

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

Section 1: Overview

Date: 1/11/2022

Life Stages Present:

Winter-run Chinook salmon (juvenile)

Spring-run Chinook salmon (juvenile)

Winter-run Chinook salmon (adult)

Advice to the Water Operations Management Team (WOMT):

No Advice is warranted.

For the week beginning January 11, 2022, salmonid presence in the Delta has triggered the OMR Management Season which requires the Central Valley Project (CVP) and the State Water Project (SWP) to maintain a 14-day average OMR index no more negative than -5,000 cfs until the end of the season. The interim winter-run Chinook salmon Juvenile Production Estimate (JPE) was approved and the SWP and CVP will operate to this interim JPE until the final JPE is approved in January 2022. Combined exports on 1/11/2022 are 5,300 cfs resulting in an Old and Middle River Index (OMRI) of -4,500 cfs and 15.7% of inflow diverted (14-day average). The DCC gates remain closed for seasonal requirement. The SWP is exporting this week and no outages are planned.

The Salmon Monitoring Team (SaMT) considers the overall entrainment risk into the central and south Delta to be medium for winter-run Chinook salmon (WR) based on movement of juveniles downstream into the Delta (Table 1), closure of the DCC gates, and high flows on the Sacramento River at Freeport. The SaMT considers the overall entrainment risk into the central and south Delta to be medium for spring-run Chinook salmon (SR) due to the numbers of SR moving into the Delta.

SaMT considers the overall entrainment risk of WR into the salvage facilities to be high this week. COA 8.6.3 Mid and Late Season Natural WR Chinook Salmon Discrete Daily Loss has been initiated which limits OMR to -3,500 cfs from January 1 - May 31 when the WR JPE derived threshold is exceeded. Salvage of WR has occurred for WY 2022, and due to expansion for salvage and loss, particularly at the SWP, low numbers of natural-origin older juvenile Chinook salmon detected at the facilities is likely to result in COA 8.6.3 being triggered. SaMT considers the potential for SR entrainment into the export facilities to be low this week due to no salvage of SR reported for WY 2022.

Table 1: Current Fish Distribution

Location	Yet to Enter Delta	In the Delta	Exited the Delta
Young-of-year (YOY) winter-run Chinook salmon	Current 25-40% Last week 40-50%	Current 59-74% Last Week 55-59%	Current 1-5% Last Week 0-1%
YOY spring-run Chinook salmon ¹	Current 55-70% Last week 65-75%	Current 30-45% Last Week 25-35%	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

Risk Assessment:

Section 1-A: Sacramento River and Confluence

Assessment of risk of entrainment into the central Delta for WR and SR in the Sacramento River: (8.1.5.1 C ii, iii, iv and 8.1.5.1 B iii)

- Exposure Risk:
 - WR: Medium
 - SR: Medium
- Routing Risk:
 - WR: Low
 - SR: Low
- Overall Entrainment Risk:
 - WR: Medium
 - SR: Medium
- Change in risk of entrainment into the central Delta (increased/decreased risk compared to last week):
 - WR: Similar to previous week
 - Routing Risk and Exposure Risk remain similar to last week. Therefore, overall entrainment risk into the central Delta is medium.
 - SR: Similar to previous week
 - Routing Risk and Exposure Risk remain similar to last week. Therefore, the overall entrainment into the central Delta is medium.

Section 1-B: Facilities Risk

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

- Exposure Risk:
 - WR: High
 - SR: Low
- Reporting OMR/Export Risk:
 - Baseline OMR (-5,000 cfs)
 - WR: High
 - SR: High
 - Scenario 1 OMR: (-4,500 cfs)

¹ The fish observed at GCID and Knight's Landing Rotary Screw Traps were identified by length at date as spring-run Chinook salmon (SR) but due to winter and spring-run Chinook salmon spawning, egg incubation, and emergence timing these detections may be late emerging winter-run Chinook salmon.

