

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

## Section 1: Overview

Date: 1/9/2024

### Life Stages Present:

Winter-run Chinook salmon (juvenile)

Winter-run Chinook salmon (adult)

Spring-run Chinook salmon (juvenile)

### Advice to the Water Operations Management Team (WOMT):

No advice is warranted.

For the week beginning 1/9/24, the SWP ITP's COA 8.3.2 Salmonid Presence (OMRI -5,000 cfs) is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Combined exports on 1/9/24 are 6,300 cfs resulting in an Old and Middle River Index (OMRI) of -5,200 cfs and 26.8% of inflow diverted (3-day average). The Delta Cross Channel (DCC) gates closed on 11/27/23 and will remain closed for the OMR season. 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). WR migration into the Delta is increasing with estimation at 30-40% this week and alternate routes into the central Delta, including Georgiana Slough, estimating low entrainment risk this week. Freeport flows are at 18,000 cfs and although routing into Georgiana Slough is still estimated at 24%, the Georgiana BAFF is estimated to decrease entrainment into Georgiana Slough. SaMT estimates an overall low risk of juvenile natural-origin young-of-year spring-run Chinook salmon (SR) entrainment into the central Delta. SR juveniles are beginning their migration downstream; however, current hydrology is expected to decrease entrainment into Georgiana Slough and other alternative routes which allows entrainment into the central Delta to remain low this week.

SaMT estimates an overall medium risk of entrainment of juvenile WR into the export facilities this week. Salvage of WR is likely due to WR movement into the Delta this week; however, there have still been no genetic natural-origin WR observed in salvage this season. SaMT estimates an overall low risk of entrainment for SR into the export facilities. SR have not been observed in salvage this season and seasonal timing would indicate that salvage is unlikely; therefore, entrainment risk is estimated as low this week.

1 length-at-date (LAD) late fall-run Chinook salmon (LFR) was salvaged at the CVP on 12/31/23, which was classified as an older juvenile Chinook salmon and initially counted towards the daily loss threshold for COA 8.6.3; however, genetics confirmed it was a non-WR, so COA 8.6.3 was offramped. SaMT estimates that it is likely that COA 8.6.3 Mid- and Late-season Natural Winter-run Chinook Salmon Daily Loss Threshold will be triggered this upcoming week.

The WY 2023 Interim Operations Agreement (IOP) was extended into WY 2024 until the WY 2024 IOP is finalized. Due to the ITP amendment on 12/22/23 of COA 8.6.3 Mid- and Late-season Natural Winter-run Chinook Salmon Daily Loss Threshold, anytime a threshold is exceeded for COA 8.6.3 under the extended WY 2023 IOP, SaMT will elevate the threshold exceedance to WOMT in order to make a decision on whether or not Reclamation will operate to their share of OMR Management for COA 8.6.3.

## Risk Assessment:

### Section 2-A: Operations and Fish Distribution Table

**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
Young-of-year winter-run Chinook salmon	Current 60-70% Last week 75-80%	Current 30-40% Last Week 20-25%	Current 0% Last Week 0%
Young-of-year spring-run Chinook salmon	Current 75-85% Last week 90-95%	Current 15-25% Last Week 5-10%	Current 0% Last Week 0%
Hatchery origin winter-run Chinook salmon	Current 100% Last week NA	Current 0% Last Week NA	Current 0% Last Week NA

### 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: Medium
  - SR: Low
- 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 as low this week. SaMT estimates WR presence in the Delta is low (20-25%). It is assumed that WR are migrating downstream due to WR being observed in real-time monitoring sites in the Delta as well as seasonal timing. Routing Risk is estimated as low for WR this week. Freeport flows are at 18,000 cfs, the DCC gates are closed for the season and although routing is still estimated at 24% through Georgiana Slough, the Georgiana BAFF is assumed to decrease entrainment for juveniles. Therefore, the overall entrainment risk into the central Delta is estimated to remain low this week.
  - SR: Similar to previous week
    - Exposure Risk is estimated as low this week. SR are beginning to migrate into the Delta this week according to real-time monitoring stations, but percentage of SR in the Delta is still low (15-25%). Routing Risk is also low this week. SR that are migrating downstream are not anticipated to be entrained into the central Delta due to current hydrological conditions. Freeport flows are at 18,000 cfs and DCC gates are closed. Although the STARS model predicts routing at 24% through Georgiana Slough, the Georgiana BAFF is assumed to decrease entrainment for juveniles; therefore, the overall entrainment into the central Delta remains at low this week.

