 - 100% Threshold based on hatchery WR JPE: 229.15
 - Risk of exceeding threshold: Low

Section 2-E: Daily Loss Threshold Risk

- Daily loss threshold risk and Alternative Actions
 - Loss at the SWP and CVP facilities compared to estimated remaining population in Delta and upstream of the Delta:
 - Daily loss thresholds and subsequent loss and associated operations:
 - COA 8.6.3 Mid and Late Season Natural WR Chinook Salmon Daily Loss Threshold:
 - January 1 – January 31: $0.0000635 * 49,924 = 3.17$
 - February 1 – February 28: $0.0000991 * 49,924 = 4.95$
 - March 1 – March 31: $0.000146 * 49,924 = 7.29$
 - April 1 – April 30: $0.0000507 * 49,924 = 2.53$
 - May 1 – May 31: $0.000077 * 49,924 = 3.84$
 - Highest Daily Loss: 0
 - Risk of exceeding threshold: High

- COA 8.6.4 Daily Spring-run Chinook Salmon Hatchery Surrogate Loss Threshold:
 - Hatchery Origin Young-of-Year SR Surrogates (0.25% of total in-river FR releases for each release group from Coleman National Fish Hatchery (CNFH):
 - Group 1 Loss Threshold: 1,002.24
 - Highest Daily Loss: 0
 - Risk of Exceeding threshold: Low
 - Group 2 Loss Threshold: 5,871.92
 - Highest Daily Loss: 0
 - Risk of Exceeding threshold: Low
 - Hatchery Origin Young-of-Year SR Surrogates (0.25% of total in-river SR releases for each release group from Feather River Hatchery (FRH):
 - Group 1 Loss Threshold: 1,828.64
 - Highest Daily Loss: 0
 - Risk of exceeding threshold: Low
 - Group 2 Loss Threshold: 1,821.47
 - Highest Daily Loss: 0
 - Risk of exceeding threshold: Low
 - Group 3 Loss Threshold: 2,204.70
 - Highest Daily Loss: 0
 - Risk of exceeding threshold: Low
 - Hatchery Origin Young-of-Year SR Surrogates (0.25% of total in-river FR releases for each release group from Nimbus Fish Hatchery (NIM):
 - Group 1 Loss Threshold: 534.62
 - Highest Daily Loss: 0
 - Risk of exceeding threshold: Low

Section 3: SWP ITP COA's in Effect

The 2020 [Incidental Take Permit for Long-Term Operation of the State Water Project in the Sacramento-San Joaquin Delta 2081-2019-066-00](#) (SWP ITP) states that advice to Water Operations Management Team (WOMT) shall be consistent with the Project Description, COA in the ITP, and the applicable ESA authorizations. This week's advice is based on the following COAs which are currently applicable:

List relevant COA number and title based on species/life stage, time of year, etc.:

8.1.4 Collaborative Approach to Real-time Risk Assessment. Beginning no later than October 1 through the end of OMR Management (see Condition of Approval 8.8) the Smelt and Salmon Monitoring Teams shall meet weekly, or more often as required, to consider survey data, salvage data, and other pertinent biotic and abiotic factors and prepare risk assessments as described in Conditions of Approval 8.1.1, 8.1.2, 8.1.5.1 and 8.1.5.2.

The Smelt and Salmon Monitoring Teams shall prepare operations advice for the WOMT as required by Conditions of Approval 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, 8.6.4, 8.7, and 8.8, including advice on operations. The Smelt and Salmon Monitoring Teams shall each prepare risk assessments and operations advice. Within each team, staff jointly develop the risk assessment and supporting documentation to accompany operations advice (see Conditions of Approval 8.1.5.1 and 8.1.5.2). DWR and CDFW Smelt and Salmon Monitoring Team staff may conclude different operations advice is warranted, in which case the difference shall be noted and elevated as described in this Condition of Approval.

The Smelt and Salmon Monitoring Teams shall communicate their advice to WOMT. The WOMT shall then confer and attempt to reach a resolution and agreed-upon Project operations. If a resolution is reached, Permittee shall operate consistent with the decision regarding Project operations from WOMT. If the WOMT does not reach a resolution, the CDFW Director may require Permittee to implement an operational recommendation provided by CDFW. CDFW will provide its operational decision to Permittee in writing. Permittee shall implement the operational decision required by CDFW. Permittee shall ensure that its proportional share (see Condition of Approval 8.10) of the OMR flow requirement as a part of the operational decision is satisfied.

8.1.5 Real-time Risk Assessments. The Smelt and Salmon Monitoring Teams (Conditions of Approval 8.1.1 and 8.1.2) shall prepare weekly risk assessments, or more often as required, and operations advice (as required by Conditions of Approval 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, 8.6.4, and 8.7) during their discussions and analyses. The Smelt and Salmon Monitoring Teams shall provide the risk assessments and pertinent supporting information to the WOMT (Condition of Approval 8.1.3) within one business day of each meeting.

8.3.2 Salmonid Presence. After January 1 each year, if Conditions of Approval 8.3.1 or 8.3.3 have not already been triggered, the OMR Management season shall begin when the Salmon Monitoring Team first estimates that 5% of the CHNWR or CHNSR population is in the Delta whichever is sooner. Upon initiation of the OMR Management season, Permittee shall reduce exports to achieve, and shall maintain a 14-day average OMR index no more negative than -5,000 cfs, until the OMR Management season ends (see Condition of Approval 8.8). In the event that a salmon daily or single-year loss threshold is exceeded (Conditions of Approval 8.6.1, 8.6.2, 8.6.3, or 8.6.4) prior to the start of OMR Management season the requirements in those Conditions shall control operations.

8.6.1 Winter-run Single-year Loss Threshold. In each year, Permittee shall, in coordination with Reclamation, operate the Project to avoid exceeding the following single-year loss thresholds:

- Natural WR (loss = 1.17% of natural WR JPE)*
- Hatchery WR (loss = 0.12% of hatchery WR JPE)*

The loss threshold and loss tracking for hatchery WR does not include releases into Battle Creek.

Loss of WR at the CVP and SWP salvage facilities shall be calculated based on LAD criteria for run assignment.

Annual loss of natural and hatchery WR at the CVP and SWP salvage facilities shall be counted cumulatively beginning November 1 each calendar year through June 30 the following calendar year.

WR shall be identified based on the Delta Model LAD criteria. Loss shall be calculated for the South Delta Export Facilities using the 2018 CDFW loss equation (Attachment 6).

During the water year, if cumulative loss of natural or hatchery WR exceeds 50% of the annual loss threshold, Permittee shall restrict south Delta exports to maintain a 14-day average OMR index no more negative than -3,500 cfs through the end of OMR Management (see Condition of Approval 8.8). After 14 days of operations to maintain an OMR index no more negative than -3,500 cfs, Permittee may convene the Salmon Monitoring Team to conduct a risk assessment (Condition of Approval 8.1.5.1) and determine whether the risk of entrainment and loss of natural and hatchery WR is no longer present. Risks shall be measured against the potential to exceed the next single-year loss threshold. The results of this risk assessment and associated OMR advice shall be provided to WOMT according to Condition of Approval 8.1.3 and the decision-making process shall follow the process described in Condition of Approval 8.1.4.

The -3,500 cfs OMR flow operational criteria, adjusted and informed by this risk assessment, shall remain in effect until the end of OMR Management (Condition of Approval 8.8).

During the water year, if cumulative loss of natural or hatchery WR at the CVP and SWP salvage facilities exceeds 75% of the single-year loss threshold, Permittee shall restrict OMR to a 14-day moving average OMR flow index that is no more negative than -2,500 cfs through the end of OMR Management (Condition of Approval 8.7). After 14 days Permittee may convene the Salmon Monitoring Team to conduct a risk assessment (Condition of Approval 8.1.5.1) and determine whether the risk of entrainment and take of natural and hatchery WR is no longer present. The results of this risk assessment and associated OMR advice shall be provided to WOMT according to Condition of Approval 8.1.3 and the decision-making process shall follow the process described in Condition of Approval 8.1.4.