- WR: Medium
 - SR: Medium
- Scenario 2 OMR: (NA)
 - WR: NA
 - SR: NA
- Overall Entrainment Risk:
 - WR: High
 - 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 remains high this week due to exports and OMR conditions being similar to last week. Exposure Risk is similar this week due to WR being caught in salvage. Therefore, overall entrainment risk is high.
 - SR: Similar to previous week
 - Reporting OMR/Export Risk remains similar this week due SR presence in the Delta. Exposure Risk remains similar to last week. No SR have been caught in salvage. Therefore, overall entrainment risk is low.

Section 1-C: Annual Loss Threshold Risk

- Annual loss threshold risk and Alternative Actions (8.1.5.1. E I, ii, iii and 8.1.5.1 F I, ii)
 - Loss at the SWP and CVP facilities compared to the estimated remaining population in the Delta and upstream of the Delta: Salvage of California Endangered Species Act (CESA)-listed Chinook salmon has occurred over the past week.
 - Define risk of hitting a threshold, 50%, or 75%, or 100%, and likelihood of exceeding a threshold:
 - Natural origin WR: 1,459.6 [1.17% of the interim natural origin WR Juvenile Production Estimate (JPE)]
 - Current Annual Loss: 17.12
 - 50% Threshold based on natural WR JPE: 729.8
 - Risk of exceeding threshold: Low
 - 75% Threshold based on natural WR JPE: 1,094.7
 - Risk of exceeding threshold: Low
 - 100% Threshold based on natural WR JPE: 1,459.6
 - Risk of exceeding threshold: Low
 - Hatchery WR: NA [0.12% of the final Livingston Stone National Fish Hatchery (LSNFH) hatchery release JPE]
 - Current Annual Loss: NA
 - 50% Threshold based on hatchery WR JPE: NA
 - Risk of exceeding threshold: NA
 - 75% Threshold based on hatchery WR JPE: NA
 - Risk of exceeding threshold: NA
 - 100% Threshold based on hatchery WR JPE: NA
 - Risk of exceeding threshold: NA

Section 1-D: 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 hit and subsequent loss and associated operations:
 - COA 8.6.3: Mid and Late Season Natural WR Chinook Salmon Daily Loss Threshold
 - January 1 - January 31: $0.0000635 * 124,760 = 7.92$
 - February 1 - February 28: $0.0000991 * 124,760 = 12.36$
 - March 1 – March 31: $0.000146 * 124,760 = 18.21$
 - April 1 – April 30: $0.0000507 * 124,760 = 6.33$
 - May 1 – May 31: $0.000077 * 124,760 = 9.61$
 - Highest daily loss: 5.21
 - Risk of exceeding threshold: High
 - COA 8.6.4 Daily SR Hatchery Surrogate Loss Threshold
 - Hatchery Origin YOY SR Surrogates Highest Daily Loss: NA
 - Risk of exceeding threshold: NA
 - Hatchery Origin YOY FR Surrogates Highest Daily Loss: NA
 - Risk of exceeding threshold: NA

Section 2: Basis for Advice

The 2020 [Incidental Take Permit for Long-Term Operation of the State Water Project in the Sacramento-San Joaquin Delta 2081-2019-066-00](#) (SWP ITP) states that advice to Water Operations Management Team (WOMT) shall be consistent with the Project Description, COA in the ITP, and the applicable ESA authorizations. This week's advice is based on the following COAs which are currently applicable:

List relevant COA number and title based on species/life stage, time of year, etc.:

8.1.4 Collaborative Approach to Real-time Risk Assessment. Beginning no later than October 1 through the end of OMR Management (see Condition of Approval 8.8) the Smelt and Salmon Monitoring Teams shall meet weekly, or more often as required, to consider survey data, salvage data, and other pertinent biotic and abiotic factors and prepare risk assessments as described in Conditions of Approval 8.1.1, 8.1.2, 8.1.5.1 and 8.1.5.2.

