

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

## Section 1: Overview

Date: 12/12/2023

### Life Stages Present:

Winter-run Chinook salmon (juvenile)

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

No advice is warranted.

For the week beginning 12/12/23, D-1641's Delta Outflow is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Combined exports on 12/12/23 are 5,600 cfs resulting in an Old and Middle River Index (OMRI) of -5,000 cfs and 47.4% of inflow diverted (3-day average). The Delta Cross Channel (DCC) gates closed on 11/27/23 and will remain closed for the season. The SWP is exporting this week and no outages are planned.

SaMT estimates an overall low risk of entrainment into the central Delta for juvenile natural-origin winter-run (WR) Chinook salmon due to the DCC gate closure for the season and low estimation of WR (1-5%) in the Delta. Although DCC gates are closed for the season, WR are still beginning to actively migrate downstream and routing into Georgiana Slough is estimated to be 28%; therefore, SaMT will continue to closely monitor storm events and real-time monitoring stations in the upcoming weeks to determine changes in overall entrainment risk. SaMT estimates an overall low risk of juvenile natural-origin young-of-year spring-run Chinook salmon (SR) entrainment into the central Delta. SR spawning has ended and eggs are incubating. Since SR juveniles are still estimated to be rearing and eggs are estimated to be incubating, entrainment downstream of their spawning area and 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 estimated in the Delta 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 seasonal timing of SR. Although 1 length-at-date (LAD) late fall-run Chinook salmon (LFR) was salvaged at the CVP on 12/2/23, which is classified as an older juvenile Chinook salmon and counted towards the daily loss threshold for COA 8.6.2, 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 triggered this upcoming week.

## Risk Assessment:

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

A hatchery-origin Chinook salmon LAD winter-run Chinook salmon was caught at the Lower Sacramento River RST on 12/9/23. Region 2 will reach out once they check for a CWT and let SaMT know what the CWT code is if they find one. DWR mentioned that there are some acoustically tagged fish in the system right now for a study on the newly installed Georgiana BAFF. It is assumed that this fish may be one of those fish released for that study.

**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 95-99% Last week 96-99%	Current 1-5% Last Week 1-4%	Current 0% Last Week 0%
Young-of-year spring-run Chinook salmon	Current 99-100% Last week 99-100%	Current 0-1% Last Week 0-1%	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: Medium
  - 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. It is assumed that WR are beginning to migrate downstream due to seasonal timing and also due to WR being observed in real-time monitoring sites in the Delta. Routing Risk is estimated as medium for WR this week. Although the DCC gates are closed for the season, routing is still estimated at 28% through Georgiana Slough and Freeport flows remain low which increases routing risk to medium for the upcoming week. However, due to the low estimation of WR in the Delta and near the entrainment zones, the overall entrainment risk into the central Delta is estimated to remain low this week.
  - SR: Similar to previous week
    - Exposure Risk is estimated as low this week. SR are not estimated to be in the Delta this week due to seasonal timing. SR adults spawning has ended and eggs are incubating in the gravel. Routing Risk is also low this week based on hydrologic conditions. Although the DCC gates are projected to remain open for most of the week and Freeport flows

remain low, SR are not anticipated to be migrating downstream where they would be affected by Delta operations. Therefore, the overall entrainment into the central Delta remains at low this week.

## Section 2-C: Facilities Risk

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

- Exposure Risk:
  - WR: Low
  - SR: Low
- Reporting OMR/Export Risk:
  - Baseline OMR (-5,000 cfs)
    - WR: Low
    - SR: Low
  - Scenario 1 OMR: (-4,000 cfs)
    - WR: Low
    - SR: Low
  - Scenario 2 OMR: (-8,000 cfs)
    - WR: High
    - SR: High
- 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
    - Exposure Risk is low this week due to no WR salvage occurring so far for WY 2024. Although Reporting OMR/Export Risk this week is estimated to be more negative than -5,000 cfs, SaMT does not expect high salvage of WR this week due to low presence of WR estimated in Delta and near the export facilities. Therefore, the overall entrainment risk into the export facilities is estimated to remain low.
  - SR: Similar to previous week
    - Reporting OMR/Export Risk and Exposure Risk are both low this week. OMRI is not expected to increase to more negative than -5,000 cfs. Young-of-year SR have not been observed at the export facilities for WY 2024. Young-of-year SR are also not expected to be near the export facilities due to seasonal timing; therefore, the overall entrainment risk into the facilities is estimated to remain 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: N/A [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: 3.52
          - Risk of exceeding threshold: Low
          - No LAD older juveniles were salvaged at the export facilities in the previous week.

