

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

## Section 1: Overview

Date: 12/27/2022

### Life Stages Present:

Winter-run Chinook salmon (adults)

Winter-run Chinook salmon (juvenile)

Spring-run Chinook salmon (juvenile)

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

No advice is warranted.

For the week beginning 12/27/22, E/I is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Beginning 1/1/23, COA 8.3.2 Salmon Presence is expected to be controlling exports. Combined exports on 12/27/22 are 5,400 cfs resulting in an Old and Middle River Index (OMRI) of -4,900 cfs and 30.1% of inflow diverted (14-day average). The Delta Cross Channel (DCC) gates are projected to remain closed for seasonal requirement. The SWP is exporting this week and no outages are planned.

SaMT estimates an overall medium risk of entrainment into the central Delta for juvenile natural-origin winter-run Chinook salmon (WR). Flows at Freeport are high, the DCC gates are closed, and entrainment into Georgiana and Threemile Slough is possible even with Sacramento River flows expected to increase due to the storm events. WR are expected to move into the Delta with the projected storms which estimates overall entrainment risk to be medium this week. SaMT also estimates an overall medium risk of juvenile Young-of-Year (YOY) natural-origin spring-run Chinook salmon (SR) entrainment into the central Delta. Current hydrological conditions have a decreased routing risk for any salmonids present in the Delta; however, current storm events are likely to move YOY SR into the Delta with a chance of entrainment into Threemile Slough and Georgiana. Therefore, entrainment into the central Delta is estimated as medium this week.

SaMT estimates an overall medium risk of entrainment of juvenile WR into the export facilities this week. Salvage of WR is possible due to exports increasing and OMRI projected to be more negative than -5,000 cfs. SaMT also estimates an overall medium risk of entrainment of juvenile YOY SR into the export facilities due OMRI projected to be more negative than -5,000 cfs and exports increasing due to the upcoming storm events.

COA 8.6.2 Early Season Natural Origin WR Discrete Daily Loss Threshold is currently in effect until 12/31/2022. Beginning 1/1/2022, COA 8.6.3 Mid and Late Season Natural WR Chinook Salmon Daily Loss Threshold will be in effect. Although SaMT does not anticipate that COA 8.6.2 Early Season Natural Origin WR Discrete Daily Loss Threshold of 26 older juvenile Chinook salmon will be exceeded during this upcoming week, SaMT does not discredit the possibility. COA 8.6.3 Mid and Late Season Natural WR Chinook Salmon Daily Loss Threshold does not currently have finalized Interim JPE thresholds but Interim JPE thresholds will be finalized by 12/30/2022 and be monitored for potential exceedances once COA 8.6.3 is in effect.

## Risk Assessment:

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

Some real-time monitoring data was not available before the SaMT meeting; therefore, fish distribution estimates were not updated due to lack of availability of data due to the state and federal holiday. This will be accounted for in next week's Risk Assessment.

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

Location	Yet to Enter Delta	In the Delta	Exited the Delta
YOY winter-run Chinook salmon <sup>1</sup>	Current 75-90% Last week 75-90%	Current 10-25% Last Week 10-25%	Current 0% Last Week 0%
YOY spring-run Chinook salmon	Current 90-99% Last week 90-99%	Current 1-10% Last Week 1-10%	Current 0% Last Week 0%
Hatchery origin winter-run Chinook salmon	Current NA Last week NA	Current NA Last Week NA	Current NA 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: 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 at medium this week. SaMT estimates WR presence in the Delta is increasing due to the incoming storm event. Routing Risk has decreased to low this week based on hydrological conditions. Freeport flows are increasing this week, DCC gates are closed and the STARS model predicts low entrainment into Georgiana and Threemile Slough; however, based on the storm event, WR are expected to emigrate downstream and into the Delta. Therefore, the overall entrainment into the central Delta is estimated to be medium this week.
  - SR: Similar to previous week
    - Exposure Risk is estimated as medium this week due to an anticipated increase in YOY SR estimated to emigrate downstream and into the Delta due to the upcoming storm events. Routing Risk has decreased to low this week based on hydrologic conditions.