The Smelt and Salmon Monitoring Teams shall prepare operations advice for the WOMT as required by Conditions of Approval 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, 8.6.4, 8.7, and 8.8, including advice on operations. The Smelt and Salmon Monitoring Teams shall each prepare risk assessments and operations advice. Within each team, staff jointly develop the risk assessment and supporting documentation to accompany operations advice (see Conditions of Approval 8.1.5.1 and 8.1.5.2). DWR and CDFW Smelt and Salmon Monitoring Team staff may conclude different operations advice is warranted, in which case the difference shall be noted and elevated as described in this Condition of Approval.

The Smelt and Salmon Monitoring Teams shall communicate their advice to WOMT. The WOMT shall then confer and attempt to reach a resolution and agreed-upon Project operations. If a resolution is reached, Permittee shall operate consistent with the decision regarding Project operations from WOMT. If the WOMT does not reach a resolution, the CDFW Director may require Permittee to implement an operational recommendation provided by CDFW. CDFW will provide its operational decision to Permittee in writing. Permittee shall implement the operational decision required by CDFW. Permittee shall ensure that its proportional share (see Condition of Approval 8.10) of the OMR flow requirement as a part of the operational decision is satisfied.

8.1.5 Real-time Risk Assessments. The Smelt and Salmon Monitoring Teams (Conditions of Approval 8.1.1 and 8.1.2) shall prepare weekly risk assessments, or more often as required, and operations advice (as required by Conditions of Approval 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, 8.6.4, and 8.7) during their discussions and analyses. The Smelt and Salmon Monitoring Teams shall provide the risk assessments and pertinent supporting information to the WOMT (Condition of Approval 8.1.3) within one business day of each meeting.

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

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

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

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

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

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

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

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

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

During the water year, if cumulative loss of natural or hatchery WR at the CVP and SWP salvage facilities exceeds 75% of the single-year loss threshold, Permittee shall restrict OMR to a 14-day moving average OMR flow index that is no more negative than -2,500 cfs through the end of OMR Management (Condition of Approval 8.7). After 14 days Permittee may convene the Salmon Monitoring Team to conduct a risk assessment (Condition of Approval 8.1.5.1) and determine whether the risk of entrainment and take of natural and

hatchery WR is no longer present. The results of this risk assessment and associated OMR advice shall be provided to WOMT according to Condition of Approval 8.1.3 and the decision-making process shall follow the process described in Condition of Approval 8.1.4.

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

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

If the single-year loss threshold is exceeded, Permittee and Reclamation shall also convene an independent panel to review Project operations and the single-year loss threshold prior to November 1, as described in Condition of Approval 8.2. The purpose of the independent panel is to review the actions and decisions contributing to the loss trajectory that lead to an exceedance of the single-year loss threshold, and make recommendations on modifications to Project implementation, or additional actions to be conducted to stay within the single-year loss threshold in subsequent years.

Permittee shall, in coordination with Reclamation, continue monitoring and reporting salvage at the CVP and SWP salvage facilities. Permittee and Reclamation shall continue the release and monitoring of yearling Coleman National Fish Hatchery (NFH) late fall-run and yearling SR surrogates. The Salmon Monitoring Team shall use reported real-time salvage counts along with qualitative and quantitative tools to inform risk assessments (see Condition of Approval 8.1.5.1). 8.3.2 Salmonid Presence. After January 1 each year, if Conditions of Approval 8.3.1 or 8.3.3 have not already been triggered, the OMR Management season shall begin when the Salmon Monitoring Team first estimates that 5% of the CHNWR or CHNSR population is in the Delta whichever is sooner. Upon initiation of the OMR Management season, Permittee shall reduce exports to achieve, and shall maintain a 14-day average OMR index no more negative than -5,000 cfs, until the OMR Management season ends (see Condition of Approval 8.8). In the event that a salmon daily or single-year loss threshold is exceeded (Conditions of Approval 8.6.1, 8.6.2, 8.6.3, or 8.6.4) prior to the start of OMR Management season the requirements in those Conditions shall control operations.