The -2,500 cfs OMR flow operational criteria adjusted and informed by this risk assessment shall remain in effect until the end of OMR Management (Condition of Approval 8.8).

During the water year, if natural or hatchery WR cumulative loss at the CVP and SWP salvage facilities exceeds the single-year loss threshold, Permittee shall immediately convene the Salmon Monitoring Team to review recent fish distribution information and operations and provide advice regarding future planned Project operations to minimize subsequent loss during that year. The Salmon Monitoring Team shall report the results of this review and advice to the WOMT (see Condition of Approval 8.1.3). Operational decisions shall be made following the process described in Condition of Approval 8.1.4 (Collaborative Real Time Risk Assessment).

If the single-year loss threshold is exceeded, Permittee and Reclamation shall also convene an independent panel to review Project operations and the single-year loss threshold prior to November 1, as described in Condition of Approval 8.2. The purpose of the independent panel is to review the actions and decisions contributing to the loss trajectory that lead to an exceedance of the single-year loss threshold, and make recommendations on modifications to Project implementation, or additional actions to be conducted to stay within the single-year loss threshold in subsequent years.

Permittee shall, in coordination with Reclamation, continue monitoring and reporting salvage at the CVP and SWP salvage facilities. Permittee and Reclamation shall continue the release and monitoring of yearling Coleman National Fish Hatchery (NFH) late fall-run and yearling SR surrogates. The Salmon Monitoring Team shall use reported real-time salvage counts along with qualitative and quantitative tools to inform risk assessments (see Condition of Approval 8.1.5.1).

8.3.2 Salmonid Presence. After January 1 each year, if Conditions of Approval 8.3.1 or 8.3.3 have not already been triggered, the OMR Management season shall begin when the Salmon Monitoring Team first estimates that 5% of the CHNWR or CHNSR population is in the Delta whichever is sooner. Upon initiation of the OMR Management season, Permittee shall reduce exports to achieve, and shall maintain a 14-day average OMR index no more negative than -5,000 cfs, until the OMR Management season ends (see Condition of Approval 8.8). In the event that a salmon daily or single-year loss threshold is exceeded (Conditions of Approval 8.6.1, 8.6.2, 8.6.3, or 8.6.4) prior to the start of OMR Management season the requirements in those Conditions shall control operations.

8.6.3 Mid- and Late-season Natural Winter-run Chinook Salmon Daily Loss Threshold. To minimize entrainment, salvage, and take of natural CHNWR during the peak and end of their migration through the Delta. Permittee shall restrict south Delta exports for five days to achieve a five-day average OMR index no more negative than - 3,500 cfs when daily loss of natural older juveniles at the SWP and CVP salvage facilities exceeds the following thresholds based on the JPE reported in January of the same calendar year:

- January 1 – January 31: 0.00635 % of the CHNWR JPE*
- February 1 – February 28: 0.00991 % of the CHNWR JPE*

- *March 1 – March 31: 0.0146 % of the CHNWR JPE*
- *April 1 – April 30: 0.00507 % of the CHNWR JPE*
- *May 1 – May 31: 0.0077 % of the CHNWR JPE*

All natural older juvenile Chinook salmon juveniles shall be identified based on the Delta Model length-at-date criteria. Loss shall be calculated for the South Delta Export Facilities using the equation provided in CDFW 2018 (Attachment 6). This Condition of Approval may be modified through the process described in Condition of Approval 8.6.6 and an amendment to this ITP.

Amendment to COA 8.6.3 in effect as of 1/20/2023: In water year 2023, Permittee shall restrict exports in response to the initial length-at-date identification of natural older juvenile Chinook salmon and the thresholds described above. If genetic analysis of an individual natural older juvenile Chinook salmon observed in salvage at the SWP or CVP indicates that it is not CHNWR, that individual shall not count toward the daily loss threshold and continued export restrictions under this Condition of Approval are not required if the daily loss threshold has consequently not been met. All genetic analyses shall be conducted using CDFW-approved genetic methods.

8.6.4 Daily Spring-run Chinook Salmon Hatchery Surrogate Loss Threshold. To minimize entrainment of emigrating natural juvenile CHNSR from the Sacramento River and tributaries, including the Feather and Yuba rivers into the channels of the central Delta, south Delta, CCF, and the Banks Pumping Plant, Permittee shall restrict exports based on the presence of hatchery produced CHNSR surrogate groups at the CVP and SWP salvage facilities. CHNSR surrogate groups shall consist of all in-river fall- and spring-run surrogate release groups of Chinook salmon from the Coleman National Fish Hatchery, Feather River Hatchery, and the Nimbus Fish Hatchery.

Each water year between February 1 and June 30 Permittee shall reduce south Delta exports for five consecutive days to achieve a five-day average OMR index no more negative than -3,500 cfs when:

- *Feather River Hatchery coded wire tagged (CWT) CHNSR surrogates (includes both spring- and fall-run hatchery release groups) cumulative loss at the at the CVP and SWP salvage facilities is greater than 0.25% for each release group, OR*
- *Coleman National Fish Hatchery and Nimbus Fish Hatchery CWT fall-run release groups cumulative loss at the at the CVP and SWP salvage facilities is greater than 0.25% of the total in-river releases for each release group.*

This Condition of Approval may be modified through the process described in Condition of Approval 8.6.6 and an amendment to this ITP.

8.17 Export Curtailments for Spring Outflow. As described in Sections 1.5 and 3.17 of the Project description, as part of the Voluntary Agreement process, Permittee and its SWP Contractors have proposed a reduction in SWP exports to protect outflows in the spring time period. Each year, following the finalization of the March forecast, Permittee will confer with CDFW regarding export reductions from April 1 to May 31. If in any year during the term of this ITP, Permittee and its SWP Contractors identify in a written operations plan, submitted to CDFW following the March forecast, and throughout April and May conduct SWP export reductions pursuant

to the Voluntary Agreements that are consistent with the SWP export reductions required by this Condition, then the Voluntary Agreement implementation may satisfy the reductions required to meet this Condition.

The following shall be implemented by Permittee during any year in which SWP export reductions pursuant to the Voluntary Agreements are not identified and conducted as described in the preceding paragraph. Permittee shall operate the Project during the spring each year to restrict exports and enhance Delta outflow.

Permittee shall reduce exports from April 1 to May 31 each year to achieve the SWP proportional share (Condition of Approval 8.10) of export reductions established by the ratio of Vernalis flow (cfs) to combined CVP and SWP exports, scaled by water year type, to provide incidental spring outflow. In a critically dry year, the ratio of Vernalis flow to CVP and SWP combined exports shall be 1 to 1. In a dry year, the ratio of Vernalis flow to CVP and SWP combined exports shall be 2 to 1. In a below normal year, the ratio of Vernalis flow to CVP and SWP combined exports shall be 3 to 1. In an above normal or wet year, the ratio of Vernalis flow to CVP and SWP combined exports shall be 4 to 124. In wet years SWP export curtailments required by this Condition of Approval for spring outflow in April and May is limited to 150 TAF. The ratio of Vernalis flows to export reductions is intended to serve as an operational mechanism to achieve the Delta outflow required by this Condition of Approval for minimization of the Covered Activities' impacts to Covered Species.

For purposes of this Condition of Approval only, the Joaquin Valley "60-20-20" Water Year Hydrologic Classification and Indicator as defined in the Bay-Delta Plan (SWRCB 2006) is used.

Permittee shall not be required to restrict operations as described above under either of the following circumstances:

- If the three-day average Delta outflow is greater than 44,500 cfs, then Project operations shall not be controlled by this Condition until the flows drop below 44,500 cfs on a three-day average.*
- Permittee shall not be required by this Condition of Approval to restrict exports at the Banks Pumping Plant below its minimum health and safety exports of 600 cfs.*

The ratios used to establish export restrictions by water year type are a tool that incorporates San Joaquin River inflows while also allowing for a high outflow off-ramp of 44,500 cfs, which is expected to be driven by inflow from the Sacramento River. Spring export curtailments are intended to augment Delta outflow during a critical time in the life history of all four Covered Species. When April and May Delta outflow is augmented salinity in Suisun Bay is reduced and central Delta productivity is dispersed westward, improving habitat for both Delta and longfin smelt. At the upper end of managed flows when X2 is in San Pablo Bay, export curtailments help maintain this favorable location and sustain food web productivity and other conditions for improved longfin smelt recruitment in San Pablo Bay. Reductions in outflow during such conditions could restrict longfin smelt nursery habitat upstream to less favorable habitat in Carquinez Strait.