## 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: Low
- Reporting OMR/Export Risk:
  - Baseline OMR (-5,000 cfs)
    - WR: Low
    - SR: Low
  - Scenario 1 OMR: (-4,800 cfs)
    - WR: Low
    - SR: Low
  - Scenario 2 OMR: (-5,100 cfs)
    - WR: Medium
    - SR: Medium
- Overall Entrainment Risk:
  - WR: Medium
  - SR: Low
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
  - WR: Decreased from previous week
    - Exposure Risk is low this week due to no WR salvage occurring so far for WY 2024. Reporting OMR/Export Risk this week has decreased due to OMRI expected to be no more negative than -5,000 cfs, which is more protective for WR and less likely to entrain WR into the export facilities. SaMT anticipates that salvage of WR this week is likely due to high presence of WR observed in the real-time monitoring sites in the Delta; however, due to not seeing any WR in salvage so far this year, the overall entrainment risk into the export facilities is estimated as low.
  - SR: Decreased from previous week
    - Exposure Risk is low due to no SR salvage occurring so far for WY 2024. Reporting OMR/Export Risk this week has decreased due to OMRI expected to be more no negative than -5,000 cfs. Young-of-year SR are also not expected to be near the export facilities due to seasonal timing and low presence of SR in the central Delta (5-10%), real-time monitoring stations in the Delta have observed high numbers of SR, which increases the likelihood that SR entrainment could occur at the export facilities this week; however, due to no SR being observed in salvage so far this season, the overall entrainment risk into the facilities is estimated as low this week.

## Section 2-D: Annual Loss Threshold Risk

- Annual loss threshold risk and Alternative Actions (8.1.5.1. E I, ii, iii and 8.1.5.1 F I, ii)
  - 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 not occurred.
    - Define risk of hitting a threshold, 50%, or 75%, or 100%, and likelihood of exceeding a threshold:
      - Natural-origin WR: 2,396.25 [1.17% of the natural-origin WR Juvenile Production Estimate (JPE)]

- Current Annual Loss: 0
- 50% Threshold based on natural-origin WR JPE: 1,198.13
  - Risk of exceeding threshold: Low
- 75% Threshold based on natural-origin WR JPE: 1,797.19
  - Risk of exceeding threshold: Low
- 100% Threshold based on natural-origin WR JPE: 2,396.25
  - Risk of exceeding threshold: Low
- Hatchery WR: 239.15 [0.12% of the Livingston Stone National Fish Hatchery (LSNFH) hatchery release JPE]
  - Current Annual Loss: 0
  - 50% Threshold based on hatchery WR JPE: 119.58
    - Risk of exceeding threshold: Low
  - 75% Threshold based on hatchery WR JPE: 179.36
    - Risk of exceeding threshold: Low
  - 100% Threshold based on hatchery WR JPE: 239.15
    - 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 Winter-run Chinook Salmon Daily Loss Threshold<sup>1</sup>:
        - January 1 – January 31:  $0.0000124 * 204,808 = 2.54$
        - February 1 – February 28:  $0.0000231 * 204,808 = 4.73$
        - March 1 – March 31:  $0.000372 * 204,808 = 7.62$
        - April 1 – April 30:  $0.0000226 * 204,808 = 4.63$
        - May 1 – May 31:  $0.0000226 * 0 = 0$
        - Highest Daily Loss: 0
          - Risk of exceeding threshold: High

## Section 3: Basis for Advice

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*

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<sup>1</sup> This COA begins on 1/1/2024 and the Interim JPE was distributed on 12/28/2023. These thresholds will be calculated with the Interim JPE numbers until the final JPE is distributed. Once the final JPE numbers are determined and distributed, all the thresholds will be updated and monitored closely in the event of a trigger.