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<sup>1</sup> SaMT did not move WR or SR distribution this week due to the lack of data available due to the state and federal holiday.

Freeport flows have increased, the DCC gates are closed and the STARS model is estimating 26% entrainment into Georgiana Slough. Therefore, the overall entrainment into the central Delta is medium.

## 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 (-4,900 cfs)
    - WR: Medium
    - SR: Medium
  - Scenario 1 OMR: (-2,500 cfs)
    - WR: Low
    - SR: Low
  - Scenario 2 OMR: (-7,500 cfs)
    - WR: High
    - SR: High
- Overall Entrainment Risk:
  - WR: Medium
  - SR: Medium
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
  - WR: Similar to previous week
    - Reporting OMR/Export Risk has increased to high this week due to OMRI expected to be more negative than -5,000 cfs and exports expected to increase later in the week to capture the storm event. Exposure Risk has decreased to low this week due to no WR being seen in salvage over the past week. Therefore, the overall entrainment risk into the export facilities remains at medium this week.
  - SR: Similar to previous week
    - Reporting OMR/Export Risk has increased to high this week due to OMRI expected to be more negative than -5,000 cfs and exports are expected to increase later this week to capture the storm events. Exposure Risk remains low this week. Natural-origin YOY SR have not been observed at the export facilities for WY 2023. However, the anticipated upcoming storms are projected move SR downstream and into the Delta. Therefore, the overall entrainment risk into the facilities is estimated to be 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 occurred.
    - Define risk of hitting a threshold, 50%, or 75%, or 100%, and likelihood of exceeding a threshold:

- Natural-origin WR: Not Available (N/A) at this time. [1.17% of the natural-origin WR Juvenile Production Estimate (JPE)]
  - Current Annual Loss: 17.54<sup>2</sup>
  - 50% Threshold based on natural-origin WR JPE: N/A
    - Risk of exceeding threshold: N/A
  - 75% Threshold based on natural-origin WR JPE: N/A
    - Risk of exceeding threshold: N/A
  - 100% Threshold based on natural-origin WR JPE: N/A
    - Risk of exceeding threshold: N/A
- Hatchery WR: N/A [0.12% of the Livingston Stone National Fish Hatchery (LSNFH) hatchery release JPE]
  - Current Annual Loss: N/A
  - 50% Threshold based on hatchery WR JPE: N/A
    - Risk of exceeding threshold: N/A
  - 75% Threshold based on hatchery WR JPE: N/A
    - Risk of exceeding threshold: N/A
  - 100% Threshold based on hatchery WR JPE: N/A
    - Risk of exceeding threshold: N/A

#### Section 2-E: Daily Loss Threshold Risk

- Daily loss threshold risk and Alternative Actions
  - Loss at the SWP and CVP facilities compared to estimated remaining population in Delta and upstream of the Delta:
    - Daily loss thresholds and subsequent loss and associated operations:
      - COA 8.6.3 Mid and Late Season Natural WR Chinook Salmon Daily Loss Threshold<sup>3</sup>:
        - January 1 – January 31: 0.0000635 \* N/A = 2.84
        - February 1 – February 28: 0.0000991 \* N/A = N/A
        - March 1 – March 31: 0.000146 \* N/A = N/A
        - April 1 – April 30: 0.0000507 \* N/A = N/A
        - May 1 – May 31: 0.000077 \* N/A = N/A
        - Highest Daily Loss: N/A
          - Risk of exceeding threshold: N/A
      - COA 8.6.2 Early Season Natural-Origin WR Discrete Daily Loss Threshold:
        - December Daily Loss Threshold: 26 per day older juvenile Chinook salmon
          - Highest Daily Loss: 17.54
          - Risk of exceeding threshold: Medium

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<sup>2</sup> Loss of natural-origin WR Chinook occurred on 12/18/2022 which is tracked prior to the JPE numbers being finalized and distributed. Risk of exceeding thresholds will not be estimated due to the total annual loss threshold still being finalized.

<sup>3</sup> This COA will begin on 1/1/2023; however, the Interim JPE will not be finalized until 12/30/2022. Once the Interim JPE numbers are finalized and distributed, these triggers will be updated and monitored closely in the event of a trigger.

