

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

Section 1: Overview

Date: 3/7/2023

Life Stages Present:

Winter-run Chinook salmon (adults)

Winter-run Chinook salmon (juvenile)

Spring-run Chinook salmon (juvenile)

Advice to the Water Operations Management Team (WOMT):

No advice is warranted.

For the week beginning 3/7/2023, COA 8.3.2 Salmonid Presence is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Combined exports on 3/7/2023 are 11,500 cfs resulting in an Old and Middle River Index (OMRI) of -5,100 cfs and 33.6% of inflow diverted (14-day average). The Delta Cross Channel (DCC) gates are projected to remain closed for seasonal requirement. 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 high risk of entrainment of juvenile WR into the export facilities this week. OMRI is operating to no more negative than -5,000 cfs and hydrological conditions remain similar to the previous week; however, many LAD WR have been salvaged at the export facilities in the previous week, which increases the likelihood of exceeding COA 8.6.3. Although the LAD WR that have been salvaged in the previous week have been genetically identified as spring-run and late fall-run Chinook salmon, COA 8.6.3 initially onramps due to LAD WR; therefore, the likelihood of exceeding COA 8.6.3 is high. Also, due to seasonal timing and presence of WR estimated in the Delta, it is likely that more LAD or genetic WR will be salvaged over the upcoming week. Therefore, the risk of entrainment into the salvage facilities has increased to high this week for WR. SaMT estimates an overall medium risk of entrainment of juvenile YOY SR into the export facilities due to 1 natural-origin YOY SR observed in salvage in the previous week. OMRI is also expected to remain similar to the previous week; however, there is a possibility of increase juvenile entrainment due to seasonal timing. Therefore, entrainment risk into the salvage facilities has increased to 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 TUCP was approved on 2/21/2023 and will be in effect during February and March 2023. The TUCO approves the changes described below:

- Modify footnote [d] of Table 4 in D-1641 to state “This standard does not apply to February and March 2023.” This would effectively remove the Port Chicago Delta outflow requirement, modifying that requirement from 29,200 cfs to 11,400 cfs or moving the required EC compliance location upstream by approximately 10 kilometers for the days the Port Chicago requirement applies.

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:

7 genetically confirmed yearling SR have been caught in salvage this WY with a total loss of 42.23.

The first LAD YOY SR observed in salvage was on 1/27/2023. For this week, 1 YOY LAD SR was observed in salvage on 3/5/2023.

2 LAD WR were caught in salvage on 2/28/2023 with a loss of 5.76. These fish initially triggered COA 8.6.3; however, genetics confirmed that the LAD WR were yearling SR and off-ramped COA 8.6.3. Another LAD WR was salvaged on 3/2/2023; however, this LAD WR did not exceed the COA 8.6.3 threshold for March and was later genetically confirmed as a late fall-run.

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 5-10% Last week 5-15%	Current 70-90% Last Week 70-90%	Current 5-20% Last Week 5-15%
YOY spring-run Chinook salmon ¹	Current 34-50% Last week 43-60%	Current 45-65% Last Week 40-55%	Current 1-5% Last Week 0-2%
Hatchery origin winter-run Chinook salmon	Current 85-95% Last week 90-95%	Current 5-15% Last Week 5-10%	Current 0% Last Week 0%

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: High
 - SR: High
- 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
 - Exposure Risk is estimated at high this week. SaMT estimates WR presence in the Delta is 70-90%. Routing Risk remains low this week based on hydrological conditions. Freeport flows remain elevated above 20,000 cfs and the DCC gates are closed. The

¹ 1-5% of YOY spring-run are estimated to have 'Exited the Delta' due to a few juvenile spring-run Chinook salmon caught in the Fish Restoration Program's (FRP) monitoring sites west of Chipps Island. Due to the high flow events that have occurred in the past few weeks, it is likely that many spring-run Chinook salmon have been pushed out of the system and are rearing west of Chipps Island. Although these fish are classified as exited the system in the distribution table, SaMT believes YOY SR are not actively migrating but, rather, rearing west of Chipps Island.