## 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, iii, iii:

- Antecedent Actions: (e.g., Actions such as integrated early winter pulse protection, etc.)
  - N/A
- Water Temperature (ITP COA 8.8 threshold: daily average water temperature exceeds 22.2°C for 7 non-consecutive days in June):
  - Mossdale (MSD): [Mossdale - CDEC](#)
    - Number of days threshold exceeded: Not applicable until June.
    - Days exceeded: N/A
  - Prisoners Point (PPT): [Prisoners Point - CDEC](#)
    - Number of days threshold exceeded: Not applicable until June.
    - Days exceeded: N/A
- Tidal Cycle: (*Spring/Neap. Note if tidal cycle has potential to affect south Delta hydrology or X2*)
  - Exiting a spring cycle and entering into a neap cycle with a first quarter moon on 12/19/23.
- Turbidity: Not discussed
- Salinity (X2): >81 km on 12/12/23
- Outages:
  - SWP: None projected
  - CVP: None projected
- Exports: 12/12/23 – 12/18/23
  - SWP: 1,000 to 4,500 cfs
  - CVP: 3,600 to 4,200 cfs
- Meteorological Forecast:
  - “Dry weather with mild days and cool nights this week. Locally breezy into Wednesday. Precipitation chances may return early next week.”
  - [NOAA - National Weather Service Forecast](#)
- Weather/Storm Event Projection:
  - There are no rain events this week are expected to trigger COA 8.7 OMR Flexibility During Delta Excess Conditions.
  - Expected OMR flows may become more negative than -3,000 to -5,000 cfs for the next week. Under OMR flows more negative than -5,000 cfs, SaMT expects impacts to rearing, foraging, sheltering, or migration of salmonids present in the south Delta.
- DCC Gates position:
  - DCC gates closed on 11/27/23 and will remain closed for the OMR management season.
- Sacramento River flow at Freeport: 10,000 cfs
  - [Sacramento River Flows - CDEC](#)
- San Joaquin River flow at Vernalis: 1,200 cfs
  - [San Joaquin River Flows - CDEC](#)
  - [San Joaquin River Guidance Plots - CDEC](#)
- QWEST: -3,000 cfs
- 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)
12/9/23	Daily	-5,500	-5,300
12/9/23	5-day	-5,000	-4,500
12/9/23	14-day	-4,200	-4,000
12/11/23	Daily	Not Applicable	-5,300
12/11/23	5-day	Not Applicable	-5,100
12/11/23	14-day	Not Applicable	-4,200



## 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 still rearing in the upper Sacramento River; however, real-time monitoring stations indicate that they have begun their downstream migration to the Delta.
  - Estimated juvenile WR passage at RBDD for 12/2/23 is 840,311 fish, which represents 91.6% of historical passage. Average historic passage (7/1/2002-6/30/2023) as of 12/2/23 indicates 91.6% with one standard deviation of 7.6% have passed Red Bluff Diversion Dam.
- Juvenile Production Estimate (JPE):
  - WR JPE PWT meetings are scheduled this month to begin discussions on the JPE.
- 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. There have been detections of emergence based on the real-time monitoring stations in the Delta and at RBDD RST.
- Hatchery release (in-river and downstream):
  - Coleman National Fish Hatchery (CNFH) is planning to begin 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 is estimated to be in early December, 3 days after the late fall-run production release. However, the production release is targeted with a significant storm event. If a storm event does not occur in December, the production fish will be released prior to 1/1/23.
  - See Appendix 4
- Distribution of natural SR:
  - See Table 1
- Distribution of Feather River Fish Hatchery SR:
  - Not applicable at this time.

