

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

## Section 1: Overview

Date: 12/6/2022

### Life Stages Present:

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 12/6/22, D-1641 Delta Water Quality is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Combined exports on 12/6/22 are 1,100 cfs resulting in an Old and Middle River Index (OMRI) of -1,100 cfs and 10.4% of inflow diverted (14-day average). The Delta Cross Channel (DCC) gates are projected to remain closed for seasonal requirement. The SWP is exporting this week and no outages are planned.

SaMT estimates an overall low risk of entrainment into the central Delta for juvenile natural-origin winter-run Chinook salmon (WR). Flows at Freeport are low and although the DCC gates are closed, entrainment into Georgiana and Threemile Slough is possible. WR have not been seen in real-time monitoring sites in the Delta this season indicating low presence and a low risk of exposure; therefore, overall entrainment risk into the central delta is low this week for WR. SaMT estimates an overall low risk of juvenile natural-origin spring-run Chinook salmon (SR) entrainment into the central Delta. Although current hydrological conditions have an increased routing risk for any salmonids present in the Delta, there have been low detections of Young-of-Year (YOY) SR in the real-time monitoring locations in the Delta; therefore, entrainment into the central Delta is unlikely this week.

SaMT estimates an overall low risk of entrainment of juvenile WR into the export facilities this week. Salvage of WR is unlikely due to low numbers of WR occupying the Delta as indicated by the lack of observations in the real-time monitoring stations and no salvage of WR yet this season. SaMT also estimates an overall low risk of juvenile SR into the export facilities due to no salvage of SR occurring so far this season and lack of detections of SR observed in real-time monitoring locations in the Delta. 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.

## Risk Assessment:

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

The COA 8.6.2 (Early Season Natural-Origin WR Discrete Daily Loss Threshold) is currently in effect with a daily loss threshold of 26 or more for the month of December. COA 8.6.2 has not been triggered for WY 2023.

*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 90-100% Last week 95-100%	Current 0-10% Last Week 0-5%	Current 0% Last Week 0%
YOY spring-run Chinook salmon	Current 100% Last week 100%	Current 0% Last Week 0%	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: Low
  - SR: Low
- Routing Risk:
  - WR: Low
  - SR: Low
- Overall Entrainment Risk:
  - WR: Low
  - SR: Low
- Change in risk of entrainment into the central Delta (increased/decreased risk compared to last week):
  - WR: Similar to previous week
    - Exposure Risk is estimated as low this week. SaMT estimates WR presence in the Delta is low due to lack of detections in real-time monitoring locations. Routing Risk has decreased to low this week based on hydrologic conditions. Routing Risk has decreased to low due to DCC gates being closed and the STARS model predicting a low routing probability. Although Freeport flows remain low, the storm is expected to increase flows in the Sacramento River. Therefore, the overall entrainment into the central Delta is still estimated to be low.
  - SR: Similar to previous week
    - Exposure Risk is estimated as low this week due to lack of detections of SR in the real-time monitoring locations in the Delta. Routing Risk remains at medium this week based

---

<sup>1</sup> SaMT moved 5% of WR into the Delta this week based on seasonal timing. Red Bluff Diversion Dam (RBDD) has observed low WR catch this year, indicating a small population of WR in the system. Seasonal timing, coupled with low flows on the Sacramento River that decreases RST efficiency, has led SaMT to increase the WR range in the Delta.

on hydrologic conditions. The storm event last week moved some SR downstream, but SR are still being detected in low numbers. Although Freeport flows remain low, flows in the Sacramento River are expected to increase throughout the week. Therefore, the overall entrainment into the central Delta is low.