Augmenting spring outflow through export curtailments improves migratory conditions for CHNWR and CHNSR by reducing Covered Activities' impacts on routing and through-Delta survival. Maintaining a higher Delta outflow during this time period will also provide a proactive approach to entrainment minimization that is expected to reduce CHNWR and CHNSR routing into the central and south Delta and minimize loss of all Covered Species at the SWP export facility. Additionally, increases in Delta outflow are associated with increased food web transport to, and productivity in, Suisun Bay.

Immediately following the SWRCB's adoption of final Voluntary Agreements Permittee, SWC and CDFW will meet and confer to review the Project in light of the final form of the Voluntary Agreements. Consistent with Condition of Approval 5, CESA, and CESA's implementing regulations, the Permittee and CDFW, in consultation with SWC and as appropriate depending on the results of that review, may replace the ratio of Vernalis flows to exports used as an operational mechanism to determine spring outflow volumes in this condition of approval, based on the final Voluntary Agreements and as part of such amendment process.

Section 4: Hydrology and Operations

Assessment of hydrologic, operational, and meteorological information. 8.1.5.1 A

Section 4-A: Water Operations, Water Operations Outlook, and Projected Conditions C 8.1.5.1 A. i, ii, iii:

- Antecedent Actions: (e.g., Actions such as integrated early winter pulse protection, etc.)
 - None
- Water Temperature (ITP COA 8.8 threshold: daily average water temperature exceeds 22.2° C for 7 non-consecutive days in June):
 - Mossdale (MSD): [Mossdale - CDEC](#)
 - Number of days threshold exceeded: Not applicable until June.
 - Days exceeded: Not applicable at this time.
 - Prisoners Point (PPT): [Prisoners Point - CDEC](#)
 - Number of days threshold exceeded: Not applicable until June.
 - Days exceeded: Not applicable at this time.
- Tidal Cycle: (*Spring/Neap. Note if tidal cycle has potential to affect south Delta hydrology or X2*)
 - Transitioning to a neap tidal cycle on 5/27/2023. It is unlikely that the tidal cycles will affect entrainment due to the elevated flows in the Sacramento River.
- Turbidity: Not discussed
- Salinity (X2): <56.0 km on 5/23/2023
 - Hydraulic Footprint (*Provide brief description of hydrologic footprint and summary of relevant DSM2 results*): DSM2 results were not discussed during SaMT this week. SaMT decided to exclude them from the assessment altogether due to concern of relevancy for SaMT. USBR will not be providing DSM2 runs unless requested by SaMT.
- Outages:
 - SWP: None projected
 - CVP: None projected
- Exports: 5/23/2023 – 5/29/2023
 - SWP: 4,000 cfs to 6,680 cfs
 - CVP: 2,700 cfs to 4,200 cfs
- Meteorological Forecast:
 - *"Cooling trend for the rest of the week. Isolated afternoon/evening showers and thunderstorms over the northern Sacramento Valley and mountains from today through next weekend."*
 - [NOAA - National Weather Service Forecast](#)
- Weather/Storm Event Projection:
 - There are no storms in the upcoming week that would allow for COA 8.7 OMR Storm Flex to onramp.
 - Expected OMR flows are no more negative than -3,000 to -5,000 cfs for the next week. Under OMR flows more negative than -5,000 cfs, SaMT expects impacts to rearing, foraging, sheltering, or migration of salmonids present in the south Delta.
- DCC Gates position:
 - DCC gates closed on 11/28/2022 and will remain closed at least through 5/29/2023.

- Sacramento River flow at Freeport: 50,500 cfs
 - [Sacramento River Flows - CDEC](#)
- San Joaquin River flow at Vernalis: 26,000 cfs
 - [San Joaquin River Flows - CDEC](#)
 - [San Joaquin River Guidance Plots - CDEC](#)
- QWEST: +26,000 cfs.
 - QWEST is expected to remain positive for the rest of the week.
- Future export modifications: *Describe anticipated or potential changes to exports*
 - Exports are expected to remain similar as the previous week due to both the CVP and SWP filling their share of San Luis Reservoir. The SWP is limited by available facility capacity this week rather than COA 8.3.2 Salmonid Presence.

Table 2: Comparison of USGS Tidally Filtered OMR and OMR Index data.

Date	Averaging Period	USGS gauges (cfs)	OMR Index (cfs)
5/20/23	Daily	+2,600	+3,200
5/20/23	5-day	+5,200	+7,400
5/20/23	14-day	+7,400	+9,000
5/22/23	Daily	Not Applicable	+4,700
5/22/23	5-day	Not Applicable	+5,200
5/22/23	14-day	Not Applicable	+8,200

Section 5: Distribution and Biology

Assessment of biological information for WR and SR. 8.1.5.1.B

Section 5-A: WR Population Status 8.1.5.1.B i

- Adult escapement estimate:
 - Final spawning escapement for WR adults contributing to brood year (BY) 2022 is 5,927
 - Hatchery proportion was 10.8% of the total run (641 hatchery-origin WR)
 - Total number of in-river WR females: 2,663
 - Total number of WR redds: 2,607
 - WR adults contributing to BY 2022 had a pre-spawn mortality rate of 2.1%
- Redd distribution and fry emergence timing:
 - Juvenile WR are migrating downstream in the Sacramento River. Real-time monitoring stations in the Delta have not observed WR in the previous few weeks. SaMT estimates that most WR have exited the system.

- Estimated juvenile WR passage at RBDD through 5/6/2023 is 240,060 fish. Average historic passage (2010-2021) as of 5/6/2023 indicates 100.0% with one standard deviation of 0.0% have passed Red Bluff Diversion Dam.
- Juvenile Production Estimate (JPE):
 - The final JPE was 49,942 fish and was distributed on 1/20/2023. COA 8.6.3 thresholds are updated and will be monitored closely for exceedances.
- Livingston Stone National Fish Hatchery releases:
 - Releases of juvenile WR occurred on 1/26/2023 and 1/27/2023. These fish are being tracked for the SWP's ITP COA 8.6.1 Winter-run Single year Loss Threshold. This release group was acoustically tagged; therefore, they will also be included in the fish distribution table (See Table 1).
 - Another release of juvenile WR occurred on 3/1/2023. These fish are being tracked for the SWP's ITP 8.6.1 Winter-run Single year Loss Threshold. This release group was acoustically tagged; therefore, they will also be included in the fish distribution table (See Table 1).
 - See Appendix 4
- Distribution of natural WR:
 - See Table 1
- Distribution of Livingston Stone National Fish Hatchery Sacramento River WR and Battle Creek WR:
 - For the acoustically tagged WR released on 1/26/2023, 1/27/2023 and 3/2/2023, there have been no additional detections on CalFishTrack upstream in the Sacramento River for a few weeks, and only a few recent detections at Benicia Bridge and below Georgiana Slough; therefore, SaMT estimates that all of these fish have exited the system.
 - [CalFishTrack - Central Valley Enhanced Acoustic Tagging Project](#)