#### Section 5-C: Additional Data Sources to Assess Sensitivity to Entrainment into the Central and South Delta

##### 8.1.5.1.C & D

- Acoustic telemetry: *Summary of acoustic telemetry tracking*

- DWR acoustically tagged fish in the system for a study on the newly installed Georgiana BAFF. These fish are currently not on CalFishTrack but data will be distributed to SaMT once it becomes available.
  - [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 RST Data: WR were caught at the Knights Landing RSTs and SR were caught at the Lower Sacramento RST between 12/5/23 – 12/11/23.
    - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
  - Yuba River RST Data: Fall-run (FR) and SR were caught between 12/3/23 – 12/8/23.
  - Red Bluff Diversion Dam RST Data: Total passage estimates 840,311 juvenile WR have passed RBDD. Last updated on 12/2/23.
  - Butte Creek RST Data: Data was not received prior to the SaMT meeting this week.
    - [Butte Creek Monitoring Programs](#)
- Seines:
  - Sacramento River Beach Seines: No salmonids were caught this week.
- Carcass Survey Data:
  - Lower American River Carcass Survey Data:
    - The American River Power Bypass proposal has decreased river temperatures down to a weekly average of 57°F, whereas the previous week's average was 58.3°F. The power bypass is expected to end soon due to river temperatures expected to decrease to 56°F in the upcoming week.
    - Fall-run Carcass Surveys began on 10/16/23 on the Lower American River. For the week of 12/4/23 – 12/7/23, there were 67 female prespawn mortalities, 20 partial spawned females, and 198 spawned females.
- Additional hatchery release notifications: *List all relevant hatchery release notifications.*
  - No hatchery releases have occurred (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. DWR will provide updates once data is collected.
- Anticipated emigration to continue into the Delta:
  - WR are still rearing downstream of their spawning grounds. Seasonal timing is likely to trigger movement into the Delta this week, especially with multiple observations of WR in real-time monitoring sites over the previous few weeks. Adult SR spawning has ended and eggs are incubating in the gravel. It is possible that early migrating SR may emigrate into the Delta this week due to a few LAD SR observations in the real-time monitoring sites in the last week.
  - [SacPAS - Migration Timing and Conditions by Cohort](#)
  - [SacPAS - Salvage Timing](#)
- Routing and Survival Analysis:

- Delta STARS Model: See Table 6 in Appendix 1
  - [STARS Model](#)
- Tillotson entrainment model or other entrainment models as they become available:
  - The entrainment tool estimates a median of 0 WR and a maximum loss of 10 WR this week (SacPAS last updated on 12/12/23).
  - [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:*
  - None
  - [USFWS - Fish Salvage Monitoring](#)

## Appendix 1: SaMT Monitoring and Modeling Data

**Table 3.** Fish monitoring data for the 12/12/23 SaMT meeting. The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length. FR = fall-run, WR = winter-run, SR = spring-run, LFR = late-fall-run.

Location	GCID RST	Butte Creek RST	Tisdale RST	Knights Landing RST	Lower Sac RST	Beach Seines	Sacramento Trawl
Sample Date	N/A	N/A	12/4/23-12/10/23	12/5/23-12/11/23	12/5/23-12/11/23	12/3/23-12/9/23	12/3/23-12/9/23
Chinook Adults	N/A	N/A	0	0	0	0	0
FR Chinook	N/A	N/A	0	0	0	0	0
SR Chinook	N/A	N/A	0	0	1	0	0
WR Chinook	N/A	N/A	0	2	0	0	0
LFR Chinook	N/A	N/A	0	0	0	0	0
Chinook (ad-clip)	N/A	N/A	0	0	1 WR	0	0
Steelhead (wild)	N/A	N/A	0	0	0	0	0
Steelhead (ad-clip)	N/A	N/A	0	0	0	0	0
Green Sturgeon	N/A	N/A	0	0	0	0	0
Flows (avg. cfs)	N/A	N/A	4,850	4,702	9,017	N/A	N/A
W. Temp. (avg. °F/°C)	N/A	N/A	10.3°C	10.2°C	10.0°C	N/A	N/A
Turbidity (avg. NTU)	N/A	0.6	5.6	10.0	10.2	N/A	N/A

**Table 3 Continued.** Fish monitoring data for the 12/12/23 SaMT meeting. The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length. FR = fall-run, WR = winter-run, SR = spring-run, LFR = late-fall-run.