### 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.*

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

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

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

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

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

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

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

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

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

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

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

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

*If the single-year loss threshold is exceeded, Permittee and Reclamation shall also convene an independent panel to review Project operations and the single-year loss threshold prior to November 1, as described in Condition of Approval 8.2. The purpose of the independent panel is to review the actions and decisions contributing to the loss trajectory that lead to an exceedance of the single-year loss threshold, and make*

*recommendations on modifications to Project implementation, or additional actions to be conducted to stay within the single-year loss threshold in subsequent years.*

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

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

*8.6.2 Early-season Natural Winter-run Chinook Salmon Discrete Daily Loss Threshold. To minimize entrainment, salvage, and take of early-migrating natural CHNWR Permittee shall restrict south Delta exports for five consecutive days to achieve a five-day average OMR index no more negative than -5,000 cfs when daily loss of older juveniles (natural older juvenile Chinook salmon) and yearling CHNSR used as a surrogate for CHNWR) at the SWP and CVP salvage facilities exceeds the following thresholds:*

- From November 1 – November 30: 6 older juvenile Chinook salmon*
- From December 1 – December 31: 26 older juvenile Chinook salmon*

*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.*

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

- January 1 – January 31: 0.00635 % of the CHNWR JPE*
- February 1 – February 28: 0.00991 % of the CHNWR JPE*
- March 1 – March 31: 0.0146 % of the CHNWR JPE*
- April 1 – April 30: 0.00507 % of the CHNWR JPE*
- May 1 – May 31: 0.0077 % of the CHNWR JPE*

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



## Section 4: Hydrology and Operations

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

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

- Antecedent Actions: (e.g., Actions such as integrated early winter pulse protection, etc.)
  - No additional actions.
- Water Temperature (ITP COA 8.8 threshold: daily average water temperature exceeds 22.2° C for 7 non-consecutive days in June):
  - Mossdale (MSD): [Mossdale - CDEC](#)
    - Number of days threshold exceeded: Not applicable until June.
    - Days exceeded: Not applicable at this time.
  - Prisoners Point (PPT): [Prisoners Point - CDEC](#)
    - Number of days threshold exceeded: Not applicable until June.
    - Days exceeded: Not applicable at this time.
- Tidal Cycle: (*Spring/Neap. Note if tidal cycle has potential to affect south Delta hydrology or X2*)
  - Currently in a neap cycle. This neap cycle will push the transitional zone downstream of the DCC gates and Georgiana Slough which will decrease entrainment effects to juvenile WR and SR that are in the vicinity.
- Turbidity: Not discussed
- Salinity (X2): >81 km on 12/27/22
  - Hydraulic Footprint (*Provide brief description of hydrologic footprint and summary of relevant DSM2 results*): DSM2 results were not discussed during SaMT this week. SaMT discussed excluding them from the assessment altogether but a final decision has not been made.
- Outages:
  - SWP: None projected
  - CVP: None projected
- Exports: 12/27/22 – 1/2/22
  - SWP: 300 to 6,680 cfs
  - CVP: 900 to 4,200 cfs
- Meteorological Forecast:
  - *“Active storm pattern will continue for the next week. First storm is moving through currently with strong winds and moderate to heavy precipitation expected into the morning. Snow will continue in the mountains through tonight.”*
  - [NOAA - National Weather Service Forecast](#)
- Weather/Storm Event Projection:
  - SaMT discussed the potential for COA 8.7 (OMR Storm Flex) to occur once COA 8.3.2 (Salmonid Presence) onramps on 1/1/2023; however, SaMT determined that changes to foraging, sheltering, or migration behavior as a result of OMR Flex operations are likely to occur if OMR is more negative than -5,000 cfs. COA 8.6.3 Interim JPE numbers will not be finalized until 12/30/2023; therefore, SaMT is not able to assess whether or not an OMR more negative than -5,000 cfs is likely to trigger an additional real-time trigger, such as COA 8.6.3.
- DCC Gates position:
  - DCC gates closed on 11/28/22 and will remain closed for seasonal requirements. DCC gates may open this month if D-1641 requirements cannot be met; however, that decision will be made on a real-time basis.

