

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

Section 1: Overview

Date: 11/9/2021

Life Stages Present:

Winter-run Chinook salmon (juvenile)

Spring-run Chinook salmon (juvenile)

Advice to the Water Operations Management Team (WOMT):

No Advice is warranted.

For the week beginning November 9, 2021 D-1641 Delta Outflow is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Combined exports on 11/9/2021 are 7,200 cfs resulting in an Old and Middle River Index (OMRI) of -6,800 cfs and 33.5% of inflow diverted (14-day average). The Delta Cross Channel (DCC) gates were opened 11/5/2021 and will remain open until further notice for Delta salinity requirements. The SWP have resumed exporting this week, following reduced exports the previous week due to aquatic weed management, 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 increased movement of juveniles downstream into the Delta (Table 1) coupled with the DCC gates being open and lower flows on the Sacramento River at Freeport. The SaMT considers the overall entrainment risk into the central and south Delta to be low for spring-run Chinook salmon (SR) due to low numbers of SR entering the Delta as reported in monitoring.

SaMT considers the overall entrainment risk of WR into the salvage facilities to be low this week. Salvage is possible due to WR presence in the Delta (Table 1), anticipated hydrology, and project operations. However, WR juveniles are currently in the rearing life stage as opposed to actively emigrating smolt life stage which reduces the likelihood of entrainment into the export facilities. SaMT does not anticipate COA 8.6.2 Early-season Natural Origin WR Discrete Daily Loss threshold of six older juvenile Chinook salmon (November 1-30) to be triggered this week but does not discount the possibility. If any amount of salvage does occur at the facilities, the entrainment risk will increase to medium because of the low number of loss per day associated with COA 8.6.2. No salvage of WR has occurred for WY 2022. SaMT considers the potential for SR entrainment into the export facilities to be low this week due to low numbers of SR in the Delta coupled with 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-or-year (YOY) winter-run Chinook salmon	Current 80-90% Last week 85-90%	Current 10-19% Last Week 10-15%	Current 0-1% Last Week 0%
YOY spring-run Chinook salmon ¹	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

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: Low
- Routing Risk:
 - WR: High
 - SR: High
- Overall Entrainment Risk:
 - WR: Medium
 - SR: Low
- Change in risk of entrainment into the central Delta (increased/decreased risk compared to last week):
 - WR: Similar to previous week
 - Routing Risk increased due to DCC gates being open and Freeport flows <12,000, however, WR are most likely rearing and not migrating so overall entrainment into the central Delta remains Medium
 - SR: Similar to previous week
 - Routing Risk increased due to DCC gates being open and Freeport flows <12,000, however, SR are most likely rearing and not migrating so overall entrainment into the central Delta remains 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: Low
 - SR: Low
- Reporting OMR/Export Risk:
 - Baseline OMR (-6,800 cfs)
 - WR: High
 - SR: High
 - Scenario 1 OMR (-11,000 cfs)
 - WR: High
 - SR: High

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.

- Scenario 2 OMR (-4,000 cfs)
 - WR: Low
 - SR: Low
- Overall Entrainment Risk:
 - WR: Low
 - SR: Low
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
 - WR: Similar to previous week
 - Reporting OMR/Export Risk increased due to increase in combined exports >5,000 cfs, however no WR have been caught in salvage so overall entrainment risk is still Low
 - SR: Similar to previous week
 - Reporting OMR/Export Risk increased due to increase in combined exports >5,000 cfs, however no SR have been caught in salvage so overall entrainment risk is still 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 Delta and upstream of the Delta: No 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: NA
 - Current Annual Loss: 0
 - 50% Threshold based on natural WR JPE: NA
 - Risk of exceeding threshold: NA
 - 75% Threshold based on natural WR JPE: NA
 - Risk of exceeding threshold: NA
 - 100% Threshold based on natural WR JPE: NA
 - Risk of exceeding threshold: NA
 - 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 8.6.2: Early Season Discrete Daily Loss Threshold²

² Condition applies to all older juvenile Chinook salmon defined as any Chinook salmon that is above the minimum length for WR, according to the Delta Model length-at-date criteria used to assign individuals to race.

- Natural Origin Older Juvenile Chinook Salmon:
- November monthly daily loss threshold: 6 per day older juvenile Chinook salmon
- Highest daily loss: 0
 - Risk of exceeding threshold: Low
- 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.