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

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

- May 1 – May 31: 0.0077 % of the CHNWR JPE

8.7 OMR Flexibility During Delta Excess Conditions. Permittee may increase exports to capture peak flows in the Delta during storm-related events (hereafter OMR flex) when:

- *The Delta is in excess conditions, AND*
- *QWEST is greater than 0, AND*
- *A measurable precipitation event has occurred in the Central Valley, AND*
- *Permittee, in coordination with Reclamation, determines that Delta outflow index indicates a higher level of outflow available for diversion due to peak storm flows, AND*
- *None of the following Conditions of Approval are controlling Project operations: 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, and 8.6.4, AND*
- *Risk assessments conducted by the Salmon and Smelt Monitoring Teams (Conditions of Approval 8.1.5.1 and 8.1.5.2) indicate that an OMR more negative than -5,000 cfs is not likely to trigger an additional real-time OMR restriction (Conditions of Approval 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, and 8.6.4), AND*
- *Cumulative salvage at the CVP and SWP facilities of yearling Coleman NFH late fall-run Chinook salmon (as yearling CHNSR surrogates) is less than 0.5% within any of the release groups, AND*
- *Risk assessments conducted by the Salmon and Smelt Monitoring Teams determines that no changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations beyond those anticipated to occur through operations described in Conditions of Approval 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, and 8.6.4 are likely to occur.*

If none of the restrictions listed above apply, Permittee may increase south Delta exports but shall manage Project operations to achieve a five-day average OMR index no more negative than -6,250 cfs. The decision to operate under this Condition of Approval shall be made following the process described in Condition of Approval 8.1.4 (Collaborative Real Time Risk Assessment), and SWP OMR flex is subject to approval by CDFW.

If, during OMR flex operations, any of the following conditions occurs, Permittee shall reduce south Delta exports to achieve a 14-day average OMR index no more negative than -5,000 cfs, unless a further reduction in exports is required by another Condition of Approval. The more positive OMR index shall be achieved within 48 hours of the occurrence of the condition, and the 14-day moving average shall apply from that point forward.

- *Risk assessments conducted by the Salmon and Smelt Monitoring Teams (Conditions of Approval 8.1.5.1 and 8.5.1.2) indicate that an OMR more negative than -5,000 cfs is likely to trigger an additional real-time OMR restriction (Conditions of Approval 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, and 8.6.4), OR*
- *Cumulative salvage at the CVP and SWP facilities of yearling Coleman NFH late fall-run Chinook salmon (as yearling CHNSR surrogates) exceeds 0.5% within any of the release groups, OR*

- *A risk assessment conducted by the Salmon or Smelt Monitoring Teams identifies changes in spawning, rearing, foraging, sheltering, or migration behavior as a result of OMR Flex operations beyond those anticipated to occur through operations described in Conditions of Approval 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, and 8.6.4, OR*
- *Operational restrictions described in Conditions of Approval 8.3.1, 8.3.3, 8.4.1, 8.4.2, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.6.3, 8.6.4, and 8.17 are required.*

Section 3: Hydrology and Operations

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

Section 3-A: Water Operations, Water Operations Outlook, and Projected Conditions C 8.1.5.1 A. i, iii, iii:

- Antecedent Actions:
- Water Temperature:
 - Mossdale (MSD): <https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=MSD>
 - Number of days threshold exceeded: Not applicable until June.
 - Prisoners Point (PPT): <https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=PPT&end=2021-01-20>
 - Number of days threshold exceeded: Not applicable until June.
- Tidal Cycle: *(Spring/Neap. Note if tidal cycle has potential to affect south Delta hydrology or X2)*
 - Not discussed
- Turbidity: Not discussed
- Salinity (X2): 65 km on 1/11/2022
- Hydraulic Footprint *(Provide brief description of hydrologic footprint and summary of relevant DSM2 results)*: DSM2 modeling runs were conducted this week. Based on discussion of the modeling, SaMT concluded:
 - North Delta into Interior and Central Delta, San Joaquin River and Central Delta into South Delta, and South Delta into Facilities were combined this week:
 - Across all regions, changes in flow and velocity related to the modeled flow conditions would not likely be detected and it is unlikely that listed salmonids would experience changes to rearing, foraging, and/or sheltering. It is possible that migrating fish in the south Delta near the export facilities may experience faster travel time towards the pumps (with influence increasing closer towards the pumps) due to more negative modeled flow.
- Outages:
 - SWP: None projected
 - CVP: None projected
- Exports – range: 1/11/2022 – 1/17/2022
 - SWP: 800 to 2,500 cfs
 - CVP: 3,500 to 4,200 cfs
- Meteorological Forecast: *“Dry weather for at least the next week. Patchy late night and morning fog and frost possible in the Central Valley.”*
https://www.wrh.noaa.gov/total_forecast/getprod.php?new&prod=XXXAFDSTO&wfo=sto
- Storm Event Projection:
 - EPAC upper ridge extends inland over NorCal as closed upper low remains quasistationary off the SoCal coast through the weekend. Models diverge with handling of low early next week, but consensus is it remains well south of the CWA as a weak upper low approaches the NW CA coast Tuesday. Pattern keeps the forecast dry through the extended period with near to slightly above normal high temperatures. Some patchy late night/morning fog possible in the Southern Sac/San Joaquin Valleys.
- DCC Gates position: Closed on 11/30/2021 per D-1641 seasonal closure.
- Sacramento River flow at Freeport: <https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=FPT>
- San Joaquin River flow at Vernalis:

- https://cdec.water.ca.gov/jspplot/jspPlotServlet.jsp?sensor_no=1689&end=&geom=&interval=&cookies=
- https://cdec.water.ca.gov/guidance_plots/VNS_gp.html
- QWEST: -800 cfs
 - QWEST will remain close to -1,000 cfs throughout the week.

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

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
1/8/2022	Daily	-3,800	-5,000
1/8/2022	5-day	-4,300	-4,900
1/8/2022	14-day	-2,300	-3,200
1/10/2022	Daily	Not Applicable	-4,800
1/10/2022	5-day	Not Applicable	-4,900
1/10/2022	14-day	Not Applicable	-3,600

Section 4: Distribution and Biology

8.1.5.1.B Assessment of biological information for WR and SR.

Section 4-A: WR Population Status 8.1.5.1.B i

- Adult escapement estimate:
 - Estimated spawning escapement for WR adults contributing to brood year (BY) 2021 is 10,269.
- Redd distribution and fry emergence timing:
 - WR fry emergence is drawing to a close for BY 2021. Estimated juvenile WR Chinook salmon passage at RBDD for December 31, 2021 is 569,917 fish, which represents 96.9% of historical passage.
- Juvenile production:
 - https://www.fws.gov/redbluff/RBDD%20JSM%20Biweekly/2021/rbdd_ismp_2021.html
- Livingston Stone National Fish Hatchery releases:
 - See Table 4
- Distribution of natural WR:
 - See Table 1
- Distribution of Livingston Stone National Fish Hatchery Sacramento River WR and Battle Creek WR:
 - Releases have not occurred.

Section 4-B: SR Population Status 8.1.5.1.B ii

- Adult escapement estimate: Not available.
- Redd distribution and fry emergence timing:
 - Most SR alevin have emerged from the gravel. Juvenile SR fry are present and migrating downstream to rear.
- Hatchery release (in-river and downstream):
 - See Table 4
- Distribution of natural SR:
 - See Table 1.
- Distribution of Feather River Fish Hatchery SR:
 - Releases have not occurred.