- Sacramento River flow at Freeport: 7,300 cfs
  - Flows are anticipated to further increase later in the week to ~20,000 cfs.
  - [Sacramento River Flows - CDEC](#)
- San Joaquin River flow at Vernalis: 1,000 cfs
  - Flows are anticipated to increase to 2,000 cfs later in the week.
  - [San Joaquin River Flows - CDEC](#)
  - [San Joaquin River Guidance Plots - CDEC](#)
- QWEST: -1,100 cfs
  - QWEST is expected to increase to +10,000 cfs later in the week due to the storm event.
- Future export modifications: *Describe anticipated or potential changes to exports*
  - Exports are anticipated to increase later in the week to capture the storm event. Exports may increase at the SWP from 1,500 cfs to 6,000 cfs.

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

Date	Averaging Period	USGS gauges (cfs)	OMR Index (cfs)
12/24/22	Daily	-1,900	-2,200
12/24/22	5-day	-2,300	-2,000
12/24/22	14-day	-3,000	-3,200
12/26/22	Daily	Not Applicable	-2,700
12/26/22	5-day	Not Applicable	-2,100
12/26/22	14-day	Not Applicable	-3,400

## 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) 2022 is 5,927
  - Hatchery proportion was 10.8% of the total run (641 hatchery-origin WR)
  - Total number of in-river WR females: 2,663
  - Total number of WR redds: 2,607
  - WR adults contributing to BY 2022 had a pre-spawn mortality rate of 2.1%
- Redd distribution and fry emergence timing:
  - Juvenile WR are beginning to redistribute downstream in the upper Sacramento River. Real-time monitoring stations were inactive due to the holiday and data was not received prior to the SaMT meeting for many of the real-time monitoring stations. However, WR are anticipated to distribute downstream and into the Delta due to the storm events occurring this week.
  - CDFW is conducting snorkel surveys weekly on the upper Sacramento River. In the first week of December, CDFW observed juvenile WR holding near Redding above the Red Bluff Diversion Dam (RBDD).
  - Estimated juvenile WR passage at RBDD for 12/16/22 is 190,238 fish. Average historic passage (2010-2021) as of 12/16/22 indicates 95.5% with one standard deviation of 3.7% have passed Red Bluff Diversion Dam.
- Juvenile Production Estimate (JPE):
  - The Interim JPE is expected to be finalized by 12/30/2022. Once the Interim JPE is finalized, COA 8.6.3 thresholds will be updated and monitored closely for triggers.
- Livingston Stone National Fish Hatchery releases:
  - Releases of juvenile WR have not occurred.
  - See Appendix 4
- Distribution of natural WR:
  - See Table 1
- Distribution of Livingston Stone National Fish Hatchery Sacramento River WR and Battle Creek WR:
  - No releases have occurred at this time.
  - [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 and fry are emerging. SR on the Sacramento River are beginning their migration downstream and have been seen in many of the real-time monitoring stations in the past few weeks.
  - This week, due to the state and federal holiday on 12/26/2022, many real-time monitoring stations were not trapping, and data were not received prior to the SaMT meeting; therefore, detections were limited this week. SaMT anticipates seeing SR in real-time monitoring sites this upcoming week and throughout next week due to the storm events.
- Hatchery release (in-river and downstream):
  - A SR surrogate group was released on 12/5/22 into Battle Creek. This group consisted of 71,057 late fall-run Chinook salmon with both a CWT and ad-clip mark. These fish will be tracked for

OMR Storm Flex in order to protect SR yearlings. None of these fish have been seen in salvage as of 12/25/2022. See Appendix 4 for more details.