Section 5-B: SR Population Status 8.1.5.1.B ii

- Adult escapement estimate:
 - Adult SR carcass counts for 2022/2023 season are estimated at 1,484.
 - Adult SR are being seen at the VAKI in Butte Creek which suggests that adult SR are migrating upstream.
- Redd distribution and fry emergence timing:
 - YOY SR on the Sacramento River are beginning their downstream migration and have been observed in many of the real-time monitoring stations in the Delta and many have been observed exiting the system. YOY SR smolts are being observed daily at RSTs in Butte, Deer, and Mill creeks.
- Hatchery release (in-river and downstream):
 - A SR surrogate group was released on 12/5/2022 into Battle Creek. This group consisted of 71,057 late fall-run Chinook salmon with both a CWT and ad-clip mark. These fish will be tracked for COA 8.7 OMR Storm Flex in order to protect SR yearlings. As of 4/4/2023, many of these fish have been observed in salvage. Loss is estimated at 165.12 fish for this surrogate group which is 0.23% of the release group.
 - A second SR surrogate group was released on 12/23/2022 into Battle Creek. This group consisted of 66,735 late fall-run Chinook salmon with both a CWT and ad-clip mark. These fish will also be tracked for COA 8.7 OMR Storm Flex in order to protect SR yearlings. As of 4/4/2023, many of these fish have been observed in salvage. Loss is estimated at 117.81 fish for this surrogate group which is 0.18% of the release group.
 - A third SR surrogate group was released on 1/13/2023 into Battle Creek. This group consisted of 60,712 late fall-run Chinook salmon with both a CWT and ad-clip mark. These fish will be tracked for COA 8.7 OMR Storm Flex in order to protect SR yearlings. As of 4/4/2023, a few of

these fish have been observed in salvage. Loss is estimated at 32.05 fish for this surrogate group which is 0.024% of the release group.

- See Appendix 4 for more details.
- Distribution of natural SR:
 - See Table 1.
- Distribution of Feather River Fish Hatchery SR Releases:
 - A release of spring-run Chinook salmon occurred on 3/16/2023. Feather River Fish Hatchery released approximately 731,457 spring-run Chinook salmon (100% CWT) into Feather River at Gridley and Boyd's Pump Boat Launch. These fish constitute one of two release groups from Feather River Fish Hatchery to satisfy the requirements of COA 8.6.4 Daily Spring-run Chinook Salmon Hatchery Surrogate Loss Threshold. These fish have two different CWT codes, but together count as ONE release group. Cumulative loss of the CWT fish count towards the 0.25% threshold for this specific release group and separately from the second release group.
 - A second release of spring-run Chinook salmon occurred on 3/24/2023. Feather River Fish Hatchery released approximately 728,586 spring-run Chinook salmon (100% CWT) into Feather River at Gridley and Boyd's Pump Boat Launch. These fish constitute two of two release groups from Feather River Fish Hatchery to satisfy the requirements of COA 8.6.4 Daily Spring-run Chinook Salmon Hatchery Surrogate Loss Threshold. These fish have two different CWT codes, but together count as ONE release group. Cumulative loss of the CWT fish count towards the 0.25% threshold for this specific release group and separately from the third release group.
 - A third release of spring-run Chinook salmon occurred on 4/11/2023. Feather River Fish Hatchery released approximately 881,880 spring-run Chinook salmon (100% CWT) into Feather River at Gridley and Boyd's Pump Boat Launch. These fish constitute three of three release groups from Feather River Fish Hatchery to satisfy the requirements of COA 8.6.4 Daily Spring-run Chinook Salmon Hatchery Surrogate Loss Threshold. These fish have six different CWT codes, but together count as ONE release group. Cumulative loss of the CWT fish count towards the 0.25% threshold for this specific release group. This release group will also serve as a substitute for one of the two Nimbus Fish Hatchery surrogate releases since they will only be conducting one in-river release.
- Distribution of Coleman National Fish Hatchery (CNFH) SR Surrogate Releases:
 - A release of fall-run Chinook salmon occurred on 3/29/2023. CNFH released approximately 1,603,585 fall-run Chinook salmon (25% CWT) into Battle Creek at CNFH. These fish constitute one of two release groups from CNFH to satisfy the requirements of COA 8.6.4 Daily Spring-run Chinook Salmon Hatchery Surrogate Loss Threshold. These fish have five different CWT codes, but together count as ONE release group. Cumulative loss of the CWT fish count towards the 0.25% threshold for this specific release group.
 - A second release of fall-run Chinook salmon occurred on 4/24/2023 and 4/25/2023. CNFH released approximately 9,395,063 fall-run Chinook salmon (25% CWT) into Battle Creek at CNFH. These fish constitute one of two release groups from the CNFH to satisfy the requirements of COA 8.6.4 Daily Spring-run Chinook Salmon Hatchery Surrogate Loss Threshold. These fish have 22 different CWT codes, but together count as ONE release group. Cumulative loss of the CWT fish count towards the 0.25% threshold for this specific release group and separately from the second release group.
- Distribution of Nimbus Fish Hatchery (NIM) SR Surrogate Releases:
 - A release of fall-run Chinook salmon occurred on 5/16/2023. NIM releases approximately 885,787 (25% CWT) into the Lower American River at the Sunrise Boat Ramp. These fish constitute one of one release group from NIM to satisfy the requirements of COA 8.6.4 Daily Spring-run Chinook salmon Hatchery Surrogate Loss Threshold. These fish have one CWT code,

and together count as ONE release group. Cumulative loss of the CWT fish count towards the 0.25% threshold for this specific release group.

Section 5-C: Additional Data Sources to Assess Sensitivity to Entrainment into the Central and South Delta

8.1.5.1.C & D

- Acoustic telemetry: *Summary of acoustic telemetry tracking*
 - WR juveniles from LSNFH were acoustically tagged and tracked for COA 8.6.1 WR Single-year Loss Threshold. There have been no new detections upstream, in the Delta, or exited the Delta in the past few weeks, suggesting that all of these fish have moved out of the system. SaMT estimated in the fish distribution table that 100% of these WR have moved past Chipps Island and are no longer in the system.
 - [CalFishTrack - Central Valley Enhanced Acoustic Tagging Project](#)
- Trawls: See Appendix 1
 - Sacramento Trawl: SR were caught between 5/15/2023 – 5/19/2023.
 - Mossdale Trawl: Chinook were caught between 5/15/2023 – 5/21/2023.
 - Chipps Island Trawl: SR were caught between 5/8/2023 – 5/19/2023.
- Rotary Screw Traps:
 - Knights Landing, Tisdale and Lower Sacramento Rotary Screw Trap Data: No listed species were caught this week.
 - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
 - Yuba River Rotary Screw Trap Data: SR were caught between 5/15/2023 – 5/21/2023.
 - Red Bluff Diversion Dam Rotary Screw Trap Data: Total passage estimates 240,059 juvenile WR have passed RBDD. Last updated on 5/9/2023.
 - GCID Rotary Screw Trap Data: No trapping occurred this week.
 - [GCID RST Live Data](#)
 - Lower Feather River Rotary Screw Trap: No listed species were caught this week.
 - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
 - Upper Feather Rotary Screw Trap: No listed species were caught this week.
 - Butte Creek Rotary Screw Trap Data: SR were caught between 5/16/2023 – 5/22/2023.
 - [Butte Creek Monitoring Programs](#)
- Seines:
 - Sacramento River Beach Seines: No listed species were caught this week.
- Carcass Survey Data:
 - Lower American River Carcass Survey Data (See Table 5):
 - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
 - Fall-run (FR) Carcass Surveys ended as of 12/29/2022.
 - CDFW Redd Surveys ended as of 12/29/2022.
- Additional hatchery release notifications: *List all relevant hatchery release notifications.*
 - Coleman National Fish Hatchery (CNFH) released steelhead and late fall-run Chinook salmon into Battle Creek on 12/1/2022 and 12/2/2022 (See Appendix 4).
 - San Joaquin River Restoration Program released SR yearlings on 12/8/2022 (See Appendix 4).
 - CNFH released 1,487,689 fall-run Chinook salmon into the Sacramento River at Caldwell Park Boat Ramp to evaluate the survival of CNFH fall-run Chinook salmon released at the fry stage on 1/30/2023 (See Appendix 4).
 - Mokelumne Fish Hatchery (MOK) released 50,500 steelhead into the Mokelumne River at New Hope Landing on 2/21/2023 and 2/22/2023 (See Appendix 4).
 - CNFH released 97,134 winter-run Chinook salmon on 3/17/2023 into North Fork Battle Creek at Wilson Bridge. This is the first release of the brood year (BY) 2022 Jumpstart winter-run

Chinook salmon, and the only release of fish reared at the Mount Lassen Trout Farm, a private aquaculture facility located on North Fork Battle Creek (See Appendix 4).

