

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

Section 1: Overview

Date: 5/3/2022

Life Stages Present:

Winter-run Chinook salmon (juvenile)
Spring-run Chinook salmon (juvenile)
Spring-run Chinook salmon (adult)
Winter-run Chinook salmon (adult)

Advice to the Water Operations Management Team (WOMT):

No advice is warranted.

For the week beginning 5/3/2022, the Temporary Urgency Change Order (TUCO) is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). More details on the TUCO can be found below. Combined exports on 5/3/2022 are 1,500 cfs resulting in an Old and Middle River Index (OMRI) of -1,500 cfs and 13.3% of inflow diverted (14-day average). The Delta Cross Channel (DCC) gates remain closed for seasonal requirement consistent with D-1641 and the CVP Proposed Action. The SWP is exporting this week and no outages are planned.

The Salmon Monitoring Team (SaMT) estimates an overall low risk of entrainment of juvenile natural-origin winter-run (WR) Chinook salmon into the interior Delta from the Sacramento River. SaMT based their determination of entrainment risk on the current distribution of WR in the Delta as well as forecasted Freeport flows and STARS entrainment modeling results. Based on monitoring data, hydrological conditions, and seasonal timing, SaMT estimates an overall medium risk of entrainment into the interior Delta from the Sacramento River for young-of-year (YOY) spring-run (SR) Chinook salmon which is similar to the previous week.

SaMT considers the overall entrainment risk of WR into the salvage facilities to increase this week. The overall entrainment risk into the facilities is estimated to be medium based on 1 WR observed at the SWP salvage facility last week on 4/27/2022 (loss of 17.57). Although OMRI is more positive than what is expected, WR continue to be salvaged at OMRI of -1,500 cfs and SaMT anticipates a possibility of COA 8.6.3 to be triggered this week due to the May threshold being low (loss > 9.63). SaMT considers the potential for SR entrainment into the export facilities to increase and is estimated to remain high this week. Exports have decreased and OMRI values are more positive than expected; however, 42 natural-origin SR and 1 hatchery-origin SR were observed at the fish salvage facilities last week, which continues to keep entrainment risk into the facilities high.

The TUCO was approved on 4/4/2022 and will be in effect until 6/30/2022. The TUCO approves the changes described below:

- Reduces the Delta outflow requirement as measured by the Net Delta Outflow Index (NDOI) from a minimum of 7,100 cubic-feet per second (cfs) on a 3-day running average to 4,000 cfs on a 14-day running average. From May 1 – June 30, unmodified D-1641 includes an offramp to a minimum average flow of 4,000 cfs if the Sacramento River Index is less than 8.1 MAF at the 90% exceedance level.

- Moves the Western Delta agricultural salinity compliance point on the Sacramento River at Emmaton from 2.5 to 3 miles upstream, to Threemile Slough.
- Limits the maximum export rate to 1,500 cfs whenever unmodified D-1641 requirements are not being met.
- Reduces the minimum monthly average flow requirement on the San Joaquin River at Airport Way Bridge, Vernalis from 710 cfs-1,140 cfs (April 1 – April 14 and May 16 - June 30) and 3,110-3,540 cfs (April 15 – May 15) to a minimum monthly average of 710 cfs. Pursuant to the National Marine Fisheries Service (2019) Biological Opinion on the Long-Term Operation of the Central Valley Project and State Water Project, Reclamation proposes to operate New Melones Reservoir on the Stanislaus River in accordance with the Stepped Release Plan, which includes a spring pulse flow (approximately April 15 – May 15). Reclamation proposes to increase New Melones Reservoir releases and Stanislaus River flows, if necessary, to meet the proposed Vernalis base flow of 710 cfs.

Risk Assessment:

COA 8.6.3 Mid and Late Season Natural WR Chinook Salmon Daily Loss Threshold was triggered on 4/27/2022. An unclipped, length-at-date WR was observed in salvage at the Skinner Fish Facility (SWP) on 4/27/2022 with loss expanded to 17.57. This salvage event occurred when OMRI was -1,500 cfs and exceeded the COA 8.6.3 daily loss threshold of 6.34 for the month of April. Due to COA 8.6.3 being exceeded, OMRI is restricted to no more negative than -3,500 cfs on a 5-day average; however, OMRI is currently at -1,500 cfs and combined exports are restricted to no more than 1,500 cfs due to the TUCO approved on 4/4/2022. SaMT did not hold an emergency meeting for the exceedance event, and no further action is required at this time.

COA 8.6.4 (Daily SR Hatchery Surrogate Loss Threshold) is in effect until the OMR management season ends (COA 8.8 End of OMR Management). SaMT does not anticipate salvage of the four release groups from CNFH or the one release group from Feather River Fish Hatchery (FRFH) to exceed the COA 8.6.4 threshold. Due to ongoing drought conditions, Nimbus Fish Hatchery FR Chinook salmon releases will be released in the Bay and will not meet the needs for ITP COA 8.6.4. The final hatchery surrogate release group of SR for COA 8.6.4 from the FRFH will also be released in the Bay on 5/10/2022 and 5/11/2022 and not meet the needs for the ITP COA 8.6.4.

Table 1: Current Fish Distribution

| Location | Yet to Enter Delta | In the Delta | Exited the Delta |
|--|----------------------------------|------------------------------------|--------------------------------------|
| Young-of-year winter-run Chinook salmon* | Current 0-1% Last week 0-2% | Current 9-30% Last Week 20-43% | Current 70-90% Last Week 55-80% |
| Young-of-year spring-run Chinook salmon | Current 5-10% Last week 5-10% | Current 20-45% Last Week 30-55% | Current 50-70% Last Week 40-60% |
| Hatchery origin winter-run Chinook salmon | Current 0% Last week 0% | Current 0-1% Last Week 0-5% | Current 99-100% Last Week 95-100% |

The SaMT group agreed to provide distribution estimates in five percent increments when feasible.