- 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*
  - Not applicable at this time.
  - [CalFishTrack - Central Valley Enhanced Acoustic Tagging Project](#)
- Trawls: See Appendix 1
  - Sacramento Trawl: Data was not available prior to the SaMT meeting.
  - Mossdale Trawl: Data was not available prior to the SaMT meeting.
  - Chipps Island Trawl: Data was not available prior to the SaMT meeting.
- Rotary Screw Traps:
  - Knights Landing, Tisdale and Lower Sacramento Rotary Screw Trap Data: WR and SR were caught between 12/19/2022 – 12/23/2022 at the Lower Sacramento and Knights Landing RST.
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
  - Yuba River Rotary Screw Trap Data: SR were caught this week between 12/19/2022 – 12/22/2022
  - Redd Bluff Diversion Dam Rotary Screw Trap Data: Total passage estimates 190,238 juvenile WR have passed RBDD. Last updated on 12/16/22.
  - GCID Rotary Screw Trap Data: WR and SR were caught between 12/19/2022 – 12/26/2022.
    - [GCID RST Live Data](#)
  - Lower Feather River Rotary Screw Trap: Data was not available prior to the SaMT meeting.
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
  - Butte Creek Rotary Screw Trap Data: Data was not available prior to the SaMT meeting.
    - [Butte Creek Monitoring Programs](#)
- Seines:
  - Sacramento River Beach Seines: Data was not available prior to the SaMT meeting.
- Carcass Survey Data:
  - Lower American River Carcass Survey Data (See Table 5):
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
    - The American River Power Bypass proposal was accepted with modifications on 10/18/22. The power bypass began on 10/20/22 starting at 100 cfs power bypass and increasing each day after until 300 cfs with a target temperature of 62 °F. On 11/1/22, a full 500 cfs bypass occurred and will continue until a target temperature of 56 °F is reached or when the cold-water pool runs out. The mean daily average for the week of 12/19/22 – 12/22/22 was 49.2 °F.
    - Fall-run (FR) Carcass Surveys began on 10/24/22 on the Lower American River. A total of 1,625 carcasses were found during the carcass survey that took place between 12/19/22 – 12/22/22. Of those carcasses, there were 6 female prespawn mortalities and 5 partial spawned females documented.

- CDFW Redd Surveys began on 10/24/22. A total of 45 redds were measured for the redd survey that took place between 12/19/22 – 12/22/22. CDFW has been splitting the work with Cramer Fish Sciences.
- Additional hatchery release notifications: *List all relevant hatchery release notifications.*
  - Coleman National Fish Hatchery (CNFH) released steelhead and late fall-run Chinook salmon into Battle Creek on 12/1/22 and 12/2/2022 (See Appendix 4).
  - San Joaquin River Restoration Program released SR yearlings on 12/8/2022 (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.*
  - The LAD natural-origin WR Chinook salmon that was salvaged on 12/18/2022 was rapidly tested for genetics and was determined to be a SR yearling.
- Anticipated emigration to continue into the Delta:
  - WR are beginning their emigration to the Delta. Hydrological and meteorological environmental cues are redistributing juveniles downstream. SR eggs are in gravel and fry are starting to emerge and move downstream. SR are being seen in real-time monitoring sites in the Delta which indicated that SR have started their downstream migration.
  - [SacPAS - Migration Timing and Conditions by Cohort](#)
  - [SacPAS - Salvage Timing](#)
- Routing and Survival Analysis:
  - Delta STARS Model: See Table 6 in Appendix 1
    - [CalFishTrack - Central Valley Enhanced Acoustic Tagging Project](#)
- Tillotson entrainment model or other entrainment models as they become available:
  - The entrainment tool estimates a median of 0 WR and maximum loss of 12 WR this week. (SacPAS last updated on 12/27/22).
  - [SacPAS - Loss and Salvage Predictor](#)
- Salvage trends in relation to OMRI: *Provide overview of salvage data and insert salvage table as attachment at end of document:* See Appendix 2.
  - [USFWS - Fish Salvage Monitoring](#)

## Appendix 1: SaMT Monitoring and Modeling Data

Table 3<sup>1</sup>: Fish monitoring data for the 12/27/22 SaMT meeting. The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length. FR = fall-run, WR = winter-run, SR = spring-run, LFR = late-fall-run, N/A= Not Available.