- CNFH released 77,416 winter-run Chinook salmon on 4/24/2023 into North Fork Battle Creek at Wilson Bridge. This is the second release of the BY 2022 Jumpstart winter-run Chinook salmon. This release occurred later in the season due to CNFH having operational issues from the storm events that occurred over the past few months.
- FRH released 1,003,364 fall-run Chinook salmon on 5/1/2023 into Mare Island at San Pablo Bay. This is the first of several releases into the bay (See Appendix 4).
- Mokelumne Fish Hatchery (MOK) released 450,000 fall-run Chinook salmon on 5/3/2023 into the San Joaquin River at Sherman Island Net Pen (See Appendix 4).
- CNFH released 639,745 fall-run Chinook salmon on 5/4/2023 into Battle Creek at CNFH. This is the last release of the CNFH BY 2022 fall-run Chinook Salmon production groups (See Appendix 4).
- FRH released 1,009,722 fall-run Chinook salmon on 5/8/2023 into Conoco release site at San Pablo Bay (See Appendix 4).
- MOK released 440,000 fall-run Chinook salmon on 5/9/2023 and 440,000 fall-run Chinook salmon on 5/10/2023 into the San Joaquin River at Sherman Island Net Pen (See Appendix 4).
- NIM released 865,931 fall-run Chinook salmon on 5/22/2023 into Conoco release site at San Pablo Bay (See Appendix 4).
- There is uncertainty in the identification of some untagged salmonids potentially due to either tag loss or poor-quality adipose clipping from hatchery releases made in the South Delta. Lower rates of tagging success were confirmed by hatchery staff for some releases. Confirmation of origin of these fish will be through genetic identification.
 - The percentage of late fall-run that had a CWT tag but were not ad clipped, which caused the biggest concern this year, was 3.32% of the total amount released.
 - The percentage of late fall-run that had no clip and no tag, and thus would be classified as a natural-origin fish in salvage, was 0.07% of the total amount released.
- New monitoring (as required by Condition of Approval 7.5.1, 7.5.2, and 7.5.3): *Upstream monitoring results during transfer window, additional rotary screw trap monitoring updates, additional acoustic tag study results, genetic identification results, trap capture efficiency trial results, and pathology results if available and relevant.*
 - Genetic confirmation of natural-origin LAD winter-run results were distributed on 4/27/2023. Genetic results of the LAD WR in salvage on 4/25/2023 was confirmed as a FR. So far for WY 2023, there has been only 1 genetically confirmed winter-run Chinook salmon in salvage.
- Anticipated emigration to continue into the Delta:
 - SaMT estimates that most of the WR have exited the system. YOY SR are migrating downstream and passing Chipps Island in large numbers.
 - [SacPAS - Migration Timing and Conditions by Cohort](#)
 - [SacPAS - Salvage Timing](#)
- Routing and Survival Analysis:
 - Delta STARS Model: See Table 6 in Appendix 1
 - [Delta STARS Model \(noaa.gov\)](#)
- Tillotson entrainment model or other entrainment models as they become available:
 - The entrainment tool estimates a median of 0 WR and maximum loss of 17 WR this week. (SacPAS last updated on 5/19/2023).
 - [SacPAS - Loss and Salvage Predictor](#)
- Salvage trends in relation to OMRI: *Provide overview of salvage data and insert salvage table as attachment at end of document:* See Appendix 2.

- [USFWS - Fish Salvage Monitoring](#)

Appendix 1: SaMT Monitoring and Modeling Data

Table 3: Fish monitoring data for the 5/23/23 SaMT meeting. The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length. FR = fall-run, WR = winter-run, SR = spring-run, LFR = late-fall-run, N/A= Not Available.

Location	GCID RST	Butte Creek RST	Tisdale RST	Knights Landing RST	Lower Sac RST	Beach Seines	Sacramento Trawl
Sample Date	N/A	5/16/23 – 5/22/23	5/15/23 – 5/21/23	5/6/23 – 5/22/23	5/14/23 – 5/20/23	5/15/23, 5/17/23 – 5/18/23	5/15/23, 5/17/23, 5/19/23
Chinook	N/A	0	0	0	0	0	0
FR Chinook	N/A	0	11	7	18	3	62
SR Chinook	N/A	14	0	0	0	0	2
WR Chinook	N/A	0	0	0	0	0	0
LFR Chinook	N/A	0	0	0	0	0	0
Chinook (ad-clip)	N/A	0	1 FR	2 FR	2 FR	0	14
Steelhead (wild)	N/A	1	0	0	0	0	0
Steelhead (ad-clip)	N/A	0	0	0	0	0	0
Green Sturgeon	N/A	0	0	0	0	0	0
Flows (avg. cfs)	N/A	966	14,778	14,265	37,318	N/A	N/A
W. Temp. (avg. °F/°C)	N/A	12.4 °C	18.41 °C	18.6 °C	15.8 °C	N/A	N/A
Turbidity (avg. NTU)	N/A	13.0	21.3	20.0	10.5	N/A	N/A

Table 3 Continued: Fish monitoring data for the 5/23/23 SaMT meeting. The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length. FR = fall-run, WR = winter-run, SR = spring-run, LFR = late-fall-run, N/A=Not Available.

Location	Chippis Is. Midwater Trawl	Mossdale Kodiak Trawl	Lower Feather RST	Feather at Herringer RST	Feather at Eye-Side RST	Yuba RST
Sample Date	5/15/23, 5/18/23 – 5/19/23	5/15/23 – 5/21/23	5/16/23 – 5/22/23	5/15/23 – 5/19/23	5/15/23 – 5/19/23	5/15/23 – 5/21/23
Chinook	0	26	0	0	0	0
FR Chinook	639	0	11	9	8	41
SR Chinook	18	0	0	0	0	1
WR Chinook	0	0	0	0	0	0
LFR Chinook	0	0	1	0	0	12
Chinook (ad-clip)	159	0	1 FR	0	0	0
Steelhead (wild)	0	0	0	0	1	8
Steelhead (ad-clip)	2	0	0	0	0	0
Green Sturgeon	0	0	0	0	0	0
Flows (avg. cfs)	N/A	N/A	22,873	15,000	7,350	N/A
W. Temp. (avg. °F/°C)	N/A	N/A	15.3	13.9 °C	12.7 °C	11.0 °C
Turbidity (avg. NTU)	N/A	N/A	4.4	4.1	3.7	4.2

Table 4: Delta sturgeon tagging and monitoring.

Date	Comments
5/16/2023	<ul style="list-style-type: none"> No new sturgeon were tagged this week. A total of 4 WS have been tagged at Marsh Island on the Sacramento River so far this WY, including the one tagged on 2/7/2023. 3 juvenile GS have been tagged on the Sacramento River at Marsh Island so far this WY.

GS = green sturgeon, WS = white sturgeon

Table 5: CDFW adult monitoring surveys. Most of the table will be 'Not Applicable' due to Carcass Surveys ending on the American and Stanislaus River.

Location	American River Carcass Survey	Stanislaus River Carcass Survey
Sample Dates	Survey ended	Survey ended
Live Fish	Not Available	Not Applicable
Redds	Not Available	Not Applicable
Carcasses	Not Applicable	Not Applicable
Ad-clipped	Not Applicable	Not Applicable
Spawn Condition	Not Applicable	Not Available
Flows (avg. cfs)	Not Applicable	Not Applicable
Water Temp (avg. °F)	Not Applicable	Not Available

Table 6: STARS Modeling. [Delta STARS Model \(noaa.gov\)](https://www.noaa.gov)

Date: (5/22/2023)	DCC	Georgiana Slough/Interior Delta	Sacramento River	Sutter/ Steamboat Slough	Yolo Bypass
Late Fall-Run Proportion of Entrainment	0	0.18	0.47	0.34	Not Applicable
Late Fall-Run Survival	Not Applicable	0.36	0.71	0.70	Not Applicable
Winter-Run Proportion of Entrainment	Not Applicable	0.11	0.66	0.23	0
Winter-Run Survival	Not Applicable	0.13	0.18	0.15/0.16	Not Applicable

Appendix 2: Salvage Data

Table 7: SWP and CVP SaMT update (5/15/23 – 5/22/23). Trend is the current value compared to the previous week. These are preliminary results and are subject to revision. Prepared by Kyle Griffiths on 5/22/23.