Section 4-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*
 - <https://oceanview.pfeg.noaa.gov/CalFishTrack/>
- Trawls:
 - Sacramento Trawl:
https://www.fws.gov/lodi/juvenile_fish_monitoring_program/djfmfp/?dir=Sacramento%20trawls%20CHN-POD%20species%202012-Present
 - Mossdale Trawl:
https://www.fws.gov/lodi/juvenile_fish_monitoring_program/djfmfp/?dir=Mossdale%20trawls%20CHN-POD%20species%202012-Present
 - Chipps Island Trawl:
https://www.fws.gov/lodi/juvenile_fish_monitoring_program/djfmfp/?dir=Beach%20seines%20CHN-POD%20species%202012-Present
- Rotary Screw Traps:
 - Knights Landing and Tisdale Rotary Screw Trap Data:
<https://www.calfish.org/ProgramsData/ConservationandManagement/CentralValleyMonitoring/SacramentoValleyTributaryMonitoring/MiddleSacramentoRiverSalmonandSteelheadMonitoring.aspx>

- Redd Bluff Diversion Dam Rotary Screw Trap Data:
https://www.fws.gov/redbluff/RBDD%20JSM%20Biweekly/2021/rbdd_jsmp_2021.html
- Feather River Rotary Screw Trap Data for Butte Creek:
<https://www.calfish.org/ProgramsData/ConservationandManagement/CentralValleyMonitoring/SacramentoValleyTributaryMonitoring/ButteCreek.aspx>
- Seines:
 - Sacramento River Beach Seines:
https://www.fws.gov/lodi/juvenile_fish_monitoring_program/difmp/?dir=Beach%20seines%20CHN-POD%20species%202012-Present
- Carcass Survey Data:
 - Lower American River Carcass Survey Data:
<https://www.calfish.org/ProgramsData/ConservationandManagement/CentralValleyMonitoring/SacramentoValleyTributaryMonitoring/MiddleSacramentoRiverSalmonandSteelheadMonitoring.aspx>
- Additional hatchery release notifications: *List all relevant hatchery release notifications.*
 - See Table 4 Hatchery Release Data WY 2022
- 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.*
 - None this week
- Anticipated emigration to continue into the Delta:
(http://www.cbr.washington.edu/sacramento/data/query_hrt.html and http://www.cbr.washington.edu/sacramento/data/query_salvage_hrt.html)
- Routing and Survival Analysis:
 - Delta STARS Model: <https://oceanview.pfeg.noaa.gov/shiny/FED/CalFishTrack/>

<u>Date:</u> (1/11/2021)	<u>DCC</u>	<u>Georgiana Slough</u>	<u>Sacramento River</u>	<u>Sutter and Steamboat Slough</u>
Proportion of Entrainment	0	0.23	0.47	0.3
Survival	NA	0.23	0.61	0.52

- Tillotson entrainment model or other entrainment models as they become available: The entrainment tool estimates a median loss of 0 fish and a maximum loss of 22 fish during this week (SacPas last updated on 1/10/22). <http://www.cbr.washington.edu/sacramento/lossandsalvage/>
- Salvage trends in relation to OMRI: *Provide overview of salvage data and insert salvage table as attachment at end of document:* <https://apps.wildlife.ca.gov/Salvage>

Table 3. Relevant Water Year 2022 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 $\geq 5\%$ of winter-run or spring-run are in the Delta)</i>	In effect	5% of the winter-run or spring-run population are present in the Delta	NA	Possible increase in presence of WR and SR	1/11/22	NA
Winter-run yearly loss (8.6.1)	Nov. 1 - Jun. 30	In effect	Natural CHNWR (loss = 1.17% of JPE) Hatchery CHNWR (loss = 0.12% of JPE)	Current yearly WR loss (natural) = 17.11; Current yearly WR loss (hatchery) = NA	Possible additional salvage of WR	1/11/22	No relevant hatchery group has been released yet.
Winter-run discrete daily loss (8.6.2)	Nov. 1 - Dec. 31	Not in effect	11/1-11/30: loss of 6/day unclipped older juv. Chinook salmon 12/1-12/31: loss of 26/day unclipped older juv. Chinook salmon	NA	NA	1/11/22	NA