Location	GCID RST	Butte Creek RST	Tisdale RST	Knights Landing RST	Lower Sac RST	Beach Seines	Sacramento Trawl
Sample Date	12/20/22–12/26/22	N/A	N/A	12/20 – 12/23	12/19/22–12/24/22	N/A	N/A
Chinook Adults	0	N/A	N/A	0	0	N/A	N/A
FR Chinook	8 juveniles	N/A	N/A	2	0	N/A	N/A
SR Chinook		N/A	N/A	2	1	N/A	N/A
WR Chinook	3 juveniles	N/A	N/A	0	1	N/A	N/A
LFR Chinook	0	N/A	N/A	0	0	N/A	N/A
Chinook (ad-clip)	0	N/A	N/A	1 LFR	0	N/A	N/A
Steelhead (wild)	0	N/A	N/A	0	0	N/A	N/A
Steelhead (ad-clip)	0	N/A	N/A	0	0	N/A	N/A
Green Sturgeon	0	N/A	N/A	0	0	N/A	N/A
Flows (avg. cfs)	N/A	N/A	N/A	3,552	6,364	N/A	N/A
W. Temp. (avg. °F/°C)	49.3°F	N/A	N/A	45.7°F	46.8°F	N/A	N/A
Turbidity (avg. NTU)	3.2	N/A	N/A	5.8	7.0	N/A	N/A

<sup>1</sup> Data is limited this week due to the state and federal holiday. Many categories in this table are left N/A due to the data not being available prior to the SaMT meeting.

Table 3 Continued<sup>1</sup>: Fish monitoring data for the 12/27/22 SaMT meeting. The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length. FR = fall-run, WR = winter-run, SR = spring-run, LFR = late-fall-run, N/A=Not Available.

Location	Chippis Is. Midwater Trawl	Mossdale Kodiak Trawl	Lower Feather RST	Feather at Herringer RST	Feather at Eye-Side RST	Yuba RST
Sample Date	N/A	N/A	N/A	12/17/22 – 12/22/22	12/17/22 – 12/22/22	12/19/22 – 12/22/22
Chinook Adults	N/A	N/A	N/A	0	0	0
FR Chinook	N/A	N/A	N/A	0	0	0
SR Chinook	N/A	N/A	N/A	61	39	26
WR Chinook	N/A	N/A	N/A	0	0	0
LFR Chinook	N/A	N/A	N/A	0	0	0
Chinook (ad-clip)	N/A	N/A	N/A	0	0	0
Steelhead (wild)	N/A	N/A	N/A	0	0	0
Steelhead (ad-clip)	N/A	N/A	N/A	0	1	0
Green Sturgeon	N/A	N/A	N/A	0	0	0
Flows (avg. cfs)	N/A	N/A	N/A	950	650	670
W. Temp. (avg. °F/°C)	N/A	N/A	N/A	47.3°F	48.2°F	46.4°F
Turbidity (avg. NTU)	N/A	N/A	N/A	1.3	2.0	1.9

Table 4: Delta sturgeon tagging and monitoring.

Date	Comments
12/26/22	<ul style="list-style-type: none"> <li>No new sturgeon were tagged this week.</li> <li>1 WS was tagged on 11/15/2022 at Marsh Island on the Sacramento River.</li> <li>3 juvenile GS were detected in the Sacramento River at Marsh Island</li> </ul>

GS = green sturgeon, WS = white sturgeon

<sup>1</sup> Data is limited this week due to the state and federal holiday. Many categories in this table are left N/A due to the data not being available prior to the SaMT meeting.

Table 5: CDFW adult monitoring surveys.

Location	American River Carcass Survey	Stanislaus River Carcass Survey
Sample Dates	12/19/22 – 12/22/22	12/19/22 – 12/23/22
Live Fish	Not Available	145
Redds	Not Available	230
Carcasses	1,625	82
Ad-clipped	92	14
Spawn Condition	Prespawn Mortality: 9% (6/68)	Not Available
Flows (avg. cfs)	1,300	200
Water Temp (avg. °F)	49.2	Not Available

Table 6: STARS Modeling. [CalFishTrack - Central Valley Enhanced Acoustic Tagging Project](#)