STARS Model predicts 21% entrainment into Georgiana and Threemile Slough, which is similar to last week. Due to the high presence in the Delta (70-90%), WR have an increased likelihood of being entrained into the central Delta; however, because of current hydrological conditions, the overall entrainment into the central Delta is estimated to remain low this week.

- SR: Similar to previous week
 - Exposure Risk is estimated as high this week due to 45-65% of YOY SR estimated in the Delta. Routing Risk remains low this week based on hydrological conditions. Freeport flows remain above 20,000 cfs and the DCC gates are closed. The STARS Model predicts 21% entrainment this week which is similar to last week. 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: High
 - SR: Medium
- Reporting OMR/Export Risk:
 - Baseline OMR (-5,100 cfs)
 - WR: Medium
 - SR: Medium
 - Scenario 1 OMR: (-3,000 cfs)
 - WR: Low
 - SR: Low
 - Scenario 2 OMR: (-5,000 cfs)
 - WR: Medium
 - SR: Medium
- Overall Entrainment Risk:
 - WR: High
 - SR: Medium
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
 - WR: Similar to previous week
 - Exposure Risk is estimated as high this week due to multiple LAD WR salvaged in the previous week. Reporting OMR/Export Risk remains medium this week due OMRI remaining at or more positive than -5,000 cfs. The likelihood of more exceedances to occur in the upcoming week is possible due to the low thresholds for COA 8.6.3 and multiple LAD WR observed in salvage the previous week. Therefore, the overall entrainment risk into the export facilities remains high.
 - SR: Similar to previous week
 - Reporting OMR/Export Risk remains at medium due to similar hydrological changes as in the previous week. Exposure Risk has increased to medium this week due to presence of SR increasing at the salvage facilities with 1 YOY LAD SR observed at the export facilities last week. Therefore, the overall entrainment risk into the facilities has also increased to 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: 62.15
 - 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: 2.60
 - Risk of exceeding threshold: High

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.*

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 from a spring tidal cycle into a neap tidal cycle on 3/14/2023. This neap tidal cycle may push the transitional zone upstream of the DCC gates and Georgiana Slough and may

increase entrainment effects to juvenile WR and SR that are in the vicinity; however, it is unlikely due to the elevated flows in the Sacramento River.

- Turbidity: Not discussed
 - Salinity (X2): 62.0 km on 3/7/2023
 - 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: 3/7/2023 – 3/13/2023
 - SWP: 7,000 to 9,500 cfs
 - CVP: 4,200 cfs
 - Meteorological Forecast:
 - *“Active weather pattern through Wednesday will bring additional snow to the foothills and mountains, and scattered showers elsewhere. A warmer storm system late this week into the weekend will bring higher elevation snow along with moderate to heavy rain with local flooding impacts of small creeks and streams possible.”*
 - [NOAA - National Weather Service Forecast](#)
 - Weather/Storm Event Projection:
 - Showers expected over the weekend with the bulk of the precipitation over the Sierra Nevada. Thursday through Sunday night is expected to receive around 1 to 3 inches in the Central Valley, and around 3 to 6 inches in the foothills and mountains with locally higher amounts. Warmer system with higher snow levels will pose a threat of significant snow melt in the lower elevations with possible hydrologic concerns.
 - 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 for seasonal requirements.
 - Sacramento River flow at Freeport: 26,000 cfs
 - Flows are expected to increase later in the week with the storm event.
 - [Sacramento River Flows - CDEC](#)
 - San Joaquin River flow at Vernalis: 11,800 cfs
 - Flows are expected to increase up to 20,000 cfs later in the week with the storm event.
 - [San Joaquin River Flows - CDEC](#)
 - [San Joaquin River Guidance Plots - CDEC](#)
 - QWEST: +8,000 cfs.
 - QWEST is expected to increase later in the week with the next storm.
 - Future export modifications: *Describe anticipated or potential changes to exports*
 - Exports are expected to increase due to the increased flows on the San Joaquin River. SWP anticipates that later in the week the controlling factor will be export capacity 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)
3/4/23	Daily	-5,600	-4,800
3/4/23	5-day	-4,000	-4,400
3/4/23	14-day	-3,600	-3,700
3/6/23	Daily	Not Applicable	-5,000
3/6/23	5-day	Not Applicable	-4,900
3/6/23	14-day	Not Applicable	-4,000

