

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

## Section 1: Overview

Date: 2/6/2024

### 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 2/6/24, the SWP ITP's COA 8.5.2 Salmonid Presence and 4.10.5.10.1 Onset of OMR Management (OMRI -5,000 cfs) is controlling exports at the State Water Project (SWP) and Central Valley Project (CVP), respectively. Combined exports on 2/6/24 are 8,300 cfs resulting in an Old and Middle River Index (OMRI) of -4,900 cfs and 11.4% of inflow diverted (14-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 medium risk of entrainment into the central Delta for juvenile natural-origin winter-run Chinook salmon (WR). Georgiana Slough is estimating low entrainment risk this week. However, due to the hydrological events predicted in the upcoming week, 60-70% of WR estimated in the Delta and alternative entrainment routes such as Threemile Slough and Georgiana Slough, SaMT estimates WR entrainment into the central Delta at medium risk this week. SaMT estimates an overall medium risk of juvenile natural-origin young-of-year spring-run Chinook salmon (SR) entrainment into the central Delta. SR juveniles are migrating downstream and although current hydrology is expected to decrease entrainment into Georgiana Slough, there are still other alternative routes, including Threemile Slough, that SR may be entrained into. Therefore, SaMT estimates SR entrainment into the central Delta at medium risk this week due to SR anticipated movement from the storm events that have occurred.

SaMT estimates an overall high risk of entrainment of juvenile WR into the export facilities this week. Salvage of WR is likely due to WR movement into the Delta and hydrology this week. LAD WR have been observed in salvage in high numbers throughout the week; therefore, SaMT estimates that more LAD WR are near the export facilities. OMRI is expected to decrease this week to -5,000 cfs on 2/6/24 before increasing to -3,500 cfs for the remainder of the week. High salvage events and seasonal timing are other contributing factors for the high entrainment risk this week. SaMT estimates an overall medium risk of entrainment for SR into the export facilities. Young-of-year SR have not been observed in salvage this season; however, a yearling SR was genetically confirmed on 2/1/24, which contributes to medium entrainment risk this week. SaMT estimates that due to seasonal timing, it may still be early to see YOY SR observed in salvage this week. However, with OMRI at -5,000 cfs and the export facilities pumping ~8,000 cfs on 2/4/24, SaMT estimates that it is possible to see additional yearling SR and potentially YOY SR in salvage; therefore, entrainment risk is estimated as medium this week.

Length-at-date (LAD) older juvenile Chinook salmon have been salvaged in high numbers at the SWP and CVP salvage facilities over the previous week. COA 8.6.3 was initially triggered 4 times in the previous week;

however, genetics confirmed that the older juveniles were not WR and therefore COA 8.6.3 was offramped. Due to both SWP and CVP already operating to COA 8.3.1 Integrated Early Winter Pulse Protection through 2/5/24, no further action was required. 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.

## Section 2: Risk Assessment

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

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, Reclamation will not be adhering to the WY 2024 COA 8.6.3 SWP ITP amendment but rather will operate to the WY 2023 COA 8.6.3 SWP ITP amendment.

**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 25-39% Last week 30-44%	Current 60-70% Last Week 55-65%	Current 1-5% Last Week 1-5%
Young-of-year spring-run Chinook salmon	Current 60-75% Last week 65-80%	Current 25-40% Last Week 20-35%	Current 0% Last Week 0%
Hatchery origin winter-run Chinook salmon	Current 100% Last week 100%	Current 0% Last Week 0%	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: Medium
- Routing Risk:
  - WR: Low
  - SR: Low
- Overall Entrainment Risk:
  - WR: Medium
  - SR: Medium
- 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 high this week. SaMT estimates WR presence in the Delta is medium (60-70%). WR are actively migrating downstream and being observed in real-time monitoring sites in the Delta. Routing Risk is estimated as low for WR this week. Freeport flows are at 57,000 cfs, the DCC gates are closed for the season and although routing is estimated at 18% through Georgiana Slough, the Georgiana BAFF is assumed to decrease entrainment for juveniles. However, due to increased presence of WR in the Delta and expected increase in presence this upcoming week due to hydrology, the

overall entrainment risk into the central Delta is estimated to remain at medium this week.