Date: (12/26/22)	DCC	<u>Georgiana Slough/Interior Delta</u>	<u>Sacramento River</u>	<u>Sutter and Steamboat Slough</u>	<u>Yolo Bypass</u>
Late Fall-Run Proportion of Entrainment	0	0.22	0.48	0.27	Not Applicable
Late Fall-Run Survival	Not Applicable	0.23	0.58	0.46	Not Applicable
Winter-Run Proportion of Entrainment	Not Applicable	0.12	0.62	0.27	.00000129
Winter-Run Survival	Not Applicable	0.17	0.37	0.71	Not Applicable



## Appendix 2: Salvage Data

Table 7: SWP and CVP SaMT update (12/19/22 – 12/25/22). Trend is the current value compared to the previous week. Prepared by Kyle Griffiths on 12/19/22. These are preliminary results and are subject to revision.

Criteria	19-Dec	20-Dec	21-Dec	22-Dec	23-Dec	24-Dec	25-Dec	Trend	Weekly Summary
Wild older juvenile CHN Loss	0	0	0	0	0	0	0	→	0.00
Wild Steelhead Loss	0	0	0	0	0	0	0	→	0.00
SWP daily export (acre-feet)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CVP daily export (acre-feet)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SWP reduced counts	None	None	None	None	None	None	None	N/A	N/A
CVP reduced counts	None	None	None	None	None	None	None	N/A	N/A

*Table 8: Chinook salmon weekly salvage and loss combined for both the SWP and the CVP fish collection facilities between 12/19/22 – 12/25/22. 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 12/26/22. 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	0	0	→
Hatchery spring-run	0	0	→
Hatchery late Fall-run	Not Available	Not Available	Not Available
Hatchery fall-run	Not Available	Not Available	Not Available
Weekly Total	Not Available	Not Available	Not Applicable

*Table 9: Chinook salmon cumulative salvage and loss combined for both the SWP and the CVP fish collection facilities across WY 2023. Race is determined by LAD on the date of capture. 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 12/19/22. These are preliminary results and are subject to revision.*

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild winter-run	4	18	→
Wild spring-run	0	0	→
Wild late Fall-run	0	0	→
Wild fall-run	0	0	→
Season Total	4	18	Not Applicable
Hatchery winter-run	0	0	→
Hatchery spring-run	138	129	→
Hatchery late Fall-run	11	33	→
Hatchery fall-run	16	27	↗
Season Total	165	189	Not Applicable

*Table 10: Steelhead weekly salvage and loss combined for both the SWP and the CVP fish collection facilities for 12/19/22 – 12/25/22. 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 12/26/22. These are preliminary results and are subject to revision.*

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

*Table 11: Steelhead cumulative salvage and loss combined for both the SWP and the CVP fish collection facilities across WY 2023. Hatchery origin fish are determined by the lack of adipose fin. Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time. SWP loss is equal to salvage multiplied by 4.33. CVP loss is equal to salvage multiplied by 0.68. Prepared by Kyle Griffiths on 12/26/22. These are preliminary results and are subject to revision.*

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild steelhead	0	0	→
Hatchery steelhead	0	0	→
Season Total	0	0	Not Applicable

## Appendix 3: Relevant Actions

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

<u>Action</u>	<u>Timeframe</u>	<u>Current Action Status</u>	<u>Threshold(s)</u>	<u>Current Relevant Data</u>	<u>Weekly Trend</u>	<u>Last Updated</u>	<u>Comments</u>
Onset of OMR Mgmt. Salmonid Presence (8.3.2)	Jan. 1 - Jun. 30 <i>(when ≥ 5% of winter-run or spring-run are in the Delta)</i>	Not In effect	5% of the winter-run or spring-run population are present in the Delta	Winter-run = 0% estimated in the Delta  Spring-run = 0% estimated in the Delta	Not Applicable	<b>12/27/22</b>	In effect on 1/1/2023
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 = N/A  Hatchery CHNWR (loss = 0.12% of JPE) 50% of 0.12% of JPE = N/A	Current yearly WR loss (natural LAD) = 17.54  Current yearly WR loss (hatchery) = N/A	Possible salvage	<b>12/27/22</b>	Based on JPE (Interim JPE should be finalized on 12/30/2022)
Winter-run discrete daily loss (8.6.2)	Nov. 1 - Dec. 31	In effect	11/1-11/30: loss of 6/day unclipped older juv. Chinook salmon  12/1-12/31: loss of 26/day unclipped older juv. Chinook salmon	Max single daily loss from previous week = 17.54 fish (1 natural LAD WR Chinook salmon salvaged on 12/18/2022)	Possible salvage	<b>12/27/22</b>	Ends on 12/31/2022