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. Upstream real-time monitoring stations saw WR this week. WR are anticipated to continue to distribute downstream and into the Delta due to seasonal timing.
 - CDFW conducted snorkel surveys on the upper Sacramento River in the beginning of the season. In December, CDFW observed juvenile WR holding near Redding above the Red Bluff Diversion Dam (RBDD).
 - Estimated juvenile WR passage at RBDD for 2/25/2023 is 234,745 fish. Average historic passage (2010-2021) as of 2/25/22 indicates 99.1% with one standard deviation of 1.3% 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 detections on CalFishTrack upstream in the Sacramento River and a few hatchery winter-run observed in the Knights Landing and the Lower Sacramento RST with fork lengths similar to the hatchery winter-run in this release group. There have also been a few detections at the I-80 bridge, which is classified as in the Delta. SaMT anticipates these fish will start moving further downstream in the upcoming week.
 - [CalFishTrack - Central Valley Enhanced Acoustic Tagging Project](#)

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

- Adult escapement estimate:
 - SR carcass counts not available.
 - Adult SR have completed their spawning.
- Redd distribution and fry emergence timing:
 - SR fry are emerging. SR on the Sacramento River are beginning their downstream migration and have been seen in the real-time monitoring stations in the Delta the past few weeks.
- 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 2/28/2023, many of these fish have been observed in salvage. Loss is estimated at 127.5 fish for this surrogate group which is 0.18% 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 2/28/2023, many of these fish have been observed in salvage. Loss is estimated at 141.3 fish for this surrogate group which is 0.21% 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 2/28/2023, a few of these fish have been observed in salvage. Loss is estimated at 14.36 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 of SR are anticipated to occur mid-March.

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 are being tracked for COA 8.6.1 WR Single-year Loss Threshold. These juveniles are moving downstream, and a few are being

detected past the I-80 bridge. There have also been some detections in many of the Delta RSTs. The fish distribution table has estimated 5-15% of these WR have moved into the Delta.

- [CalFishTrack - Central Valley Enhanced Acoustic Tagging Project](#)
- Trawls: See Appendix 1
 - Sacramento Trawl: SR were caught between 2/26/2023 – 3/3/2023.
 - Mossdale Trawl: No listed species were caught this week.
 - Chipps Island Trawl: No listed species were caught this week.
- Rotary Screw Traps:
 - Knights Landing, Tisdale and Lower Sacramento Rotary Screw Trap Data: WR and SR were caught between 2/20/2023 – 2/26/2023.
 - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
 - Yuba River Rotary Screw Trap Data: SR were caught between 2/27/2023 – 3/5/2023.
 - Redd Bluff Diversion Dam Rotary Screw Trap Data: Total passage estimates 234,745 juvenile WR have passed RBDD. Last updated on 2/28/2023.
 - GCID Rotary Screw Trap Data: No trapping occurred this week.
 - [GCID RST Live Data](#)
 - Lower Feather River Rotary Screw Trap: SR were caught between 2/21/2023 – 2/27/2023.
 - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
 - Upper Feather Rotary Screw Trap: SR were caught between 2/28/2023 – 3/2/2023.
 - Butte Creek Rotary Screw Trap Data: SR were caught between 2/27/2023 – 3/5/2023
 - [Butte Creek Monitoring Programs](#)
- Seines:
 - Sacramento River Beach Seines: SR were caught between 2/28/2023 – 3/3/2023.
- 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 is releasing 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 (See Appendix 4).
 - Mokelumne Fish Hatchery (MOK) are releasing 50,500 steelhead into the Mokelumne River at New Hope Landing on 2/21/2023 and 2/22/2023 (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 was distributed on 3/2/2023. So far for WY 2023, there has been 1 genetically confirmed winter-run Chinook salmon in salvage.
- Anticipated emigration to continue into the Delta:
 - WR have been seen in real-time monitoring sites in the Delta. Hydrological and meteorological environmental cues are redistributing juvenile WR and SR downstream. YOY SR fry are beginning to move downstream. SR are being seen in real-time monitoring sites in the Delta and in salvage which indicates that SR have started their downstream migration.
 - [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 27 WR and maximum loss of 193 WR this week. (SacPAS last updated on 3/7/2023).
 - [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 3/7/23 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	2/27/23 – 3/5/23	3/2/23– 3/5/23	2/27/23 – 3/5/23	2/27/23 – 3/5/23	2/28/23 – 3/3/23	2/26/23 – 3/3/23
Chinook Adults	N/A	0	0	0	0	0	0
FR Chinook	N/A	0	95	59	19	72	34
SR Chinook	N/A	306	7	5	4	4	1
WR Chinook	N/A	0	0	2	0	0	0
LFR Chinook	N/A	0	0	0	0	0	0
Chinook (ad-clip)	N/A	0	11 WR	2 FR 7 WR	0	5	2
Steelhead (wild)	N/A	0	0	1	0	0	7