*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.*

*8.6.1 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. The ITP is amended as follows (amended language in bold italics; deleted language in strikethrough): 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~~ **0.00124**% of the CHNWR JPE*
- February 1 – February 28: ~~0.00991~~ **0.00231**% of the CHNWR JPE*
- March 1 – March 31: ~~0.0146~~ **0.00372**% of the CHNWR JPE*
- April 1 – April 30: ~~0.00507~~ **0.00226**% of the CHNWR JPE*
- May 1 – May 31: ~~0.0077~~ **>0**% 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.*

*For the time this Amendment is in effect, 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.*

*8.7 OMR Flexibility During Delta Excess Conditions. Permittee may increase exports to capture peak flows in the Delta during storm-related events (hereafter OMR flex) when:*

- The Delta is in excess conditions,<sup>22</sup> AND*
- QWEST is greater than 0, AND*
- A measurable precipitation event has occurred in the Central Valley, AND*
- Permittee, in coordination with Reclamation, determines that the Delta outflow index indicates a higher level of outflow available for diversion due to peak storm flows, AND*
- None of the following Conditions of Approval are controlling Project 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, and 8.6.4, AND  
Risk assessments conducted by the Salmon and Smelt Monitoring Teams (Conditions of Approval 8.1.5.1 and 8.1.5.2) indicate that an OMR more negative than -5,000 cfs is not likely to trigger an additional real-time OMR restriction (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, and 8.6.4), AND*
- Cumulative salvage at the CVP and SWP facilities of yearling Coleman NFH late fall-run Chinook salmon (as yearling CHNSR surrogates) is less than 0.5% within any of the release groups, AND*
- Risk assessments conducted by the Salmon and Smelt Monitoring Teams determines that no changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex*

*operations beyond those anticipated to occur through operations described in 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, and 8.6.4 are likely to occur.*

*If none of the restrictions listed above apply, Permittee may increase south Delta exports but shall manage Project operations to achieve a five-day average OMR index no more negative than -6,250 cfs. The decision to operate under this Condition of Approval shall be made following the process described in Condition of Approval 8.1.4 (Collaborative Real Time Risk Assessment), and SWP OMR flex is subject to approval by CDFW.*

*If, during OMR flex operations, any of the following conditions occurs, Permittee shall reduce south Delta exports to achieve a 14-day average OMR index no more negative than -5,000 cfs, unless a further reduction in exports is required by another Condition of Approval. The more positive OMR index shall be achieved within 48 hours of the occurrence of the condition, and the 14-day moving average shall apply from that point forward.*

- Risk assessments conducted by the Salmon and Smelt Monitoring Teams (Conditions of Approval 8.1.5.1 and 8.5.1.2) indicate that an OMR more negative than -5,000 cfs is likely to trigger an additional real-time OMR restriction (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, and 8.6.4), OR*
- Cumulative salvage at the CVP and SWP facilities of yearling Coleman NFH late fall-run Chinook salmon (as yearling CHNSR surrogates) exceeds 0.5% within any of the release groups, OR*
- A risk assessment conducted by the Salmon or Smelt Monitoring Teams identifies changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations beyond those anticipated to occur through operations described in 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, and 8.6.4, OR*
- Operational restrictions described in 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 8.17 are required.*