<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	Not in effect	<p>January 1 – 31: 0.00635% of the CHNWR JPE</p> <p>February 1 – 28: 0.00991% of the CHNWR JPE</p> <p>March 1 – 31: 0.0146% of the CHNWR JPE</p> <p>April 1 – 30: 0.00507% of the CHNWR JPE</p> <p>May 1 – 31: 0.0077% of the CHNWR JPE</p>	Not Applicable	Not Applicable	<b>12/27/22</b>	In effect on 1/1/2023. Based on JPE (Interim JPE will be finalized on 12/30/2022)

<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)</p> <p>Group 1: 0.25% of total in-river CWT fall-run release (total of 7 CWT #s)</p> <p>Group 2: 0.25% of total in-river CWT fall-run release (total of 7 CWT #s)</p> <p>Group 3: 0.25% of total in-river CWT fall-run release (total of 10 CWT #s)</p> <p>Group 4: 0.25% of total in-river CWT fall-run release (total of 4 CWT #s)</p> <p>Feather River Fish Hatchery (FRFH)</p> <p>Group 1: 0.25% of total in-river CWT spring-run release (total of 2 CWT #s)</p>	Not Applicable	Not Applicable	<b>12/27/22</b>	No Additional Comments

<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>
OMR Storm Flexibility (8.7)	Jan 1 – Jun 30	Not in effect	<ul style="list-style-type: none"> <li>-Delta is in excess</li> <li>-QWEST is &gt; 0</li> <li>-Measurable amount of precipitation has occurred</li> <li>-None of COA's are controlling operations (8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, 8.6.4)</li> <li>-Cumulative salvage at CVP and SWP of yearling CNFH LFR Chinook salmon (as yearling CHNSR surrogates) is &lt; 0.5% with any of the release groups</li> <li>-Risk Assessments conducted by the SaMT/SMT determines no changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations beyond those are likely to occur.</li> </ul>	Not Applicable	Not Applicable	<b>12/27/2022</b>	Based on storm conditions

<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>
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	Not Applicable	Not Applicable	<b>12/27/22</b>	No Additional Comments
Export Curtailments for Spring Outflow (8.17)	Apr 1 – May 31	Not in effect	<u>Dry:</u> Vernalis flow and CVP/SWP combined exports are 2:1  <u>Below Normal:</u> Vernalis flow and CVP/SWP combined exports are 3:1  <u>Above Normal/Wet:</u> Vernalis flow and CVP/SWP combined exports are 4:1	Not Applicable	Not Applicable	<b>12/27/2022</b>	No Additional Comments



## Appendix 4: Hatchery Releases

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

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
12/1/2022	CNFH	Late Fall	05-64-84	61,399	61,399	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-85	57,217	57,217	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-86	73,060	73,060	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-87	74,344	74,344	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-90	49,664	49,664	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-91	62,246	62,246	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-92	61,939	61,939	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-94	64,648	64,648	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-95	57,334	57,334	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-96	60,582	60,582	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/1/2022	CNFH	Late Fall	05-64-97	58,530	58,530	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/5/2022	CNFH	Late Fall	05-64-88	71,057	71,057	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Experimental
12/8/2022	SCARF	Spring	06-29-44	3,666	3,666	100%	San Joaquin at Hwy 140	PIT, CWT and Ad-Clip	CDFW	SJRRP
12/8/2022	SCARF	Spring	06-19-68	911	911	100%	San Joaquin at Hwy 140	PIT, CWT and Ad-Clip	CDFW	SJRRP
12/23/2022	CNFH	Late Fall	05-64-89	66,735	66,735	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Experimental

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

Release Date	Hatchery	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
12/2/2022	CNFH	None	614,702	614,702	100%	Battle Creek at CNFH	Ad-Clip	USFWS	Production