Location	GCID RST	Butte Creek RST	Tisdale RST	Knights Landing RST	Lower Sac RST	Beach Seines	Sacramento Trawl
Steelhead (ad-clip)	N/A	0	0	1	1	0	19
Green Sturgeon	N/A	0	0	0	0	0	0
Flows (avg. cfs)	N/A	417	12,012	13,515	23,893	N/A	N/A
W. Temp. (avg. °F/°C)	N/A	5.6 °C	8 °C	7.4 °C	7.7	N/A	N/A
Turbidity (avg. NTU)	N/A	2.1	26.9	39.9	24.5	N/A	N/A

Table 3 Continued: Fish monitoring data for the 3/7/23 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	2/26/23 – 3/3/23	2/27/23 – 3/3/23	2/28/23 – 3/6/23	2/28/23 – 3/2/23	2/28/23 – 3/6/23	2/27/23 – 3/5/23
Chinook Adults	0	0	0	0	0	0
FR Chinook	0	0	182	236	4,198	1,948
SR Chinook	0	0	7	2	9	23
WR Chinook	0	0	0	0	0	0
LFR Chinook	0	0	0	0	0	0
Chinook (ad-clip)	0	0	0	0	0	0
Steelhead (wild)	0	0	0	0	2	2
Steelhead (ad-clip)	11	0	16	0	0	1
Green Sturgeon	0	0	0	0	0	0
Flows (avg. cfs)	N/A	N/A	5,050	1,050	650	NA
W. Temp. (avg. °F/°C)	N/A	N/A	7.5 °C	8.3 °C	7.7	7.1
Turbidity (avg. NTU)	N/A	N/A	10.0	3.9	3.6	4.9

Table 4: Delta sturgeon tagging and monitoring.

Date	Comments
3/7/2023	<ul style="list-style-type: none"> • No 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	12/27/2022 – 12/29/2022	1/6/2023 – 1/9/2023
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: (3/5/23)	DCC	<u>Georgiana Slough/Interior Delta</u>	<u>Sacramento River</u>	<u>Sutter/Steamboat Slough</u>	<u>Yolo Bypass</u>
Late Fall-Run Proportion of Entrainment	0	0.21	0.48	0.31	Not Applicable
Late Fall-Run Survival	Not Applicable	0.27	0.64	0.58	Not Applicable
Winter-Run Proportion of Entrainment	Not Applicable	0.12	0.62	0.26	0
Winter-Run Survival	Not Applicable	0.23	0.54	0.43/0.58	Not Applicable

Appendix 2: Salvage Data

Table 7: SWP and CVP SaMT update (2/27/23 – 3/5/23). Trend is the current value compared to the previous week. These are preliminary results and are subject to revision. Prepared by Kyle Griffiths on 3/6/23.

Criteria	27-Feb	28-Feb	1-Mar	2-Mar	3-Mar	4-Mar	5-Mar	Trend	Weekly Summary (Average)
Wild older juvenile CHN Loss	0	5.76	0	2.60	0	0	0	↗	4.18
Wild Steelhead Loss	2.72	8.16	2.72	2.72	40.08	2.72	51.96	↗	15.87
SWP daily export (acre-feet)	5,269	5,112	5,112	9,157	11,729	13,216	11,929	↗	8,789
CVP daily export (acre-feet)	6,957	6,963	7,932	8,305	8,308	8,346	8,316	↗	7,875
SWP reduced counts	None	None	None	None	None	None	None	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 2/27/23 – 3/5/23. 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 3/6/23. These are preliminary results and are subject to revision.