Criteria	15-May	16-May	17-May	18-May	19-May	20-May	21-May	Trend	Weekly Summary (Average)
Wild older juvenile CHN Loss	0	0	0	0	0	0	0	→	0
Wild Steelhead Loss	0	0	5.44	0	0	0	2.72	↗	1.17
SWP daily export (acre-feet)	0	0	0	0	1,282	11,974	12,805	↘	3,723
CVP daily export (acre-feet)	6,993	6,927	6,996	6,990	6,970	6,995	6,991	→	6,980
SWP reduced counts	NA	NA	NA	NA	None	None	Yes	N/A	N/A
CVP reduced counts	None	None	None	None	None	None	None	N/A	N/A

Table 8: Chinook salmon weekly salvage and loss combined for both the SWP and the CVP fish collection facilities between 5/15/23 – 5/21/23. Race is determined by LAD on the date of capture. Hatchery origin fish are determined by the lack of adipose fin. Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time. SWP loss is equal to salvage multiplied by 4.33. CVP loss is equal to salvage multiplied by 0.68. Prepared by Kyle Griffiths on 5/22/23. These are preliminary results and are subject to revision.

Category	Salvage	Loss	Trend
Wild winter-run	0	0	→
Wild spring-run	1,766	1,754.49	↘
Wild late Fall-run	0	0	→
Wild fall-run	937	794.7	↗
Weekly Total	2,703	2,549.19	Not Applicable
Hatchery winter-run	0	0	→
Hatchery spring-run	14	17.31	↘
Hatchery late Fall-run	0	0	→
Hatchery fall-run	1	4.33	↗
Weekly Total	15	21.64	Not Applicable

Table 9: Chinook salmon cumulative salvage and loss combined for both the SWP and the CVP fish collection facilities across WY 2023. Race is determined by LAD on the date of capture but is updated once genetics and CWT information is determined. Hatchery-origin fish are determined by the lack of adipose fin or CWT tag. Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time. SWP loss is equal to salvage multiplied by 4.33. CVP loss is equal to salvage multiplied by 0.68. Prepared by Kyle Griffiths on 5/22/23. These are preliminary results and are subject to revision.

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild winter-run	61	109.88	→
Wild spring-run	4,380	5,770.42	↘
Wild late Fall-run	36	55.53	→
Wild fall-run	2,192	2,029.43	↗
Season Total	6,612	7,858.26	Not Applicable
Hatchery winter-run	32	125.55	→
Hatchery spring-run	4,675	10,367.7	↘
Hatchery late Fall-run	828	2,252.59	→
Hatchery fall-run	37	48.68	↗
Season Total	5,572	12,794.79	Not Applicable

Table 10: Steelhead weekly salvage and loss combined for both the SWP and the CVP fish collection facilities for 5/15/23 – 5/21/23. Hatchery origin fish are determined by the lack of adipose fin. Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time. SWP loss is equal to salvage multiplied by 4.33. CVP loss is equal to salvage multiplied by 0.68. Prepared by Kyle Griffiths on 5/22/23. These are preliminary results and are subject to revision.

Category	Salvage	Loss	Trend
Wild steelhead	12	8.16	↘
Hatchery steelhead	0	0	→
Weekly Total	18	77.94	Not Applicable

Table 11: Steelhead cumulative salvage and loss combined for both the SWP and the CVP fish collection facilities across WY 2023. Hatchery origin fish are determined by the lack of adipose fin. Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time. SWP loss is equal to salvage multiplied by 4.33. CVP loss is equal to salvage multiplied by 0.68. Prepared by Kyle Griffiths on 5/22/23. These are preliminary results and are subject to revision.

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild steelhead	399	1,261.47	↘
Hatchery steelhead	1,356	3,653.00	→
Season Total	1,755	4,914.47	Not Applicable

Appendix 3: Relevant Actions

Table 12. Relevant WY 2023 Criteria and Status for Listed Chinook Salmon under the SWP Long-Term Incidental Take Permit.

<u>Action</u>	<u>Timeframe</u>	<u>Current Action Status</u>	<u>Threshold(s)</u>	<u>Current Relevant Data</u>	<u>Weekly Trend</u>	<u>Last Updated</u>	<u>Comments</u>
Onset of OMR Mgmt. Salmonid Presence (8.3.2)	Jan. 1 - Jun. 30 <i>(when ≥ 5% of winter-run or spring-run are in the Delta)</i>	In effect	5% of the winter-run or spring-run population are present in the Delta	Winter-run = 1-2% estimated in the Delta Spring-run = 10-25% estimated in the Delta	Not Applicable	5/23/2023	No additional comments
Winter-run yearly loss (8.6.1)	Nov. 1 - Jun. 30	In effect	Natural CHNWR (loss = 1.17% of JPE) 50% of 1.17% of JPE = 584.11 Hatchery CHNWR (loss = 0.12% of JPE) 50% of 0.12% of JPE = 229.15	Current yearly WR loss (natural LAD) = 109.88 Current yearly WR loss (hatchery) = 0	Salvage may occur over the next week.	5/23/2023	No additional comments
Winter-run discrete daily loss (8.6.2)	Nov. 1 - Dec. 31	Not in effect	11/1-11/30: loss of 6/day unclipped older juv. Chinook salmon 12/1-12/31: loss of 26/day unclipped older juv. Chinook salmon	Max single daily loss from previous week = N/A	Not Applicable	1/3/2023	No additional comments

Mid- and Late-season Natural WR Daily Loss Threshold defined as natural origin juvenile Chinook salmon (8.6.3)	Jan 1 – May 31	In effect	<p>January 1 – 31: 0.00635% of the CHNWR JPE</p> <p>February 1 – 28: 0.00991% of the CHNWR JPE</p> <p>March 1 – 31: 0.0146% of the CHNWR JPE</p> <p>April 1 – 30: 0.00507% of the CHNWR JPE</p> <p>May 1 – 31: 0.0077% of the CHNWR JPE</p>	<p>January 1 – 31: 0.0000635 * 49,942 = 3.17</p> <p>February 1 – February 28: 0.0000991 * 49,924 = 4.95</p> <p>March 1 – March 31: 0.000146 * 49,924 = 7.29</p> <p>April 1 – April 30: 0.0000507 * 49,924 = 2.53</p> <p><u>May 1 – May 31: 0.000077 * 49,924 = 3.84</u></p>	<p>Salvage may occur over the next week.</p> <p>Exports will be restricted in response to an initial LAD identification of natural older juvenile Chinook salmon. If genetic analysis indicates that the older juvenile is not a WR, then that individual shall not count toward the daily loss threshold and continued export restrictions under this COA are not required if the daily loss threshold has consequently not been met.</p>	5/23/2023	No additional comments
Spring-run surrogate protection (8.6.4)	Feb. 1 - Jun. 30	In effect	<p>Coleman National Fish Hatchery (CNFH): 0.25% of total in-river CWT fall-run release</p> <p>Feather River Fish Hatchery (FRFH): 0.25% of total in-river CWT spring-run release</p>	<p>FRH Group 1: 0.0025 * 731,457 = 1,828.64</p> <p>FRH Group 2: 0.0025 * 728,586 = 1,821.47</p> <p>FRH Group 3: 0.0025 * 881,880 = 2,204.70</p>	<p>FRH Group 1 release occurred on 3/16/2023</p> <p>FRH Group 2 release occurred on 3/24/2023</p> <p>FRH Group 3 release occurred on 4/11/2023</p>	5/23/2023	No Additional Comments