## 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, iii, iii:

- Antecedent Actions: (e.g., Actions such as integrated early winter pulse protection, etc.)
  - N/A
- 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: N/A
  - Prisoners Point (PPT): [Prisoners Point - CDEC](#)
    - Number of days threshold exceeded: Not applicable until June.
    - Days exceeded: N/A
- Tidal Cycle: (*Spring/Neap. Note if tidal cycle has potential to affect south Delta hydrology or X2*)
  - Exiting a spring cycle with a new moon on 1/11 and entering into a neap cycle with a quarter moon on 1/17.
- Turbidity: Not discussed
- Salinity (X2): 79 km on 1/9/24
- Outages:
  - SWP: None projected
  - CVP: None projected
- Exports: 1/9/24 – 1/15/24
  - SWP: 2,000 to 3,500 cfs
  - CVP: 3,600 to 4,200 cfs
- Meteorological Forecast:
  - *“Precipitation chances return today and the active weather pattern will persist through the weekend with periods of heavy mountain snow and mountain travel impacts. Very cold lows expected Thursday morning.”*
  - [NOAA - National Weather Service Forecast](#)
- Weather/Storm Event Projection:
  - Pacific storm moves through Saturday bringing widespread wetting rain, mountain snow, and gusty wind. Snow levels are initially around 3000 to 5000 feet early Saturday, rising to 4500 to 6000 feet Saturday afternoon/night. Lingering showers/snow showers possible into early Sunday, mainly over the mountains. Drier weather then returns Sunday into Monday as high amplitude upper ridging builds inland.
  - These rain events are not likely to trigger COA 8.7 OMR Flexibility During Delta Conditions.
  - Expected OMR flows may become 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 11/27/23 and will remain closed for the OMR management season.
- Sacramento River flow at Freeport: 18,300 cfs
  - Freeport flows peaked last week at 33,700 cfs but expected to decrease this upcoming week.
  - [Sacramento River Flows - CDEC](#)
- San Joaquin River flow at Vernalis: 1,800 cfs

- [San Joaquin River Flows - CDEC](#)
- [San Joaquin River Guidance Plots - CDEC](#)
- QWEST: -200 cfs
  - QWEST is expected to become as negative as -2,000 cfs this week.
- Future export modifications: *Describe anticipated or potential changes to exports:*
  - Exports are anticipated to remain similar to last week in order to keep OMRI no more negative than -5,000 cfs; however, with the potential storm events in the upcoming week they may increase to capture those elevated flows.

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

Date	Averaging Period	USGS gauges (cfs)	OMR Index (cfs)
1/6/24	Daily	-5,900	-5,000
1/6/24	5-day	-5,300	-4,900
1/6/24	14-day	N/A	-6,200
1/8/24	Daily	Not Applicable	-4,900
1/8/24	5-day	Not Applicable	-4,900
1/8/24	14-day	Not Applicable	-6,000

## Section 5: Distribution and Biology

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

#### 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) 2023 is 2,427 adults.
  - Escapement estimate for adults contributing to BY 2023 was low at only 41% of the previous 20-year average.
- Redd distribution and fry emergence timing:
  - Juvenile WR are migrating downstream into the Delta.
  - Estimated juvenile WR passage at Red Bluff Diversion Dam for 12/31/23 is 1,064,813 fish, which represents 96.7% of historical passage. Average historic passage (7/1/2002-6/30/2023) as of 12/31/23 indicates 96.7% with one standard deviation of 3.5% have passed Red Bluff Diversion Dam.
- Juvenile Production Estimate (JPE):
  - WR JPE PWT distributed the Interim JPE letter on 12/28/23. The final JPE is anticipated to be finalized by 1/19/24.
- Livingston Stone National Fish Hatchery (LSNFH) releases:
  - On 12/28/23, LSNFH released 150,654 winter-run Chinook salmon into the Sacramento River.
  - See Appendix 4
- Distribution of natural WR:
  - See Table 1
- Distribution of LSNFH Sacramento River WR and Battle Creek WR:
  - The fish released on 12/28/23 were not acoustically tagged; therefore, will not be found on CalFishTrack. LSNFH made an early release this year due to excess winter-run juveniles; therefore, the WR released on 12/28/23 were released prior to being acoustically tagged.
  - [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 eggs are incubating in the gravel. Based on the real-time monitoring stations in the Delta and at RBDD RST, fry are emerging and migrating into the Delta.
- Hatchery release (in-river and downstream):
  - Coleman National Fish Hatchery (CNFH) have begun releasing yearling spring-run Chinook salmon surrogates (late fall-run Chinook salmon) for COA 8.7 OMR Flexibility During Delta Excess Conditions. The first release occurred on 12/22/23, 4 days after the late fall-run production release. The second release occurred on 12/29/23.
  - See Appendix 4
- Distribution of natural SR:
  - See Table 1
- Distribution of Feather River Fish Hatchery SR:
  - Not applicable at this time.