Category	Salvage	Loss	Trend
Wild winter-run	0	0	↘
Wild spring-run	12	8.09	↗
Wild late Fall-run	4	2.6	↗
Wild fall-run	60	34.88	↗
Weekly Total	76	45.57	Not Applicable
Hatchery winter-run	12	7.81	↗

Category	Salvage	Loss	Trend
Hatchery spring-run	0	0	→
Hatchery late Fall-run	4	17.69	↗
Hatchery fall-run	0	0	→
Weekly Total	16	25.5	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 3/7/23. These are preliminary results and are subject to revision.

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild winter-run	4	2.88	↘
Wild spring-run	58	62.46	↗
Wild late Fall-run	32	53.20	↗
Wild fall-run	489	347.91	↗
Season Total	583	466.45	Not Applicable
Hatchery winter-run	40	116.19	↗
Hatchery spring-run	379	393.35	→
Hatchery late Fall-run	828	2,252.59	↗
Hatchery fall-run	36	44.35	→
Season Total	1,283	2,806.48	Not Applicable

Table 10: Steelhead weekly salvage and loss combined for both the SWP and the CVP fish collection facilities for 2/27/23 – 3/5/23. 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 3/6/23. These are preliminary results and are subject to revision.

Category	Salvage	Loss	Trend
Wild steelhead	56	111.08	↗
Hatchery steelhead	356	738.48	↗
Weekly Total	412	849.56	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 3/6/23. These are preliminary results and are subject to revision.

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild steelhead	131	301.78	↗
Hatchery steelhead	946	2,242.70	↗
Season Total	1,077	2,544.48	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 = 70-90% estimated in the Delta Spring-run = 45-65% estimated in the Delta	Not Applicable	3/7/2023	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) = 62.15 Current yearly WR loss (hatchery) = 0	Salvage is likely to occur over the next week.	3/7/2023	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 * 49,924 = 3.17</p> <p>February 1 – February 28: 0.0000991 * 49,924 = 4.95</p> <p><u>March 1 – March 31: 0.000146 *</u> <u>49,924 = 7.29</u></p> <p>April 1 – April 30: 0.0000507 * 49,924 = 2.53</p> <p>May 1 – May 31: 0.000077 * 49,924 = 3.84</p>	<p>Salvage is likely to 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>	3/7/2023	3 LAD WR were salvaged over the previous week. These LAD WR were genetically confirmed as NOT true WR.
Spring-run surrogate protection (8.6.4)	Feb. 1 - Jun. 30	Not in effect	<p>Coleman National Fish Hatchery (CNFH) Group 1: 0.25% of total in-river CWT fall-run release</p> <p>Feather River Fish Hatchery (FRFH) Group 1:</p>	Releases are anticipated to begin mid-March.	Not Applicable	3/7/2023	No Additional Comments

			0.25% of total in-river CWT spring-run release Nimbus Fish Hatchery (NIM) Group 1: 0.25% of total in-river CWT spring-run release				
OMR Storm Flexibility (8.7)	Jan 1 – Jun 30	Not in effect	-Delta is in excess -QWEST is > 0 -Measurable amount of precipitation has occurred -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) -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 -Risk Assessments conducted by the SaMT/SMT determines no changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations beyond	-Spring-run Surrogate Release Group #1 Loss: 127.5 (0.18% of the 0.50% threshold) -Spring-run Surrogate Release Group #2 Loss: 141.3 (0.21% of the 0.50% threshold) -Spring-run Surrogate Release Group #3 Loss: 14.36 (0.024% of the 0.50% threshold)	Not Applicable	3/7/2023	Based on storm conditions.

			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	Not in effect	<u>Dry:</u> Vernalis flow and CVP/SWP combined exports are 2:1 <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	Not Applicable	Not Applicable	1/3/2023	No Additional Comments

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

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

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	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Feather River Fish Hatchery	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nimbus Fish Hatchery	N/A	N/A	N/A	N/A	N/A	N/A	N/A