## Section 2-C: Facilities Risk

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

- Exposure Risk:
  - WR: Low
  - SR: Low
- Reporting OMR/Export Risk:
  - Baseline OMR (-1,100 cfs)
    - WR: Low
    - SR: Low
  - Scenario 1 OMR: (-1,200 cfs)
    - WR: Low
    - SR: Low
  - Scenario 2 OMR: (-3,500 cfs)
    - WR: Medium
    - SR: Medium
- Overall Entrainment Risk:
  - WR: Low
  - SR: Low
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
  - WR: Similar to previous week
    - Reporting OMR/Export Risk is low this week due to OMRI expected to be more positive than expected at this time. Exposure Risk is low this week due to no WR salvage occurring for WY 2023. Exports are expected to increase later this week due to the storm event; however, OMRI is more positive than we would expect at this time. Therefore, the overall entrainment risk into the export facilities is estimated to be low this week.
  - SR: Similar to previous week
    - Reporting OMR/Export Risk has decreased to low this week due to OMRI expected to be more positive than expected at this time and decreased exports. Exposure Risk is low this week. No SR have been observed at the export facilities for WY 2023 and SR are not anticipated to be in salvage. Therefore, the overall entrainment risk into the facilities is estimated to be low this week.

## Section 2-D: Annual Loss Threshold Risk

- Annual loss threshold risk and Alternative Actions (8.1.5.1. E I, ii, iii and 8.1.5.1 F I, ii)
  - Loss at the SWP and CVP facilities compared to the estimated remaining population in the Delta and upstream of the Delta: Salvage of California Endangered Species Act (CESA)-listed Chinook salmon has not occurred.
    - Define risk of hitting a threshold, 50%, or 75%, or 100%, and likelihood of exceeding a threshold:

- Natural-origin WR: Not Available (N/A) at this time. [1.17% of the natural-origin WR Juvenile Production Estimate (JPE)]
  - Current Annual Loss: N/A
  - 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 8.6.2 Early Season Natural-Origin WR Discrete Daily Loss Threshold:
        - December Monthly Daily Loss Threshold: 26 per day older juvenile Chinook salmon
          - Highest Daily Loss: 0
          - Risk of exceeding threshold: Low

#### 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.*

*8.6.2 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.*

## 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 spring cycle and will be entering into a neap cycle next week. This neap cycle will push the transitional zone downstream of the DCC gates and Georgiana Slough which will decrease entrainment affects to juvenile WR and SR that are in the vicinity.
- Turbidity: Not discussed
- Salinity (X2): >81 km on 12/6/22
  - 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: 12/6/22 – 12/12/22
  - SWP: 300 to 2,000 cfs
  - CVP: 800 to 1,800 cfs
- Meteorological Forecast:
  - *“Showers and a few thunderstorms will continue across the region today before tapering off from north to south on Tuesday. A brief period of dry weather is expected mid-week before precipitation returns by the end of the week.”*
  - [NOAA - National Weather Service Forecast](#)
- Weather/Storm Event Projection:
  - The trough finally shifts south today with remaining lingering showers ending this morning. A brief period of dry weather is expected Wednesday into early Thursday which will allow for a couple cold mornings in the Valley with minimum temperatures around the freezing mark in rural areas (especially Wednesday morning) with widespread frost and patchy fog. Clouds with the next approaching system could act to moderate temperatures some early Thursday if they move in quickly enough.
- 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: 10,000 cfs
  - Flows are anticipated to increase later in the week to ~12,000 cfs.
  - [Sacramento River Flows - CDEC](#)
- San Joaquin River flow at Vernalis: 800 cfs
  - [San Joaquin River Flows - CDEC](#)
  - [San Joaquin River Guidance Plots - CDEC](#)
- QWEST: +7,000 cfs
  - QWEST is expected to remain positive this week.
- Future export modifications: *Describe anticipated or potential changes to exports*
  - Not applicable at this time.

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

Date	Averaging Period	USGS gauges (cfs)	OMR Index (cfs)
12/3/22	Daily	-1,700	-1,100
12/3/22	5-day	-1,200	-1,200
12/3/22	14-day	Not Available	-1,600
12/5/22	Daily	Not Applicable	-1,100
12/5/22	5-day	Not Applicable	-1,100
12/5/22	14-day	Not Applicable	-1,400