- SR: Similar to previous week
  - Exposure Risk is estimated as medium this week. SR are beginning to actively migrate into the Delta according to real-time monitoring stations (25-40%). Routing Risk is estimated as low this week. Freeport flows are at 57,000 cfs and DCC gates are closed. Although the STARS model predicts routing at 18% through Georgiana Slough, the Georgiana BAFF is assumed to decrease routing into Georgiana Slough. However, due to SR presence in the Delta this week based on real-time monitoring estimates, the overall entrainment into the central Delta is estimated remain at medium 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: High
  - SR: Low
- Reporting OMRI/Export Risk:
  - Baseline OMRI (-5,000 cfs)
    - WR: High
    - SR: High
  - Scenario 1 OMRI: (-2,000 cfs)
    - WR: Low
    - SR: Low
  - Scenario 2 OMRI: (-5,000 cfs)
    - WR: High
    - SR: High
- Overall Entrainment Risk:
  - WR: High
  - SR: Medium
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
  - WR: Increase from previous week
    - Exposure Risk is high this week due to high numbers of LAD WR being observed in salvage over the previous week. Although some of these LAD WR have been genetically confirmed as not WR, the likelihood to see additional LAD and/or genetic WR in the upcoming week is likely due to seasonal timing and recent salvage events. Reporting OMRI/Export Risk this week is high due to OMRI expected to be more negative than -3,500 cfs on 2/7/24, which increases the likelihood of higher entrainment of WR into to the salvage facilities. Since WR were observed in salvage at OMRI -2,000 cfs, SaMT predicts that with the OMRI being more negative than -3,500 cfs, it will increase salvage of WR at the export facilities. Therefore, entrainment risk is estimated as high this week.
  - SR: Increased from previous week
    - Exposure Risk is low this week. No young-of-year SR were observed in salvage over the previous week; however, 1 yearling SR was observed on 2/1/24 and SaMT estimates more may be observed in salvage in the upcoming week. Reporting OMRI/Export Risk this week is high due to OMRI values expected to be more negative than -3,500 cfs on 2/7/24. Real-time monitoring stations in the Delta have observed high numbers of

young-of-year SR, which increases the likelihood that YOY SR entrainment could occur at the export facilities this week. Therefore, the overall entrainment risk into the facilities is estimated as medium 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: 2,748.28 [1.17% of the natural-origin WR Juvenile Production Estimate (JPE)]
        - Current Annual Loss: 198.56
        - 50% Threshold based on natural-origin WR JPE: 1,374.14
          - Risk of exceeding threshold: Low
        - 75% Threshold based on natural-origin WR JPE: 2,061.21
          - Risk of exceeding threshold: Low
        - 100% Threshold based on natural-origin WR JPE: 2,748.28
          - Risk of exceeding threshold: Low
      - Hatchery WR: 232.30 [0.12% of the Livingston Stone National Fish Hatchery (LSNFH) hatchery release JPE]
        - Current Annual Loss: 0
        - 50% Threshold based on hatchery WR JPE: 116.15
          - Risk of exceeding threshold: Low
        - 75% Threshold based on hatchery WR JPE: 174.23
          - Risk of exceeding threshold: Low
        - 100% Threshold based on hatchery WR JPE: 232.30
          - 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:
        - January 1 – January 31:  $0.0000124 * 234,896 = 2.91$
        - February 1 – February 28:  $0.0000231 * 234,896 = 5.43$
        - March 1 – March 31:  $0.000372 * 234,896 = 8.74$
        - April 1 – April 30:  $0.0000226 * 234,896 = 5.31$
        - May 1 – May 31:  $0.0000226 * 0 = 0$
        - Highest LAD Older Juvenile Daily Loss for February: 37.98
        - Highest Genetic WR Daily Loss for February: 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 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.)
  - COA 8.3.1 Early Integrated Pulse Protection triggered on 1/22/24, which limited OMRI to be no more negative than -2,000 cfs. Both SWP and CVP will be operated to this through 2/5/24. COA 8.5.2 Larval and Juvenile Delta Smelt Protection triggered on 2/5/24, which limits OMRI to no more negative than -3,500 cfs on a 7-day average, starting on 2/7/24, until the subsequent SLS survey indicates an average Secchi depth greater than 1 meter in the Central and South Delta. The subsequent SLS survey will be on the water on 2/20/24.
- 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 last quarter moon on 2/9/24 and entering into a neap cycle.
- Turbidity: Not discussed
- Salinity (X2): 71 km on 2/6/24
- Outages:
  - SWP: None projected
  - CVP: None projected
- Exports: 2/6/24 – 2/12/24
  - SWP: 800 to 2,500 cfs
  - CVP: 1,800 to 3,600 cfs
- Meteorological Forecast:
  - *“Mostly quiet weather persists through the remainder of today. A quick moving system will then bring light Valley rain and moderate mountain snow showers to the region through Wednesday. Scattered mountain snow showers continue through Friday, before quieter and warmer weather arrives from the weekend into early next week.”*
  - [NOAA - National Weather Service Forecast](#)
- Weather/Storm Event Projection:
  - These rain events are not likely to trigger COA 8.7 OMR Flexibility During Delta Conditions.
  - 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: 57,700 cfs
  - [Sacramento River Flows - CDEC](#)
- San Joaquin River flow at Vernalis: 6,000 cfs
  - Vernalis flows are expected to peak this week at 7,000 cfs.
  - [San Joaquin River Flows - CDEC](#)