8.6.1 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).

8.6.2 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 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): 81km on 11/9/2021
- Hydraulic Footprint (*Provide brief description of hydrologic footprint and summary of relevant DSM2 results*): DSM2 modeling runs were not conducted this week.
 - North Delta into Interior and Central Delta
 - San Joaquin River and Central Delta into South Delta
 - South Delta into Facilities
- Outages:
 - SWP: None projected
 - CVP: None projected
- Exports – range: 11/9/2021
 - SWP: 6,680 to 2,000 cfs
 - CVP: 4,200 to 2,700 cfs
- Meteorological Forecast: “Dry and cool start to today. The next system approaches NorCal late today through Tuesday, and will bring with it widespread rain, high elevation mountain snow, and wind. Dry conditions will return by Thursday with a warming trend.”
https://www.wrh.noaa.gov/total_forecast/getprod.php?new&prod=XXXAFDSTO&wfo=sto
- Storm Event Projection: Although rain is expected later this week there are no OMRI management restrictions at this time which would require a storm flex.
- DCC Gates position: Opened on 11/5/2021. Fish catch indices are no longer controlling operations and gates will be open until further notice.
- 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: -1,500 cfs.
 - Due to the drought barrier being in place QWEST may not be a large factor.

Table 2: Comparison of OMR gauge and OMR Index. USGS data

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
11/6/2021	Daily	-6,300	-6,800
11/6/2021	5-day	Not Available	-6,100
11/6/2021	14-day	Not Available	-6,700
11/8/2021	Daily	Not Applicable	-6,100
11/8/2021	5-day	Not Applicable	-5,500
11/8/2021	14-day	Not Applicable	-7,300

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:
 - Estimate from carcass counts for adults contributing to brood year (BY) 2020 is pending.
- Redd distribution and fry emergence timing: WR fry emergence is drawing to a close for BY 2021
- Juvenile production:
 - https://www.fws.gov/redbluff/RBDD%20JSM%20Biweekly/2021/rbdd_jsmp_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:
 - Adult SR will likely complete their spawning by mid-November.
 - SR egg are incubating in the gravel. Early emergence may have occurred as evidenced by length-at-date SR detections in the rotary screw trap sampling stations.
- 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/djfm/?dir=Sacramento%20trawls%20CHN-POD%20species%202012-Present
 - Mossdale Trawl:
https://www.fws.gov/lodi/juvenile_fish_monitoring_program/djfm/?dir=Mossdale%20trawls%20CHN-POD%20species%202012-Present
 - Chipps Island Trawl:
https://www.fws.gov/lodi/juvenile_fish_monitoring_program/djfm/?dir=Beach%20seines%20CHN-POD%20species%202012-Present
- Rotary Screw Traps:
 - Knights Landing, Tisdale, and Butte Creek 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
- Seines:

- Sacramento River Beach Seines:
 - https://www.fws.gov/lodi/juvenile_fish_monitoring_program/djfm/?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/>
- Tillotson entrainment model or other entrainment models as they become available:
 - <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>
OMR Mgmt. triggered (8.3.2)	Jan. 1 - Jun. 30 <i>(when ≥ 5% of spring-run or winter-run in Delta)</i>	Not in effect	5% of the winter-run or spring-run population in Delta	NA	NA	10/4/21	NA
Winter-run yearly loss (8.6.1)	Nov. 1 - Jun. 30	In effect (Based on JPE Value)	TBD (Based on JPE guidance)	Current yearly WR loss (natural) = 0; Current yearly WR loss (hatchery) = 0	No change expected	11/9/21	No relevant hatchery group has been released yet.
Winter-run discrete daily loss (8.6.2)	Nov. 1 - Dec. 31	In effect	11/1-11/30: loss of 6/day unclipped older juv. Chinook salmon 12/1-12/31: loss of 26/day unclipped older juv. Chinook salmon	Max single daily loss from previous week = 0.00 fish (No older juveniles observed yet)	No change expected	11/9/21	NA
Mid- and Late-season Natural WR Daily Loss Threshold (8.6.3) defined as natural origin juvenile Chinook salmon	Jan.1 -June 30	Not in effect	TBD (Based on JPE guidance)	NA	NA	11/9/21	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	11/9/21	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

Table 5. COA 8.6.4 Spring-run Chinook Hatchery Surrogate Summary Table, WY 2021.

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