## 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. There have been limited detections of WR in the real-time monitoring stations which is assumed to be due to low flows on the Sacramento River and low numbers of WR in the system. A storm event occurred on 12/1/22 – 12/4/22 which should move WR downstream and into the Delta. Real-time monitoring locations should start to see increases in WR catch in the next few days.
  - 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 12/2/22 is 160,875 fish. Average historic passage (2010-2021) as of 12/2/22 indicates 92.7% with one standard deviation of 8.9% have passed Red Bluff Diversion Dam.
- Juvenile Production Estimate (JPE):
  - Not Available at this time.
- 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 Clear Creek are anticipated to start emerging with the upcoming storm and should be detected in the Red Bluff Diversion Dam RSTs.
  - There have been very few detections of SR in the real-time monitoring stations on the Sacramento River, Feather River, and Butte Creek.
- 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. 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: No salmonids were caught this week.
  - Mossdale Trawl: No salmonids were caught this week.
  - Chipps Island Trawl: No salmonids were caught this week.
- Rotary Screw Traps:
  - Knights Landing, Tisdale and Lower Sacramento Rotary Screw Trap Data: No salmonids have been caught this week.
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
  - Yuba River Rotary Screw Trap Data: SR Chinook salmon were caught between 11/29/22 – 12/2/22.
  - Redd Bluff Diversion Dam Rotary Screw Trap Data: Total passage estimates 160,875 juvenile WR have passed RBDD. Last updated on 12/2/22.
  - GCID Rotary Screw Trap Data: No salmonids were caught this week.
    - [GCID RST Live Data](#)
  - Lower Feather River Rotary Screw Trap: SR were caught this week on 12/2/22 and 12/4/22.
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
  - Butte Creek Rotary Screw Trap Data: SR were caught on 12/2/22 and 12/4/22.
    - [Butte Creek Monitoring Programs](#)
- Seines:
  - Sacramento River Beach Seines: No salmonids were caught this week.
- 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 11/28/22 – 12/2/22 was 54.6 °F.
    - Fall-run (FR) Carcass Surveys began on 10/24/22 on the Lower American River. A total of 913 carcasses were found during the carcass survey that took place between 11/28/22 – 12/2/22. Of those carcasses, there were 49 female prespawn mortalities and 22 partial spawned females documented.
    - CDFW Redd Surveys began on 10/24/22. A total of 167 redds were measured for the redd survey that took place between 11/28/22 – 12/2/22. CDFW was not able to survey all of the reaches this week. Time constraints restricted crews from being able to finish all of reaches. CDFW was only able to finish a few of the reaches and have 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).
- 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.*
  - No additional monitoring updates.
- Anticipated emigration to continue into the Delta:
  - WR are still rearing downstream of their spawning grounds. Hydrological and meteorological environmental cues could redistribute juveniles downstream. Adult SR have finished spawning and eggs are still in gravel. No anticipation of SR emigrating into the Delta this week.
  - [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 and maximum loss of 0 WR this week. (SacPAS last updated on 12/6/22).
  - [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:* Not applicable due to no salvage of salmonids for WY 2023 (See Appendix 2).
  - [USFWS - Fish Salvage Monitoring](#)

## Appendix 1: SaMT Monitoring and Modeling Data

Table 3: Fish monitoring data for the 12/6/22 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	11/29/22–12/5/22	11/28/22–12/5/22	11/29/22–12/5/22	11/28 – 12/1 & 12/3 – 12/5	11/28/22–12/4/22	11/27/22–12/2/22	11/27/22 – 12/2/22
Chinook Adults	0	0	0	0	0	0	0
FR Chinook	0	0	0	0	0	0	0
SR Chinook	0	2	0	0	0	0	0
WR Chinook	0	0	0	0	0	0	0
LFR Chinook	0	0	0	0	0	0	0
Chinook (ad-clip)	23 smolts	0	0	0	0	0	0
Steelhead (wild)	0	0	0	0	0	0	0
Steelhead (ad-clip)	12	0	0	0	0	0	0
Green Sturgeon	0	0	0	0	0	0	0
Flows (avg. cfs)	730	201	3,689	3,478	5,875	N/A	N/A
W. Temp. (avg. °F/°C)	50.4°F	42.4°F	49.1°F	49.5°F	48.6°F	N/A	N/A
Turbidity (avg. NTU)	3.0	5.9	1.9	2.4	3.0	N/A	N/A

