

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

Section 1: Overview

Date: 12/19/2023

Life Stages Present:

Winter-run Chinook salmon (juvenile)

Advice to the Water Operations Management Team (WOMT):

No advice is warranted.

For the week beginning 12/19/23, D-1641's Delta Outflow is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Combined exports on 12/19/23 are 6,600 cfs resulting in an Old and Middle River Index (OMRI) of -5,700 cfs and 46.8% 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 Chinook salmon (WR) due to low estimation of WR (1-5%) in the Delta and alternate routes into the central Delta, including Georgiana Slough and DCC gates, having low entrainment risk this week. Freeport flows are above 12,000 cfs and although routing into Georgiana Slough is still estimated at 29%, the Georgiana BAFF is estimated to decrease entrainment into Georgiana Slough. SaMT estimates an overall low risk of juvenile natural-origin young-of-year spring-run Chinook salmon (SR) entrainment into the central Delta. SR spawning has ended, eggs are incubating, and juveniles are beginning to start their migration downstream. Since most SR juveniles are still estimated to be upstream, entrainment into the central Delta is unlikely this week.

SaMT estimates an overall medium 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; however, due to the recent storms that are likely to trigger WR movement, WR have a higher potential this week to be entrained into the export facilities. 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 WR 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 95-99%	Current 1-5% Last Week 1-5%	Current 0% Last Week 0%
Young-of-year spring-run Chinook salmon	Current 98-99% Last week 99-100%	Current 1-2% 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: 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 (1-5%). It is assumed that WR are migrating downstream due to WR being observed in real-time monitoring sites in the Delta as well as seasonal timing. Routing Risk is estimated as low for WR this week. Freeport flows are above 12,000 cfs, the DCC gates are closed for the season and although routing is still estimated at 29% through Georgiana Slough, the Georgiana BAFF is assumed to decrease entrainment for juveniles. Routing into Georgiana Slough by the STARS model as of 12/14/23, is 29%; however, this estimation has not taken account the storm event which would likely decrease entrainment into Georgiana Slough. Therefore, the overall entrainment risk into the central Delta is estimated to remain low this week.
 - SR: Similar to previous week
 - Exposure Risk is estimated as low this week. SR are not estimated to be in the Delta this week due to seasonal timing. SR adults spawning has ended, eggs are incubating in the gravel, and SR are emerging and beginning to migrate downstream. SR that are

migrating downstream are in small numbers and not anticipated to be entrained into the central Delta. Routing Risk is also low this week based on hydrologic conditions. Freeport flows are above 12,000 cfs and DCC gates are closed. Routing into Georgiana Slough by the STARS model as of 12/14/23, is 29%; however, this estimation has not taken account the storm event which would likely decrease entrainment into Georgiana Slough. The Georgiana BAFF is also assumed to decrease entrainment of juveniles; therefore, the overall entrainment into the central Delta remains at low this week.