#### 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*

- DWR acoustically tagged LFR for a study on the newly installed Georgiana BAFF. These fish are currently being tracked on CalFishTrack but additional data and information will be distributed to SaMT once the data becomes available.
  - [CalFishTrack \(noaa.gov\)](https://www.noaa.gov/calfishtrack)
- Trawls: See Appendix 1
  - Sacramento Trawl: SR and WR were caught between 1/2/24 – 1/5/24.
  - Mossdale Trawl: No listed salmonids were caught this week.
  - Chipps Island Trawl: No listed salmonids were caught this week.
- Rotary Screw Traps:
  - Knights Landing, Tisdale and Lower Sacramento RST Data: SR and WR were caught at the Knights Landing, Lower Sacramento, and Tisdale RST between 12/30/23 – 1/8/24.
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
  - Yuba River RST Data: Data was not received prior to the SaMT meeting.
  - Red Bluff Diversion Dam RST Data: Total passage estimates 1,064,813 juvenile WR have passed RBDD. Last updated on 1/9/24.
  - Butte Creek RST Data: SR were caught between 12/27/23 – 1/2/24.
    - [Butte Creek Monitoring Programs](#)
- Seines:
  - Sacramento River Beach Seines: WR and SR were caught between 12/27/23 – 12/29/23.
- Carcass Survey Data:
  - Lower American River Carcass Survey Data:
    - The American River Power Bypass proposal decreased river temperatures down to a weekly average below 56°F. The power bypass officially ended on 12/10/23.
    - Fall-run Carcass Surveys began on 10/16/23 on the Lower American River. For the week of 1/2/24 – 1/5/24, 35 female carcasses were found, with 6% of those carcasses showing pre-spawn mortality and a mean weekly average of 51.8°F.
- Additional hatchery release notifications: *List all relevant hatchery release notifications.*
  - Coleman National Fish Hatchery (CNFH) released the first spring-run Chinook salmon surrogates (late fall-run Chinook salmon) on 12/22/23. CNFH also released the second spring-run Chinook salmon surrogates (late fall-run Chinook salmon) on 12/29/23. Both these releases will be tracked for COA 8.7 OMR Flexibility During Delta Excess Conditions.
  - See Appendix 4
- 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.*
  - An acoustic tag study is being conducted near Georgiana Slough for the newly installed Georgiana BAFF. Late fall-run Chinook salmon have been tagged and released and can be tracked on CalFishTrack (link below). DWR will provide updates once data is collected.
  - [CalFishTrack \(noaa.gov\)](https://www.noaa.gov/calfishtrack)
- Anticipated emigration to continue into the Delta:
  - WR are moving into the Delta in high numbers according to real-time monitoring station observations this week, which is likely due to current hydrology in the Sacramento River and seasonal timing. SR have also begun emigrating into the Delta according to young-of-year SR observations in the real-time monitoring sites. Both WR and SR are likely to have increased movement throughout this week due to the rain events that have occurred.
  - [SacPAS - Migration Timing and Conditions by Cohort](#)

- [SacPAS - Salvage Timing](#)
- Routing and Survival Analysis:
  - Delta STARS Model: See Table 6 in Appendix 1
    - [STARS Model](#)
- Tillotson entrainment model or other entrainment models as they become available:
  - The entrainment tool estimates a median of 0 WR and a maximum loss of 29 WR this week (SacPAS last updated on 1/9/24).
  - [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:*
  - Hatchery late fall-run Chinook salmon from the CNFH production release have been observed in salvage in high numbers this week.
  - [USFWS - Fish Salvage Monitoring](#)