- [San Joaquin River Guidance Plots - CDEC](#)
- QWEST: +15,000 cfs
  - QWEST is expected to remain positive this week but may drop down to +6,000 cfs by the end of the week.
- Future export modifications: *Describe anticipated or potential changes to exports:*
  - Exports are anticipated to increase this week. However, the SWP and CVP will operate to a 7-day average OMRI of -3,500 cfs for COA 8.5.2 beginning 2/7/24.

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

Date	Averaging Period	USGS gauges (cfs)	OMR Index (cfs)
2/3/24	Daily	-2,200	-1,900
2/3/24	5-day	-2,600	-2,000
2/3/24	14-day	-2,500	-2,300
2/5/24	Daily	Not Applicable	-1,900
2/5/24	5-day	Not Applicable	-2,000
2/5/24	14-day	Not Applicable	-1,979

## 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 1/28/24 is 1,088,520 fish, which represents 98.4% of historical passage. Average historic passage (7/1/2002-6/30/2023) as of 1/14/24 indicates 98.4% with one standard deviation of 1.9% have passed Red Bluff Diversion Dam.
- Juvenile Production Estimate (JPE):
  - WR JPE PWT distributed the Final JPE letter on 1/12/24.
- Livingston Stone National Fish Hatchery (LSNFH) releases:
  - On 12/28/23, LSNFH released 150,654 winter-run Chinook salmon into the Sacramento River.
  - On 1/19/24, LSNFH released 227,527 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 and 1/19/24 were released prior to being acoustically tagged.
  - The fish released on 1/19/24 were not acoustically tagged; therefore, will not be found on CalFishTrack.
  - [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:
  - Based on the real-time monitoring stations in the Delta and at RBDD RST, fry are emerging and migrating into the Delta. Yearling SR are also migrating into the Delta according to genetic confirmation in salvage of larger SR.
- Hatchery release (in-river and downstream):
  - Coleman National Fish Hatchery (CNFH) began 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. The third release occurred on 1/11/24.
  - Loss from the first, second, and third release groups has occurred with loss for release group 1 totaling 28.05 fish, loss for release group 2 totaling 17.30 fish, and loss for release group three totaling 33.56 fish.
  - See Appendix 3 and 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/)
- Trawls: See Appendix 1
  - Sacramento Trawl: WR and SR were caught between 1/29/24 – 1/30/24.
  - Mossdale Trawl: No listed species were caught this week.
  - Chipps Island Trawl: WR were caught between 1/29/24 – 2/2/24.
- Rotary Screw Traps:
  - Knights Landing RST Data: Trapping did not occur this week.
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
  - Tisdale RST Data: WR and SR were caught between 1/29/24 – 2/3/24.
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
  - Lower Sacramento RST Data: Trapping did not occur this week.
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
  - Lower Feather RST Data: WR and SR were caught between 1/30/24 – 2/5/24.
  - Yuba River RST Data: SR were caught between 1/27/24 – 2/2/24.
  - Red Bluff Diversion Dam RST Data: Total passage estimates 1,088,520 juvenile WR have passed RBDD. Last updated on 1/28/24.
  - Butte Creek RST Data: SR were caught between 1/26/24 – 1/28/24.
    - [Butte Creek Monitoring Programs](#)
- Seines:
  - Sacramento River Beach Seines: SR and WR were caught between 1/29/24 – 2/2/24.
- 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 and concluded on 1/24/24. Total number of fish observed was roughly 18,000 fish which is the highest carcass survey numbers since 2013.
- Additional hatchery release notifications: *List all relevant hatchery release notifications.*
  - Coleman National Fish Hatchery (CNFH) released the first SR surrogates (late fall-run Chinook salmon) on 12/22/23. CNFH released the second SR surrogates (late fall-run Chinook salmon) on 12/29/23. CNFH released the third and final SR surrogates (late fall-run Chinook salmon) on 1/11/24. All of these releases will be tracked for COA 8.7 OMR Flexibility During Delta Excess Conditions.
  - Loss from the first, second, and third release groups has occurred with loss for release group 1 totaling 28.05 fish, loss for release group 2 totaling 17.30 fish, and loss for release group 3 totaling 33.56 fish.
  - 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 stations and observations in salvage, which is likely due to current hydrology in the Sacramento River and seasonal timing.
  - Young-of-year SR have also begun emigrating into the Delta according to young-of-year SR observations in the real-time monitoring sites. Yearling SR have also begun migrating downstream and into the Delta based on genetically confirmed salvage data. 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 17 WR and a maximum loss of 127 WR this week (SacPAS last updated on 2/6/24).
  - [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:*
  - LAD WR have been observed in salvage in high numbers over the previous week.
  - [USFWS - Fish Salvage Monitoring](#)