Section 2-C: Facilities Risk

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

- Exposure Risk:
 - WR: Low
 - SR: Low
- Reporting OMR/Export Risk:
 - Baseline OMR (-5,700 cfs)
 - WR: Medium
 - SR: Medium
 - Scenario 1 OMR: (-4,000 cfs)
 - WR: Low
 - SR: Low
 - Scenario 2 OMR: (-8,000 cfs)
 - WR: High
 - SR: High
- Overall Entrainment Risk:
 - WR: Medium
 - 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. Reporting OMR/Export Risk this week is estimated to be more negative than -5,000 cfs, which is likely to entrain WR into the export facilities. SaMT does not expect high salvage of WR this week due to low presence of WR estimated in Delta; however, salvage of WR is possible with OMRI at -8,000 cfs; therefore, the overall entrainment risk into the export facilities is estimated to increase to medium.
 - SR: Similar to previous week
 - Exposure Risk is low due to no SR salvage occurring so far for WY 2024. Reporting OMR/Export Risk is medium this week. OMRI is expected to increase to more negative than -5,000 cfs which is likely to entrain SR that are near the export facilities; however, young-of-year SR are also not expected to be near the export facilities due to seasonal timing and low presence of SR in the central Delta; 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 neap cycle and entering into a spring cycle with a full moon on 12/26/23.
- Turbidity: Not discussed
- Salinity (X2): >81 km on 12/19/23
- Outages:
 - SWP: None projected
 - CVP: None projected
- Exports: 12/19/23 – 12/25/23
 - SWP: 2,000 to 7,200 cfs
 - CVP: 3,600 to 4,200 cfs
- Meteorological Forecast:
 - *“Periods of moderate to heavy rain, high elevation snow, and isolated thunderstorm chances continue through Wednesday. Quieter and more seasonable weather is then anticipated late week into the weekend.”*
 - [NOAA - National Weather Service Forecast](#)
- Weather/Storm Event Projection:
 - Scattered showers are evident across much of interior NorCal. Observed 24-hour rainfall totals so far range from around a half inch to an inch across the Valley, up to 1.5 to 2.5 inches over the mountains. This scattered activity looks to persist throughout much of the day today before another round of more widespread precipitation arrives late Tuesday into Wednesday. These rain events are not likely to trigger COA 8.7 OMR Flexibility During Delta Conditions.
 - Expected OMR flows may become more negative than -3,000 to -5,000 cfs for the next week. Under OMR flows more negative than -5,000 cfs, SaMT expects impacts to rearing, foraging, sheltering, or migration of salmonids present in the south Delta.
- DCC Gates position:
 - DCC gates closed on 11/27/23 and will remain closed for the OMR management season.
- Sacramento River flow at Freeport: 11,300 cfs
 - Freeport flows may increase up to 20,000 cfs this week.
 - [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: -2,800 cfs
 - QWEST is expected to become more positive, around -2,000 cfs, due to the rain events.
- 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)
12/16/23	Daily	-5,200	-5,200
12/16/23	5-day	-5,000	-4,900
12/16/23	14-day	-4,900	-4,600
12/18/23	Daily	Not Applicable	-5,100
12/18/23	5-day	Not Applicable	-5,000
12/18/23	14-day	Not Applicable	-4,900

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 Red Bluff Diversion Dam for 12/16/23 is 865,850 fish, which represents 91.6% of historical passage. Average historic passage (7/1/2002-6/30/2023) as of 12/2/23 indicates 94.9% with one standard deviation of 4.7% 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 on 12/22/23, which is ~3 days after the late fall-run production release.
 - 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 the data 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: SR and WR were caught at the Knights Landing and Tisdale RSTs and SR were also caught at the Lower Sacramento RST between 12/11/23 – 12/17/23.
 - [Middle Sacramento River Salmon and Steelhead Monitoring](#)
 - Yuba River RST Data: Fall-run (FR) and SR were caught between 12/12/23 – 12/18/23.
 - Red Bluff Diversion Dam RST Data: Total passage estimates 865,850 juvenile WR have passed RBDD. Last updated on 12/16/23.
 - Butte Creek RST Data: SR were caught between 12/5/23 – 12/11/23.
 - [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 ended on 12/11/23.
 - Fall-run Carcass Surveys began on 10/16/23 on the Lower American River. For the week of 12/11/23 – 12/15/23, there were 26 female prespawn mortalities, 7 partial spawned females, and 151 spawned females.
- Additional hatchery release notifications: *List all relevant hatchery release notifications.*
 - Coleman National Fish Hatchery (CNFH) released late fall-run Chinook salmon on 12/18/23.
 - 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 likely that early migrating SR may emigrate into the Delta this week due to LAD SR observations in the real-time monitoring sites during the previous week. Both WR and SR are likely to have increased movement this week due to the rain event that has occurred.
 - [SacPAS - Migration Timing and Conditions by Cohort](#)