## Appendix 1: SaMT Monitoring and Modeling Data

**Table 3.** Fish monitoring data for the 1/9/24 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.

Location	Butte Creek RST	Tisdale RST	Knights Landing RST	Lower Sac RST	Beach Seines	Sacramento Trawl
Sample Date	12/27- 12/29, 12/30-1/2	1/2-1/7	12/30- 12/30, 1/2- 1/6	1/2-1/8	1/3-1/5	1/2, 1/3, 1/5
Chinook Adults	0	0	0	0	0	1
FR Chinook	0	1,181	146	421	66	55
SR Chinook	1,622	73	15	187	5	5
WR Chinook	0	72	29	46	9	11
LFR Chinook	0	0	1	0	1	5
Chinook (ad-clip)	0	6 SR 36 WR 5 LFR	2 FR 17 WR 2 LFR	30 WR 6 LFR	0	68
Steelhead (wild)	1	1	1	3	0	0
Steelhead (ad-clip)	0	9	4	2	0	3
Green Sturgeon	0	0	0	0	0	0
Flows (avg. cfs)	201	10,879	11,811	18,043	-	-
W. Temp. (avg. °F/°C)	8.0	9.9	10.6	9.6	10.7	10.8
Turbidity (avg. NTU)	1.2	24.0	34.3	22.4	29.0	99.3

**Table 3 Continued.** Fish monitoring data for the 1/9/24 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.

Location	Chippis Is. Midwater Trawl	Mossdale Kodiak Trawl	EDSM	Feather at Herringer RST	Feather at Eye-Side RST	Lower Feather River RST	Yuba River RST
Sample Date	1/2, 1/4, 1/5	1/2, 1/3, 1/5	1/2-1/5	N/A	N/A	1/2-1/8	N/A
Chinook Adults	0	0	0	N/A	N/A	0	N/A
FR Chinook	0	0	1	N/A	N/A	155	N/A
SR Chinook	0	0	0	N/A	N/A	0	N/A
WR Chinook	0	0	1	N/A	N/A	1	N/A
LFR Chinook	0	1	1	N/A	N/A	0	N/A
Chinook (ad-clip)	7	0	7	N/A	N/A	0	N/A
Steelhead (wild)	0	0	0	N/A	N/A	1	N/A
Steelhead (ad-clip)	0	0	2	N/A	N/A	0	N/A
Green Sturgeon	0	0	0	N/A	N/A	0	N/A
Flows (avg. cfs)	-	-	-	N/A	N/A	2,822	N/A
W. Temp. (avg. °F/C)	11.3	12.0	-	N/A	N/A	9.4	N/A
Turbidity (avg. NTU)	20.1	23.2	-	N/A	N/A	9.9	N/A

**Table 4.** Delta sturgeon tagging and monitoring.

Date	Comments
11/14/23	<ul style="list-style-type: none"> <li>1 juvenile white sturgeon located/ tagged near Sacramento River north of Marsh Island on 10/24/23</li> </ul>

**Table 5.** CDFW adult monitoring surveys. N/A means Not Available due to carcass survey data not being received prior to SaMT Meeting.

Location	American River Carcass Survey	Stanislaus River Carcass Survey
Sample Dates	1/2/24 – 1/5/24	12/25/23 – 12/29/23
Live Fish	Not Available	80
Redds	N/A	145
Total Carcasses	7	28
Ad-clipped	11	1
Spawn Condition	Prespawn Mortality: 6%	Not Available
Flows (avg. cfs)	1,750	200
Water Temp (avg. °F)	51.8°F	Not Available

**Table 6.** STARS Modeling

<u>Date:</u> (1/8/24)	<u>DCC</u>	<u>Georgiana</u> <u>Slough</u>	<u>Sacramento</u> <u>River</u>	<u>Sutter and</u> <u>Steamboat</u> <u>Slough</u>	<u>Yolo</u> <u>Bypass</u>
Late Fall-Run Routing Probabilities	N/A	0.24	0.47	0.29	N/A
Late Fall-Run Route Specific Survival	N/A	0.24	0.60	0.49	N/A
Winter-Run Routing Probabilities	N/A	0.13	0.60	0.14/0.14	0
Winter-Run Route Specific Survival	N/A	0.14	0.44	0.37/0.50	N/A



## Appendix 2: Salvage Data

**Table 7.** SWP and CVP SaMT update (1/1/24 – 1/7/24). Trend is the current value compared to the previous week. Reduced counts are the percentage of time that routine salvage sample times were less than 30 minutes per two hours of salvage and export operations. Prepared by Kyle Griffiths on 1/8/24. These are preliminary results and are subject to revision.