Table 3 Continued: Fish monitoring data for the 12/6/22 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	11/28/22, 11/30/22, & 12/2/22	11/28/22 & 11/30/22	11/28/22 – 12/5/22	11/28/22 – 12/2/22	11/28/22 – 12/2/22	11/21/22 – 11/27/22
Chinook Adults	0	0	0	0	0	0
FR Chinook	0	0	1	0	0	0
SR Chinook	0	0	28	61	39	8
WR Chinook	0	0	0	0	0	0
LFR Chinook	0	0	0	0	0	0
Chinook (ad-clip)	0	0	0	0	0	0
Steelhead (wild)	0	0	0	0	0	0
Steelhead (ad-clip)	0	0	0	0	1	0
Green Sturgeon	0	0	0	0	0	0
Flows (avg. cfs)	N/A	N/A	2,200	1,400	650	627
W. Temp. (avg. °F/°C)	N/A	N/A	48.6°F	49.1°F	49.1°F	44.6°F
Turbidity (avg. NTU)	N/A	N/A	9.6	1.0	2.8	.77

Table 4: Delta sturgeon tagging and monitoring.

Date	Comments
12/6/22	<ul style="list-style-type: none"> <li>No new sturgeon were tagged this week.</li> <li>1 WS was tagged on 11/15/22 at Marsh Island on the Sacramento River.</li> <li>2 juvenile GS were detected in the Sacramento River at Marsh Island</li> </ul>

GS = green sturgeon, WS = white sturgeon

Table 5: CDFW adult monitoring surveys.

Location	American River Carcass Survey	Stanislaus River Carcass Survey
Sample Dates	11/28/22 – 12/2/22	11/18/22 – 11/21/22
Live Fish	Not Available	1126
Redds	Not Available	1061
Carcasses	2,273	126
Ad-clipped	250	70
Spawn Condition	Prespawn Mortality: 18% (49/267)	Not Available
Flows (avg. cfs)	1,300	176
Water Temp (avg. °F)	54.6	Not Available

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

Date: (12/5/22)	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	0.24	0.28	0.46	0.26	Not Applicable
Late Fall-Run Survival	Not Applicable	0.17	0.52	0.39	Not Applicable
Winter-Run Proportion of Entrainment	Not Applicable	0.13	0.59	0.28	0
Winter-Run Survival	Not Applicable	0.07	0.27	0.59	Not Applicable

## Appendix 2: Salvage Data

Table 7: SWP and CVP SaMT update (11/28/22 – 12/4/22). Trend is the current value compared to the previous week. Prepared by Kyle Griffiths on 12/5/22. These are preliminary results and are subject to revision.

Criteria	28-Nov	29-Nov	30-Nov	1-Dec	2-Dec	3-Dec	4-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)	809	605	602	615	615	0	603	↘	550
CVP daily export (acre-feet)	1,813	1,787	1,772	1,622	1,571	1,602	1,600	↘	1,681
SWP reduced counts	None	Yes	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 11/28/22 – 12/4/22. 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 12/5/22. 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	0	0	→
Hatchery fall-run	1	4	↗
Weekly Total	1	4	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 12/5/22. These are preliminary results and are subject to revision.*

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild winter-run	0	0	→
Wild spring-run	0	0	→
Wild late Fall-run	0	0	→
Wild fall-run	0	0	→
Season Total	0	0	Not Applicable
Hatchery winter-run	0	0	→
Hatchery spring-run	0	0	↘
Hatchery late Fall-run	0	0	→
Hatchery fall-run	1	4	↗
Season Total	133	121	Not Applicable

*Table 10: Steelhead weekly salvage and loss combined for both the SWP and the CVP fish collection facilities for 11/28/22 – 12/4/22. 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 12/5/22. 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 12/5/22. 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>12/6/22</b>	No Additional Comments
Winter-run yearly loss (8.6.1)	Nov. 1 - Jun. 30	In effect	Natural CHNWR (loss = 1.17% of JPE) 50% of 1.17% of JPE = N/A  Hatchery CHNWR (loss = 0.12% of JPE) 50% of 0.12% of JPE = N/A	Current yearly WR loss (natural LAD) = N/A  Current yearly WR loss (hatchery) = N/A	Not Applicable	<b>12/6/22</b>	Based on JPE (TBD)
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 = 0.00 fish (No older juveniles observed yet)	No change expected	<b>12/6/22</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>
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>12/6/22</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>
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>12/6/22</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>
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>12/6/22</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

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