- [SacPAS - Salvage Timing](#)
- Routing and Survival Analysis:
 - Delta STARS Model: See Table 6 in Appendix 1
 - [STARS Model](#)
- Tillotson entrainment model or other entrainment models as they become available:
 - The entrainment tool estimates a median of 0 WR and a maximum loss of 9 WR this week (SacPAS last updated on 12/19/23).
 - [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 12/19/23 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	12/5/23 - 12/11/23	12/11/23- 12/17/23	12/11/23- 12/17/23	12/11/23- 12/17/23	12/10/23- 12/16/23	12/11, 12/13, 12/15
Chinook Adults	N/A	0	0	0	0	0	0
FR Chinook	N/A	0	0	0	0	0	0
SR Chinook	N/A	20	1	1	1	0	0
WR Chinook	N/A	0	1	1	0	0	0
LFR Chinook	N/A	0	0	0	0	0	0
Chinook (ad-clip)	N/A	0	0	0	0	0	0
Steelhead (wild)	N/A	0	0	0	0	0	0
Steelhead (ad-clip)	N/A	0	0	0	0	0	0
Green Sturgeon	N/A	0	0	0	0	0	0
Flows (avg. cfs)	N/A	146	4,710	4,682	9,044	N/A	N/A
W. Temp. (avg. °F/°C)	N/A	6.8	8.6°C	8.7°C	8.7°C	9.6°C	9.4°C

Location	GCID RST	Butte Creek RST	Tisdale RST	Knights Landing RST	Lower Sac RST	Beach Seines	Sacramento Trawl
Turbidity (avg. NTU)	N/A	0.8	5.4	8.2	9.3	13.7	11.5

Table 3 Continued. Fish monitoring data for the 12/19/23 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	Mosssdale Kodiak Trawl	EDSM	Feather at Herringer RST	Feather at Eye-Side RST	Lower Feather River RST	Yuba River RST
Sample Date	12/11, 12/13, 12/15	12/11, 12/13, 12/15	12/11/23-12/15/23	12/12/23 - 12/18/23	12/12/23-12/18/23	12/11/23-12/18/23	12/12/23-12/18/23
Chinook Adults	0	0	0	0	0	0	0
FR Chinook	0	0	0	2	19	1	69
SR Chinook	0	0	0	0	0	0	50
WR Chinook	0	0	0	0	0	0	0
LFR Chinook	0	0	0	0	0	0	0
Chinook (ad-clip)	0	0	0	0	0	0	0
Steelhead (wild)	0	0	0	0	0	0	0
Steelhead (ad-clip)	0	0	0	0	0	0	0
Green Sturgeon	0	0	0	0	0	0	0
Flows (avg. cfs)	N/A	N/A	N/A	1,750	653	2,340	538
W. Temp. (avg. °F/C)	11.6°C	10.1°C	N/A	8.0°C	9.4°C	9.0°C	9.1°C
Turbidity (avg. NTU)	11.6	10.1	N/A	1.8	1.2	6.8	1.7

Table 4. Delta sturgeon tagging and monitoring.

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

Table 5. CDFW adult monitoring surveys.

Location	American River Carcass Survey	Stanislaus River Carcass Survey
Sample Dates	12/11/23 – 12/15/23	12/11/23 – 12/14/23
Live Fish	Not Available	114
Redds	67	184
Total Carcasses	4,026	34
Ad-clipped	95	12
Spawn Condition	Prespawn Mortality: 14%	Not Available
Flows (avg. cfs)	2,000 cfs	200
Water Temp (avg. °F)	54.6°F	Not Available

Table 6. STARS Modeling

<u>Date:</u> (12/14/23)	<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	0.29	0.46	0.26	N/A
Late Fall-Run Route Specific Survival	N/A	0.17	0.51	0.39	N/A
Winter-Run Routing Probabilities	N/A	0.13	0.58	0.29	0
Winter-Run Route Specific Survival	N/A	0.07	0.28	0.63	N/A

Appendix 2: Salvage Data

Table 7. SWP and CVP SaMT update (12/11/23 – 12/17/23). 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 12/18/23. These are preliminary results and are subject to revision.