[illegible]

**Table 8.** Chinook salmon weekly salvage and loss combined for both the SWP and the CVP fish collection facilities between 1/1/24 – 1/7/24. 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 1/8/24. These are preliminary results and are subject to revision.

Category	Salvage	Loss	Trend
Wild winter-run	0	0	→
Wild spring-run	0	0	→
Wild late Fall-run	0	0	↘
Wild fall-run	0	0	→
Weekly Total	0	0	Not Applicable
Hatchery winter-run	2	8.67	↗
Hatchery spring-run	16	11.53	↗
Hatchery late Fall-run	119	139.67	↗
Hatchery fall-run	0	0	→
Weekly Total	137	159.87	Not Applicable

**Table 9.** Chinook salmon cumulative salvage and loss combined for both the SWP and the CVP fish collection facilities across WY 2024. 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. No official report was prepared this week due to the holiday. These are preliminary results and are subject to revision.

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild winter-run	0	0	→
Wild spring-run	0	0	→
Wild late Fall-run	8	6.4	↘
Wild fall-run	0	0	→
Season Total	8	6.4	Not Applicable
Hatchery winter-run	2	8.67	↗
Hatchery spring-run	28	20.17	↗
Hatchery late Fall-run	127	145.43	↗
Hatchery fall-run	0	0	→
Season Total	157	174.27	Not Applicable

**Table 10.** Steelhead weekly salvage and loss combined for both the SWP and the CVP fish collection facilities for 1/1/24 – 1/7/24. 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 1/8/24. These are preliminary results and are subject to revision.

Category	Salvage	Loss	Trend
Wild steelhead	4	2.72	→
Hatchery steelhead	0	0	↘
Weekly Total	4	2.72	Not Applicable

**Table 11.** Steelhead cumulative salvage and loss combined for both the SWP and the CVP fish collection facilities across WY 2024. 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. No official report was prepared this week due to the holiday season. These are preliminary results and are subject to revision.

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild steelhead	9	6.12	↗
Hatchery steelhead	4	2.72	↘
Season Total	13	8.84	Not Applicable

## Appendix 3: Relevant Actions

**Table 12.** *Relevant WY 2024 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 = 30-40% estimated in the Delta  Spring-run = 15-25% estimated in the Delta	N/A	<b>1/9/24</b>	N/A
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 = 2,396.25  Hatchery CHNWR (loss = 0.12% of JPE) 50% of 0.12% of JPE = 239.15	Current yearly WR loss (natural LAD) = 0  Current yearly WR loss (hatchery) = 0	N/A	<b>1/9/24</b>	N/A
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 juvenile Chinook salmon  12/1-12/31: loss of 26/day unclipped older juvenile Chinook salmon	N/A	N/A	<b>1/9/24</b>	N/A

<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>
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: 0.00124% of the CHNWR JPE</p> <p>February 1 – 28: 0.00231% of the CHNWR JPE</p> <p>March 1 – 31: 0.00372% of the CHNWR JPE</p> <p>April 1 – 30: 0.00226% of the CHNWR JPE</p> <p>May 1 – 31: 0% of the CHNWR JPE</p>	<p>January: 0.0000124*204,808 = 2.5396192 (<b>2.54</b>)</p> <p>February: 0.0000231 * 204,808 = 4.7310648 (<b>4.73</b>)</p> <p>March: 0.0000372 * 204,808 = 7.6188576 (<b>7.62</b>)</p> <p>April: 0.0000226 * 204,808 = 4.6286608 (<b>4.63</b>)</p> <p>May: 0 * 204,808 = 0 (<b>0</b>)</p>	Salvage of older juvenile Chinook salmon is likely to occur this upcoming week.	<b>1/9/24</b>	N/A

<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>
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: 0.25% of total in-river CWT spring-run release</p> <p>Nimbus Fish Hatchery (NIM) Group 1: 0.25% of total in-river CWT fall-run release</p>	N/A	N/A	<b>1/9/24</b>	N/A