## Appendix 1: SaMT Monitoring and Modeling Data

**Table 3.** Fish monitoring data for the 2/6/24 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	1/26/24- 1/28/24	1/29/24- 2/1/24, 2/2/24- 2/3/24	1/24/24- 1/30/24	1/18/24- 1/21/24, 1/29/24- 1/31/24	1/29/24- 1/31/24, 2/2/24	1/29/24- 1/30/24, 2/2/24
Chinook Adults	0	0	0	0	0	0
FR Chinook	0	344	2,684	2,711	179	116
SR Chinook	40	2	16	48	2	1
WR Chinook	0	1	30	18	1	4
LFR Chinook	0	0	0	0	0	0
Chinook (ad-clip)	0	0	1 SR 51 WR	2 SR 53 WR	2	4
Steelhead (wild)	1	0	0	0	0	2
Steelhead (ad-clip)	0	0	2	2	0	3
Green Sturgeon	0	0	0	0	0	0
Flows (avg. cfs)	748	23,559	22,477	24,505	-	-
W. Temp. (avg. °C)	9.8	11.8	11.3	10.9	12.6	12.0
Turbidity (avg. NTU)	2.9	48.1	67.1	37.5	28.4	58.0

**Table 3 Continued.** Fish monitoring data for the 2/6/24 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	1/29/24- 1/30/24, 2/1/24- 2/2/24	1/29/24, 1/31/24, 2/2/24	1/29/24- 2/2/24	1/30/24, 2/1/24- 2/5/24	1/25/24- 1/31/24	1/30/24- 1/31/24, 2/2/24- 2/5/24	1/27/24- 2/2/24
Chinook Adults	0	0	0	0	0	0	0
FR Chinook	0	2	14	369	5,251	656	8,068
SR Chinook	0	0	0	5	0	5	30
WR Chinook	3	0	0	0	0	0	0
LFR Chinook	2	0	0	0	0	0	0
Chinook (ad-clip)	2	0	1	0	0	0	0
Steelhead (wild)	0	0	0	0	0	0	4
Steelhead (ad-clip)	4	0	2	0	0	0	0
Green Sturgeon	0	0	0	0	0	0	0
Flows (avg. cfs)	-	-	-	9,958	657	10,278	970
W. Temp. (avg. °F/C)	12.0	12.7	-	9.0	9.8	11.4	11.0
Turbidity (avg. NTU)	42.8	38.5	-	3.6	2.6	11.8	4.6

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

Date	Comments
2/6/24	<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 ending on 1/24/24.

Location	American River Carcass Survey	Stanislaus River Carcass Survey
Sample Dates	Not Sampling	Not Sampling
Live Fish	Not Available	N/A
Redds	N/A	N/A
Total Carcasses	N/A	N/A
Ad-clipped	N/A	N/A
Spawn Condition	Prespawn Mortality: N/A	Not Available
Flows (avg. cfs)	N/A	N/A
Water Temp (avg. °F)	N/A	Not Available

**Table 6.** STARS Modeling

<u>Date:</u> (2/5/24)	<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	0.18	0.47	0.35	N/A
Late Fall-Run Route Specific Survival	N/A	0.36	0.72	0.71	N/A
Winter-Run Routing Probabilities	N/A	0.09	0.61	0.11/0.08	0.1
Winter-Run Route Specific Survival	N/A	0.70	0.80	0.70/0.80	0.66



## Appendix 2: Salvage Data

**Table 7.** SWP and CVP SaMT update (1/29/24 – 2/4/24). 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 2/5/24. 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 1/29/24 – 2/4/24. 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 2/5/24. These are preliminary results and are subject to revision.