			<p>Nimbus Fish Hatchery (NIM): 0.25% of total in-river CWT spring-run release</p>	<p>CNFH Group 1: $0.0025 * 400,897 = 1,000.24$</p> <p>CNFH Group 2: $0.0025 * 2,348,768 = 5,871.92$</p> <p>NIM Group 1: $0.0025 * 213,847 = 534.62$</p>	<p>CNFH Group 1 release occurred on 3/29/2023</p> <p>CNFH Group 2 release occurred on 4/24/2023 and 4/25/2023</p> <p>NIM Group 1 release occurred on 5/16/2023.</p>		
OMR Storm Flexibility (8.7)	Jan 1 – Jun 30	Not in effect	<p>-Delta is in excess</p> <p>-QWEST is > 0</p> <p>-Measurable amount of precipitation has occurred</p> <p>-None of COA's are controlling operations (8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, 8.6.4)</p> <p>-Cumulative salvage at CVP and SWP of yearling CNFH LFR Chinook salmon (as yearling CHNSR surrogates) is < 0.50% with any of the release groups</p> <p>-Risk Assessments conducted by the SaMT/SMT determines no changes in</p>	<p>-Spring-run Surrogate Release Group #1 Loss: 165.12 (0.24% of the 0.50% threshold)</p> <p>-Spring-run Surrogate Release Group #2 Loss: 117.81 (0.18% of the 0.50% threshold)</p> <p>-Spring-run Surrogate Release Group #3 Loss: 32.05 (0.024% of the 0.50% threshold)</p>	<p>No storm events are projected in the upcoming week that would lead to on ramping COA 8.7 Storm Flexibility.</p>	5/23/2023	Based on storm conditions.

			spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations beyond those are likely to occur.				
End of OMR Management (8.8)	Jan – Jun. 30	Not in effect	More than 95% of WR and SR have migrated past Chipps Island as determined by SaMT, AND Daily average water temperature at Mossdale exceeds 22.2°C (71.96°F) for 7 non-consecutive days in June, AND Daily average water temperature at Prisoner’s Point exceeds 22.2°C (71.96°F) for 7 non-consecutive days in June	Not Applicable	Not Applicable	1/3/2023	No Additional Comments
Export Curtailments for Spring Outflow (8.17)	Apr 1 – May 31	In effect	<u>Critically Dry:</u> Vernalis flow to CVP and SWP combined exports shall be 1:1 <u>Dry:</u> Vernalis flow and CVP/SWP combined exports are 2:1	Not Applicable	Not applicable due to outflow being higher than 44,500 cfs.	5/23/2023	No Additional Comments

			<u>Below Normal:</u> Vernalis flow and CVP/SWP combined exports are 3:1				
			<u>Above Normal/Wet:</u> Vernalis flow and CVP/SWP combined exports are 4:1				

Appendix 4: Hatchery Releases

Table 13. Hatchery salmon release data for BY 2022 and WY 2023.

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
12/1/2022	CNFH	Late Fall	05-64-84	61,399	61,399	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-85	57,217	57,217	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-86	73,060	73,060	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-87	74,344	74,344	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-90	49,664	49,664	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-91	62,246	62,246	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-92	61,939	61,939	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-94	64,648	64,648	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-95	57,334	57,334	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-96	60,582	60,582	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-97	58,530	58,530	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/5/2022	CNFH	Late Fall	05-64-88	71,057	71,057	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Experimental
12/8/2022	SCARF	Spring	06-29-44	3,666	3,666	100%	San Joaquin at Hwy 140	PIT, CWT and Ad-Clip	CDFW	SJRRP
12/8/2022	SCARF	Spring	06-19-68	911	911	100%	San Joaquin at Hwy 140	PIT, CWT and Ad-Clip	CDFW	SJRRP
12/23/2022	CNFH	Late Fall	05-64-89	66,735	66,735	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Experimental
1/3/2023	CNFH	Fall	None	605,539	605,539	0%	Caldwell Park Boat Ramp	None	USFWS	Experimental
1/13/2023	CNFH	Late Fall	05-64-93	60,712	60,712	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Experimental
1/17/2023	CNFH	Fall	None	None	673,132	0%	Balls Ferry Boat Ramp	None	USFWS	Experimental
1/26/2023 - 1/27/2023	LSNFH	Winter	05-65-21	87,857	87,857	100%	Sacramento River at Reginato River Access	CWT and Ad-Clip	USFWS	Production
1/26/2023 - 1/27/2023	LSNFH	Winter	05-65-22	89,899	89,899	100%	Sacramento River at Reginato River Access	CWT and Ad-Clip	USFWS	Production
1/26/2023 - 1/27/2023	LSNFH	Winter	05-65-23	88,640	88,640	100%	Sacramento River at Reginato River Access	CWT and Ad-Clip	USFWS	Production
1/26/2023 - 1/27/2023	LSNFH	Winter	05-65-24	80,278	80,278	100%	Sacramento River at Reginato River Access	CWT and Ad-Clip	USFWS	Production
1/26/2023 - 1/27/2023	LSNFH	Winter	05-65-86	85,784	85,784	100%	Sacramento River at Reginato River Access	CWT and Ad-Clip	USFWS	Production
1/30/2023	CNFH	Fall	None	None	1,487,689	0%	Balls Ferry Boat Ramp	None	USFWS	Experimental

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
2/23/2023	NIM	Fall	None	None	1,153,036	0%	Nimbus Fish Hatchery	None	CDFW	Experimental
2/23/2023	SCARF	Spring	06-31-70	50,932	50,932	100%	San Joaquin at Fremont Ford Bridge	CWT and Ad-Clip	USFWS	SJRRP
3/1/2023	LSNFH	Winter	05-58-92	50,798	50,798	100%	Sacramento River at Reginato River Access	CWT and Ad-Clip	USFWS	Production
3/1/2023	LSNFH	Winter	05-65-86	85,380	50,798	100%	Sacramento River at Reginato River Access	CWT and Ad-Clip	USFWS	Production
3/1/2023	LSNFH	Winter	05-65-87	77,922	50,798	100%	Sacramento River at Reginato River Access	CWT and Ad-Clip	USFWS	Production
3/1/2023	LSNFH	Winter	05-65-88	85,766	50,798	100%	Sacramento River at Reginato River Access	CWT and Ad-Clip	USFWS	Production
3/15/2023	FRH	Fall	None	8,601	266,540	3%	Sutter Bypass at Sacramento Ave	VIE- Yellow	CDFW	Production
3/16/2023	FRH	Spring	06-30-61	366,267	366,267	100%	Feather River at Boyds Pump Boat Launch	CWT and Ad-Clip	CDFW	Experimental
3/16/2023	FRH	Spring	06-30-62	365,190	365,190	100%	Feather River at Gridley Boat Launch	CWT and Ad-Clip	CDFW	Experimental
3/16/2023	SCARF	Spring	06-31-69	139,784	139,784	100%	Eastside Bypass at El Nido Road	CWT and Ad-Clip	CDFW	SJRRP
3/17/2023	CNFH	Winter	05-64-98	29,116	29,116	100%	North Fork Battle Creek, Manton, CA	CWT, Ad-Clip, Left Pelvic	USFWS	Jumpstart
3/17/2023	CNFH	Winter	05-64-89	68,018	68,018	100%	North Fork Battle Creek, Manton, CA	CWT, Ad-Clip, Left Pelvic	USFWS	Jumpstart
3/24/2023	FRH	Spring	06 30 64	362,343	362,343	100%	Feather River at Boyd's Pump Boat Launch	CWT and Ad-Clip	CDFW	Production
3/24/2023	FRH	Spring	06 30 63	366,243	366,243	100%	Feather River at Gridley Boat Launch	CWT and Ad-Clip	CDFW	Production
3/29/2023	CNFH	Fall	05 66 75	21,570	86,279	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
3/29/2023	CNFH	Fall	05 66 92	107,809	431,236	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
3/29/2023	CNFH	Fall	05 66 93	95,977	383,908	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
3/29/2023	CNFH	Fall	05 66 94	82,989	331,956	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
3/29/2023	CNFH	Fall	05 66 95	92,552	370,206	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/11/2023	FRH	Spring	06-30-65	366,231	366,231	100%	Feather River at Boyd's Pump Boat Launch	CWT and Ad-Clip	CDFW	Production
4/11/2023	FRH	Spring	06-23-08	56,594	56,594	100%	Feather River at Boyd's Pump Boat Launch	CWT and Ad-Clip	CDFW	Production