OMR Flexibility During Delta Excess Conditions (8.7)	Nov. 1 - Jun. 30	Not in effect	<ul style="list-style-type: none"> <li>•The Delta is in excess conditions, AND</li> <li>•QWEST is &gt;0, AND</li> <li>•A measurable precipitation event has occurred, AND</li> <li>•DWR and Reclamation determines that the Delta outflow index indicates a higher level of outflow available for diversion due to peak storm flows, AND</li> <li>•None of the following COA's are controlling Project 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, and 8.6.4, AND</li> <li>•Risk assessments indicate that an OMR more negative than -5,000 cfs is unlikely to trigger an additional real-time OMR restriction</li> <li>•Cumulative salvage at the CVP and SWP facilities of yearling CNFH LFR (as yearling CHNSR surrogates) is</li> </ul>	<p>COA 8.7 will not trigger this week due to the following:</p> <ul style="list-style-type: none"> <li>•The Delta is not in excess conditions</li> <li>•QWEST is -1,800 cfs</li> <li>•There has not been a measurable precipitation event</li> <li>•Risk assessments indicate that an OMR more negative than -5,000 cfs is likely to trigger an additional real-time OMR restriction</li> <li>•Risk assessments determine that changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations will occur.</li> </ul>	Current storm events are being monitored for COA 8.7.	<b>1/9/24</b>	N/A
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<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>
			less than 0.5% within any of the release groups, AND •Risk assessments determine that no changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations				
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, <b>AND</b> Daily average water temperature at Mossdale exceeds 22.2°C (71.96°F) for 7 non-consecutive days in June, <b>AND</b> Daily average water temperature at Prisoner’s Point exceeds 22.2°C (71.96°F) for 7 non-consecutive days in June	N/A	N/A	<b>1/9/24</b>	N/A



## Appendix 4: Hatchery Releases

**Table 13.** Hatchery salmon release data for BY 2023 and WY 2024.

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
12/6/2023	SCARF	Spring	06-29-45	2,477	2,477	100%	San Joaquin River at Highway 140	PIT, CWT, and Ad-Clip	CDFW	SJRRP
12/6/2023	SCARF	Spring	06-29-46	1,060	1,060	100%	San Joaquin River at Highway 140	PIT, CWT, and Ad-Clip	CDFW	SJRRP
12/18/2023	CNFH	Late Fall	05-67-28	66,574	66,574	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-29	68,204	68,204	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-30	73,473	73,473	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-31	74,938	74,938	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-32	67,155	67,155	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-33	70,038	70,038	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-34	61,405	61,405	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-35	69,674	69,674	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-36	71,048	71,048	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-66-87	74,745	74,745	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-66-88	35,387	35,387	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-00-45	70,552	70,552	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-00-46	72,539	72,539	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-00-47	66,946	66,946	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/22/2023	CNFH	Late Fall	05-66-89	60,764	60,764	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Experimental
12/28/2023	LSNFH	Winter	05-00-31	74,940	74,940	100%	Sacramento River at John F. Reginato River Access	CWT and Ad-clip	USFWS	Production
12/28/2023	LSNFH	Winter	05-00-32	75,714	75,714	100%	Sacramento River at John F. Reginato River Access	CWT and Ad-clip	USFWS	Production
12/29/2023	CNFH	Late Fall	05-6690	71,049	71,049	100%	Sacramento River at John F. Reginato River Access	CWT and Ad-clip	USFWS	Experimental

**Table 14.** Hatchery steelhead release data for BY 2023 and WY 2024.

Release Date	Hatchery	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
12/19/23 - 12/21/23	CNFH	N/A	142,402	142,402	100%	Sacramento River at Sycamore Grove	Ad-clip	USFWS	Production
12/29/23- 1/5/24	CNFH	N/A	276,336	276,336	100%	Sacramento River at Sycamore Grove	Ad-clip	USFWS	Production

**Table 15.** COA 8.6.4 Young-of-Year Spring-run Chinook Salmon Hatchery Surrogate Summary Table, WY 2024.

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