Category	Salvage	Loss	Trend
Wild winter-run	4	17.54	↗
Wild spring-run	8	6.71	↘
Wild late Fall-run	4	2.88	↗
Wild fall-run	87	133.22	↗
Weekly Total	103	160.35	Not Applicable
Hatchery winter-run	33	144.57	↗
Hatchery spring-run	15	23.56	↗
Hatchery late Fall-run	20	30.13	↘
Hatchery fall-run	0	0	→
Weekly Total	68	198.26	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	5	21.87	↘
Wild spring-run	16	27.22	↗
Wild late Fall-run	12	9.28	→
Wild fall-run	157	192.18	↗
Season Total	190	250.55	Not Applicable
Hatchery winter-run	33	144.57	↗
Hatchery spring-run	71	79.27	↗
Hatchery late Fall-run	312	480.13	↘
Hatchery fall-run	0	0	→
Season Total	416	703.97	Not Applicable

**Table 10.** Steelhead weekly salvage and loss combined for both the SWP and the CVP fish collection facilities for 1/29/24 – 2/4/24. 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 2/5/24. These are preliminary results and are subject to revision.

Category	Salvage	Loss	Trend
Wild steelhead	111	217.83	↗
Hatchery steelhead	4	17.32	↗
Weekly Total	115	235.15	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	194	307.12	↗
Hatchery steelhead	37	72.61	↗
Season Total	231	379.73	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 = 60-70% estimated in the Delta  Spring-run = 25-40% estimated in the Delta	N/A	<b>2/6/24</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 = 2,748.28  Hatchery CHNWR (loss = 0.12% of JPE) 50% of 0.12% of JPE = 232.30	Current yearly WR loss (natural LAD) = 198.56  Current yearly WR loss (hatchery) = 0	LAD natural-origin WR are likely to be observed in salvage in the upcoming week.	<b>2/6/24</b>	LAD natural-origin WR have been observed in salvage over the previous week.
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>2/6/24</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: <math>0.0000124 * 234,896 = 2.9127104</math> (<b>2.91</b>)</p> <p><u>February:</u> <u><math>0.0000231 * 234,896 =</math></u> <u><math>5.4260976</math> (<b>5.43</b>)</u></p> <p>March: <math>0.0000372 * 234,896 = 8.7381312</math> (<b>8.74</b>)</p> <p>April: <math>0.0000226 * 234,896 = 5.3086496</math> (<b>5.31</b>)</p> <p>May: <math>0 * 234,896 = 0</math> (<b>0</b>)</p>	Salvage of older juvenile Chinook salmon/genetic WR is likely to occur this upcoming week.	<b>2/6/24</b>	LAD WR have been observed in salvage in high numbers over the previous week.

<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>2/6/24</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 in excess conditions <u>with restrictions</u>.</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>2/6/24</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>2/6/24</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	05-66-90	71,049	71,049	100%	Sacramento River at John F. Reginato River Access	CWT and Ad-clip	USFWS	Experimental
1/11/2024	CNFH	Late Fall	05-66-91	67,018	67,018	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Experimental
1/19/2024	LSNFH	Winter	05-00-33	71,101	71,101	100%	Sacramento River at John F. Reginato River Access	CWT and Ad-clip	USFWS	Production

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
1/19/2024	LSNFH	Winter	05-00-34	77,433	77,433	100%	Sacramento River at John F. Reginato River Access	CWT and Ad-clip	USFWS	Production
1/19/2024	LSNFH	Winter	05-00-35	78,993	78,993	100%	Sacramento River at John F. Reginato River Access	CWT and Ad-clip	USFWS	Production
2/5/24-2/6/24	MOK	Steelhead	06-19-43	63,260	63,260	100%	New Hope Landing	Ad-clip	CDFW	Production

**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
1/31/2024	NIM	N/A	168,000	168,000	100%	Lower American River at Sunrise Boat Ramp	Ad-clip	CDFW	Production
2/1/2024	NIM	N/A	173,000	173,000	100%	Lower American River at Sunrise Boat Ramp	Ad-clip	CDFW	Production
2/2/2024	NIM	N/A	175,000	175,000	100%	Lower American River at Sunrise Boat Ramp	Ad-clip	CDFW	Production
2/5/24-2/6/24	MOK	06-19-43	63,260	63,260	100%	New Hope Landing	CWT and Ad-clip	CDFW	Production
2/5/24-2/9/24 and 2/12/24-2/16/24	FRFH	N/A	445,000	445,000	100%	Feather River at Boyd's Pumping Boat Ramp	Ad-clip	CDFW	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