Mid- and Late-season Natural WR Daily Loss Threshold defined as natural origin juvenile Chinook salmon (8.6.3)	Jan.1 - Jun.30	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>	<p><u>January 1 – 31:</u> <u>$0.000635 * 124,760 = 7.92$</u></p> <p>February 1– 29: $0.0000991 * 124,760 = 12.36$</p> <p>March 1 – 31: $0.000146 * 124,760 = 18.21$</p> <p>April 1 – 30: $0.0000507 * 124,760 = 6.33$</p> <p>May 1 – 31: $0.000077 * 124,760 = 9.61$</p>	Possible additional salvage of older juvenile Chinook salmon	1/11/22	NA
Spring-run surrogate protection (8.6.4)	Feb. 1 - Jun. 30	Not in effect	TBD (Based on the number of fish in each release group)	NA	NA	10/4/21	NA

Table 4. Hatchery salmon release data for Brood Year 2021 and Water Year 2022.

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
11/8/2021	CNFH	Late Fall	05 64 65	78,056	78,056	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/8/2021	CNFH	Late Fall	05 64 66	82,154	82,154	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/8/2021	CNFH	Late Fall	05 64 73	75,923	75,923	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/7/2021	SCARF	Spring	06-80-02	3,476	3,476	100%	San Joaquin at Highway 140	CWT, Ad-Clip and PIT	CDFW	SJRRP
12/7/2021	SCARF	Spring	06-19-67	236	236	100%	San Joaquin at Highway 140	CWT, Ad-Clip and PIT	CDFW	SJRRP
12/7/2021	SCARF	Spring	06-18-10	61	61	100%	San Joaquin at Highway 140	CWT and Ad-Clip	CDFW	SJRRP
12/11/2021	CNFH	Late Fall	05 64 67	44,503	44,503	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/11/2021	CNFH	Late Fall	05 64 69	75,848	75,848	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/11/2021	CNFH	Late Fall	05 64 75	64,458	64,458	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/11/2021	CNHF	Late Fall	05 64 72	75,798	75,798	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/11/2021	CNFH	Late Fall	05 64 74	72,120	72,120	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/11/2021	CNFH	Late Fall	05 64 76	69,274	69,274	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/11/2021	CNFH	Late Fall	05 64 77	73,907	73,907	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/11/2021	CNFH	Late Fall	05 64 78	78,103	78,103	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/15/2021	CNFH	Late Fall	05 64 68	84,343	84,343	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Experimental
12/17/2021	CNFH	Fall	NA	0	615,426	0%	Sacramento River at Balls Ferry Boat Ramp	No Mark	USFWS	Experimental
12/22/2021	CNFH	Late Fall	05 64 70	82,626	82,626	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Experimental
12/30/2021	CNFH	Fall	NA	0	635,998	0%	Sacramento River at Balls Ferry Boat Ramp	No Mark	USFWS	Experimental
1/6/2022	CNFH	Late Fall	05 64 71	77,325	77,325	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Experimental
1/11/2022	CNFH	Fall	NA	0	607,605	0%	Sacramento River at Balls Ferry Boat Ramp	No Mark	USFWS	Experimental

Table 5. Hatchery steelhead release data for Brood Year 2021 and Water Year 2022.

Release Date	Hatchery	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
12/11/2021	CNFH	N/A	610,911	610,911	100%	Battle Creek at CNFH	Ad-Clip	USFWS	Production

Table 6. COA 8.6.4 Spring-run Chinook Hatchery Surrogate Summary Table, WY 2022.

Hatchery	Release Group	Date	Race	Total Fish Released	CWT Fish	Tag Codes	Loss Threshold
Coleman National Fish Hatchery	NA	NA	NA	NA	NA	NA	NA
Feather River Fish Hatchery	NA	NA	NA	NA	NA	NA	NA
Nimbus Fish Hatchery	NA	NA	NA	NA	NA	NA	NA