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
4/11/2023	FRH	Spring	06-23-69	21,242	21,242	100%	Feather River at Boyd's Pump Boat Launch	CWT and Ad-Clip	CDFW	Production
4/11/2023	FRH	Spring	06-20-81	6,818	6,818	100%	Feather River at Boyd's Pump Boat Launch	CWT and Ad-Clip	CDFW	Production
4/11/2023	FRH	Spring	06-30-66	364,402	364,402	100%	Feather River at Gridley Boat Launch	CWT and Ad-Clip	CDFW	Production
4/11/2023	FRH	Spring	06-07-91	66,593	66,593	100%	Feather River at Gridley Boat Launch	CWT and Ad-Clip	CDFW	Production
4/11/2023	FRH	Fall	06-06-60	126,934	508,111	25%	Feather River at Gridley Boat Launch	CWT and Ad-Clip	CDFW	Production
4/18/2023	MOK	Fall	06-30-03	110,000	440,000	25%	San Joaquin River at Sherman Island Net Pen	CWT and Ad-Clip	CDFW	Production
4/21/2023	FRH	Fall	06-28-83	252,116	1,008,917	25%	Feather River at Gridley Boat Launch	CWT and Ad-Clip	CDFW	Production
4/21/2023	FRH	Fall	06-09-73	126,074	504,488	25%	Feather River at Boyd's Pump Boat Launch	CWT and Ad-Clip	CDFW	Production
4/24/2023	CNFH	Winter	05-65-15	3,529	3,529	100%	North Fork Battle Creek at Manton	CWT, Ad-Clip, Left Pelvic	USFWS	Jumpstart
4/24/2023	CNFH	Winter	05-65-41	73,887	73,887	100%	North Fork Battle Creek at Manton	CWT, Ad-Clip, Left Pelvic	USFWS	Jumpstart
4/24/23 – 4/25/23	CNFH	Fall	05-66-96	115,340	461,361	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-66-97	107,153	428,613	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-66-98	100,957	403,827	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-66-99	115,746	462,983	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-01	100,492	401,969	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-02	113,138	452,552	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-03	88,080	352,318	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-04	117,320	469,278	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-05	83,894	335,577	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
4/24/23 – 4/25/23	CNFH	Fall	05-67-06	115,989	463,957	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-07	106,997	427,988	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-08	110,553	442,211	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-09	115,279	461,117	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-10	113,829	455,317	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-11	115,957	463,825	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-12	102,740	410,960	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-13	94,113	376,453	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-14	113,993	455,970	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-15	105,193	420,772	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-16	95,923	383,690	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-17	110,039	440,156	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
4/24/23 – 4/25/23	CNFH	Fall	05-67-18	106,043	424,169	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
5/1/23 – 5/2/23	FRH	Fall	06-00-20	250,631	1,003,364	25%	San Pablo Bay, Mare Island Net Pen	CWT and Ad-Clip	CDFW	Production
5/3/2023	MOK	Fall	06-30-06	112,500	450,000	25%	San Joaquin River at Sherman Island Net Pen	CWT and Ad-Clip	CDFW	Production
5/4/2023	CNFH	Fall	05-67-19	78,001	312,005	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
5/4/2023	CNFH	Fall	05-67-20	81,935	327,740	25%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
5/8/2023	FRH	Fall	06-00-19	252,261	1,009,722	25%	Conoco San Pablo Bay	CWT and Ad-Clip	CDFW	Production
5/9/2023	MOK	Fall	06-30-07	110,000	440,000	25%	San Joaquin River at Sherman Island Net Pen	CWT and Ad-Clip	CDFW	Production
5/10/2023	MOK	Fall	06-30-08	110,000	440,000	25%	San Joaquin River at Sherman Island Net Pen	CWT and Ad-Clip	CDFW	Production

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
5/11/2023	FRH	Fall	06-09-73	257,928	1,008,917	25%	San Francisco Bay Estuary and Ocean Science Center at Tiburon	CWT and Ad-Clip	CDFW	Production
5/13/2023	MOK	Fall	06-30-27	105,000	420,000	25%	San Francisco Bay at Fort Baker	CWT and Ad-Clip	CDFW	Production
5/15/2023	MOK	Fall	06-30-28	122,500	490,000	25%	San Francisco Bay at Fort Baker	CWT and Ad-Clip	CDFW	Production
5/16/2023	NIM	Fall	06-04-77	213,847	855,787	25%	Lower American River at Sunrise Boat Ramp	CWT and Ad-Clip	CDFW	Production
5/22/2023	NIM	Fall	06-00-26	206,625	826,848	25%	San Pablo Bay at Conoco	CWT and Ad-Clip	CDFW	Production
5/22/2023	NIM	Fall	06-87-40	9,767	39,083	25%	San Pablo Bay at Conoco	CWT and Ad-Clip	CDFW	Production

Table 14. Hatchery steelhead release data for BY 2022 and WY 2023.

Release Date	Hatchery	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
12/2/22	CNFH	None	614,702	614,702	100%	Battle Creek at CNFH	Ad-Clip	USFWS	Production
1/17/23 – 1/20/23	NIM	None	447,000	447,000	100%	Sunrise Boat Ramp	Ad-Clip	CDFW	Production
2/6/23 – 2/10/23 And 2/13/23 – 2/16/23	FRH	None	408,900	408,900	100%	Boyd's Pump Boat Launch	Ad-Clip	CDFW	Production
1/23/23 – 1/24/23	MOK	06-20-87	44,147	44,187	100%	New Hope Landing	Ad-Clip	CDFW	Production
1/23/23 – 1/24/23	MOK	06-87-89	7,200	7,194	100%	New Hope Landing	Ad-Clip	CDFW	Production
2/21/23 – 2/22/23	MOK	None	50,500	50,500	100%	New Hope Landing	Ad-Clip	CDFW	Production
3/21/23 – 3/22/23	MOK	None	51,000	51,000	100%	New Hope Landing	Ad-Clip and Right Maxillary Clip	CDFW	Production

Table 15. COA 8.6.4 Young-of-Year Spring-run Chinook Salmon Hatchery Surrogate Summary Table, WY 2023.

Hatchery	Release Group	Date	Race	Total Fish Released	CWT Fish	Tag Codes	Loss Threshold
Coleman National Fish Hatchery	Group 1	3/29/2023	Fall	1,603,585	400,897	05-66-75	1,002.24
						05-66-92	
						05-66-93	
						05-66-94	
						05-66-95	
	Group 2	4/24/2023 – 4/25/2023	Fall	9,395,063	2,348,768	05-66-96	5,871.92
						05-66-97	
						05-66-98	
						05-66-99	
						05-67-01	
						05-67-02	
						05-67-03	
						05-67-04	
						05-67-05	
						05-67-06	
						05-67-07	
						05-67-08	
						05-67-09	
						05-67-10	
						05-67-11	
05-67-12							
05-67-13							
05-67-14							
05-67-15							
05-67-16							
05-67-17							
05-67-18							
Feather River Fish Hatchery	Group 1	3/16/2023	Spring	731,457	731,457	06-30-61	1,828.64
						06-30-62	
	Group 2	3/24/2023	Spring	728,586	728,586	06-30-64	1,821.47
						06-30-63	
	Group 3	4/11/2023	Spring	881,880	881,880	06-30-61	2,204.70
						06-23-08	
						06-23-69	
06-20-81							
06-30-66							
06-07-91							

Nimbus Fish Hatchery	Group 1	5/16/2023	Fall	855,787	213,847	06-04-77	534.62
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