Criteria	11-Dec	12-Dec	13-Dec	14-Dec	15-Dec	16-Dec	17-Dec	Trend	Weekly Summary
Wild older juvenile CHN Loss	0	0	0	0	0	0	0	→	0
Wild Steelhead Loss	0	0	0	0	0	0	0	→	0
SWP daily export (acre-feet)	5,168	3,833	3,845	3,842	3,624	5,168	5,168	↘	4,378
CVP daily export (acre-feet)	6,748	6,771	6,777	6,774	6,387	6,799	6,772	↗	6,718
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 12/11/23 – 12/17/23. 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 12/18/23. 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	4	2.88	↗
Weekly Total	2.88	2.88	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 12/18/23. 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	4	2.88	↗
Season Total	4	2.88	Not Applicable

Table 10. Steelhead weekly salvage and loss combined for both the SWP and the CVP fish collection facilities for 12/11/23 – 12/17/23. 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 12/18/23. 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 12/18/23. These are preliminary results and are subject to revision.

Category	Cumulative Salvage	Cumulative Loss	Trend
Wild steelhead	1	0.68	→
Hatchery steelhead	0	0	→
Season Total	1	0.68	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 = 1-2% estimated in the Delta	N/A	12/19/23	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	12/19/23	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	Salvage of LAD older juveniles is possible over the next week.	12/19/23	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	12/19/23	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	12/19/23	N/A

<p>OMR Flexibility During Delta Excess Conditions (8.7)</p>	<p>Nov. 1 - Jun. 30</p>	<p>Not in effect</p>	<ul style="list-style-type: none"> •The Delta is in excess conditions, AND •QWEST is >0, AND •A measurable precipitation event has occurred, AND •DWR and Reclamation determines that the Delta outflow index indicates a higher level of outflow available for diversion due to peak storm flows, AND •None of the following COA's are controlling Project operations: 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, and 8.6.4, AND •Risk assessments indicate that an OMR more negative than - 5,000 cfs is unlikely to trigger an additional real-time OMR restriction •Cumulative salvage at the CVP and SWP facilities of yearling CNFH LFR (as yearling CHNSR surrogates) is less than 0.5% within any of the release groups, AND 	<p>COA 8.7 will not trigger this week due to the following:</p> <ul style="list-style-type: none"> •The Delta is not in excess conditions •QWEST is – cfs •There has not been a measurable precipitation event •Risk assessments indicate that an OMR more negative than - 5,000 cfs is likely to trigger an additional real-time OMR restriction •Risk assessments determine that changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations will occur. 	<p>Current storm events are being monitored for COA 8.7.</p>	<p>12/19/23</p>	<p>N/A</p>
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<u>Action</u>	<u>Timeframe</u>	<u>Current Action Status</u>	<u>Threshold(s)</u>	<u>Current Relevant Data</u>	<u>Weekly Trend</u>	<u>Last Updated</u>	<u>Comments</u>
			<ul style="list-style-type: none"> •Risk assessments determine that no changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations 				
End of OMR Management (8.8)	Jan – Jun. 30	Not in effect	<p>More than 95% of WR and SR have migrated past Chipps Island as determined by SaMT,</p> <p>AND</p> <p>Daily average water temperature at Mossdale exceeds 22.2°C (71.96°F) for 7 non-consecutive days in June,</p> <p>AND</p> <p>Daily average water temperature at Prisoner’s Point exceeds 22.2°C (71.96°F) for 7 non-consecutive days in June</p>	N/A	N/A	12/19/23	N/A

Appendix 4: Hatchery Releases

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

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
12/6/2023	SCARF	Spring	06-29-45	2,477	2,477	100%	San Joaquin River at Highway 140	PIT, CWT, and Ad-Clip	CDFW	SJRRP
12/6/2023	SCARF	Spring	06-29-46	1,060	1,060	100%	San Joaquin River at Highway 140	PIT, CWT, and Ad-Clip	CDFW	SJRRP
12/18/2023	CNFH	Late Fall	05-67-28	66,574	66,574	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-29	68,204	68,204	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-30	73,473	73,473	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-31	74,938	74,938	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-32	67,155	67,155	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-33	70,038	70,038	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-34	61,405	61,405	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-35	69,674	69,674	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-67-36	71,048	71,048	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-66-87	74,745	74,745	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-66-91	67,040	67,040	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-00-45	70,552	70,552	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-00-46	72,539	72,539	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production
12/18/2023	CNFH	Late Fall	05-00-47	66,946	66,946	100%	Battle Creek at CNFH	CWT and Ad-clip	USFWS	Production

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