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	12/3/23- 12/9/23	12/3/23- 12/9/23	11/27/23- 11/30/23	N/A	N/A	12/5/23- 12/11/23	12/3/23- 12/8/23
Chinook Adults	0	0	0	N/A	N/A	0	0
FR Chinook	0	0	0	N/A	N/A	0	20
SR Chinook	0	0	0	N/A	N/A	0	40
WR Chinook	0	0	0	N/A	N/A	0	0
LFR Chinook	0	0	0	N/A	N/A	0	2
Chinook (ad-clip)	0	0	0	N/A	N/A	0	0
Steelhead (wild)	0	0	0	N/A	N/A	0	1
Steelhead (ad-clip)	0	0	0	N/A	N/A	0	0
Green Sturgeon	0	0	0	N/A	N/A	0	0
Flows (avg. cfs)	N/A	N/A	N/A	N/A	N/A	2,243	534
W. Temp. (avg. °F/C)	N/A	N/A	N/A	N/A	N/A	9.9°C	9.8°
Turbidity (avg. NTU)	N/A	N/A	N/A	N/A	N/A	6.6	1.7

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

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

**Table 5.** CDFW adult monitoring surveys.

Location	American River Carcass Survey	Stanislaus River Carcass Survey
Sample Dates	12/4/23 – 12/7/23	12/4/23 – 12/7/23
Live Fish	Not Available	254
Redds	109	369
Total Carcasses	4,233	73
Ad-clipped	188	28
Spawn Condition	Prespawn Mortality: 23%	Not Available
Flows (avg. cfs)	2,000 cfs	200
Water Temp (avg. °F)	56.1°F	Not Available

**Table 6.** STARS Modeling

<u>Date:</u> (12/7/23)	<u>DCC</u>	<u>Georgiana Slough</u>	<u>Sacramento River</u>	<u>Sutter and Steamboat Slough</u>	<u>Yolo Bypass</u>
Late Fall-Run Routing Probabilities	N/A	0.28	0.46	0.26	N/A
Late Fall-Run Route Specific Survival	N/A	0.18	0.52	0.39	N/A
Winter-Run Routing Probabilities	N/A	0.13	0.58	0.28	0
Winter-Run Route Specific Survival	N/A	0.08	0.33	0.73	N/A

## Appendix 2: Salvage Data

**Table 7.** SWP and CVP SaMT update (12/4/23 – 12/10/23). 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 12/11/23. 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 12/4/23 – 12/10/23. Race is determined by LAD on the date of capture. Hatchery origin fish are determined by the lack of adipose fin. Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time. SWP loss is equal to salvage multiplied by 4.33. CVP loss is equal to salvage multiplied by 0.68. Prepared by Kyle Griffiths on 12/11/23. 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	0	0	→
Weekly Total	0	0	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. Prepared by Kyle Griffiths on 12/11/23. 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	4	3.52	↘
Wild fall-run	0	0	→
Season Total	4	3.52	Not Applicable
Hatchery winter-run	0	0	→
Hatchery spring-run	0	0	→
Hatchery late Fall-run	0	0	→
Hatchery fall-run	0	0	→
Season Total	0	0	Not Applicable

**Table 10.** Steelhead weekly salvage and loss combined for both the SWP and the CVP fish collection facilities for 12/4/23 – 12/10/23. Hatchery origin fish are determined by the lack of adipose fin. Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time. SWP loss is equal to salvage multiplied by 4.33. CVP loss is equal to salvage multiplied by 0.68. Prepared by Kyle Griffiths on 12/11/23. 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 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. Prepared by Kyle Griffiths on 12/11/23. 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 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>	Not In effect	≥ 5% of the winter-run or spring-run population are present in the Delta	Winter-run = 1-5% estimated in the Delta  Spring-run = 0-1% estimated in the Delta	N/A	<b>12/12/23</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 = 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	N/A	<b>12/12/23</b>	N/A
Winter-run discrete daily loss (8.6.2)	Nov. 1 - Dec. 31	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	Max single daily loss from previous week = 3.52 fish	Possible salvage of LAD older juveniles is likely to occur over the next week.	<b>12/12/23</b>	No salvage of LAD older juveniles were salvaged this 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>
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>	N/A	N/A	<b>12/12/23</b>	N/A

<u>Action</u>	<u>Timeframe</u>	<u>Current Action Status</u>	<u>Threshold(s)</u>	<u>Current Relevant Data</u>	<u>Weekly Trend</u>	<u>Last Updated</u>	<u>Comments</u>
Spring-run surrogate protection (8.6.4)	Feb. 1 - Jun. 30	Not in effect	<p>Coleman National Fish Hatchery (CNFH) Group 1: 0.25% of total in-river CWT fall-run release</p> <p>Feather River Fish Hatchery (FRFH) Group 1: 0.25% of total in-river CWT spring-run release</p> <p>Nimbus Fish Hatchery (NIM) Group 1: 0.25% of total in-river CWT fall-run release</p>	N/A	N/A	<b>12/12/23</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>
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>12/12/23</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
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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