*This distribution estimate is informed mostly by historical trends and life history due to low observations of WR in real-time monitoring.

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: Low
 - SR: Medium
- Routing Risk:
 - WR: Low
 - SR: Medium
- Overall Entrainment Risk:
 - WR: Low
 - SR: Medium
- Change in risk of entrainment into the central Delta (increased/decreased risk compared to last week):
 - WR: Similar to the previous week

- Exposure Risk has remained similar to the previous week. SaMT estimates WR presence in the Delta is 9-30% due to historical migration and WR life history. SaMT estimated 99-100% of hatchery WR have exited the Delta based on lack of detection of acoustically tagged fish. Overall, the acoustic tag detection data are static implying that the hatchery origin WR have largely exited the Delta and the battery life is estimated to have ended. Routing Risk has remained similar for WR this week based on the STARS model predicting an entrainment of 14% into the interior Delta at Georgiana, and Freeport flows continuing to remain low. Therefore, overall risk of entrainment of WR into the central Delta is similar to the previous week and remains low.
- SR: Similar to the previous week
 - Exposure Risk has decreased this week based on an estimated 5-10% of natural-origin SR estimated to have yet to reach the Delta. Routing Risk remains similar to the previous week based on low Freeport flows and predicted entrainment into Georgiana Slough at 33%. SR emigrate from the upper Sacramento River tributaries in late April and May; however, it is unclear when they arrive in the Delta and how long they may stay. Therefore, the overall entrainment into the central Delta remains similar to the previous week and 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: Medium
 - SR: High
- Reporting OMR/Export Risk:
 - Baseline OMR (-1,400 cfs)
 - WR: Low
 - SR: Low
 - Scenario 1 OMR: (-1,000 cfs)
 - WR: Low
 - SR: Low
 - Scenario 2 OMR: (-1,600 cfs)
 - WR: Medium
 - SR: High
- Overall Entrainment Risk:
 - WR: Medium
 - SR: High
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
 - WR: Anticipated to increase from the previous week
 - Reporting OMR/Export Risk and Exposure Risk have both increased this week. Reporting/OMR Risk increased to medium this week based on 1 WR being observed at the SWP salvage facility on 4/27/2022 which caused COA 8.6.3 to be exceeded. Reporting/OMR Risk has increased for Scenario 2 because of the potential for OMR to become more negative than -1,500 cfs. Although exports are more positive than expected at this time, WR are continuing to be observed in salvage and there is a continued potential for exceeding COA 8.6.3 for the month of May (loss > 9.63).

Therefore, the overall entrainment risk into the facilities has increased and is estimated to be medium this week.

- SR: Similar to the previous week
 - Reporting OMR/Export Risk and Exposure Risk has remained similar to last week. Although exports are at minimums and OMR is more positive than expected, 42 natural-origin SR and 1 hatchery-origin SR were observed at the fish facilities over the previous week. Therefore, the overall entrainment risk into the facilities remains similar to last week and is estimated to be high.

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: 1,462.94 [1.17% of the 125,038 natural-origin WR Juvenile Production Estimate (JPE)]
 - Current Annual Loss: 90.61
 - 50% Threshold based on natural-origin WR JPE: 731.47
 - Risk of exceeding threshold: Low
 - 75% Threshold based on natural-origin WR JPE: 1,097.21
 - Risk of exceeding threshold: Low
 - 100% Threshold based on natural-origin WR JPE: 1,462.94
 - Risk of exceeding threshold: Low
 - Hatchery WR: 181.85 [0.12% of the 151,544 Livingston Stone National Fish Hatchery (LSNFH) hatchery release JPE]
 - Current Annual Loss: 6.71
 - 50% Threshold based on hatchery WR JPE: 90.93
 - Risk of exceeding threshold: Low
 - 75% Threshold based on hatchery WR JPE: 136.39
 - Risk of exceeding threshold: Low
 - 100% Threshold based on hatchery WR JPE: 181.85
 - Risk of exceeding threshold: Low

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 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: $0.0000635 * 125,038 = 7.94$
 - February 1 - February 28: $0.0000991 * 125,038 = 12.39$
 - March 1 – March 31: $0.000146 * 125,038 = 18.26$
 - April 1 – April 30: $0.0000507 * 125,038 = 6.34$

- May 1 – May 31: $0.000077 * 125,038 = 9.63$
- Highest daily loss for May: 0
 - Risk of exceeding threshold: High
- COA 8.6.4 Daily SR Hatchery Surrogate Loss Threshold
 - Hatchery Origin Young-of-Year SR Surrogates (0.25% of total in-river FR releases for each release group from CNFH):
 - Group 1 Loss Threshold: 1,799.60
 - Cumulative Loss: 0
 - Risk of exceeding threshold: Low
 - Group 2 Loss Threshold: 1,873.42
 - Cumulative Loss: 0
 - Risk of exceeding threshold: Low
 - Group 3 Loss Threshold: 2,646.10
 - Cumulative Loss: 4.33
 - Risk of exceeding threshold: Low
 - Group 4 Loss Threshold: 847.74
 - Cumulative Loss: 4.33
 - Risk of exceeding threshold: Low
 - Hatchery Origin Young-of-Year SR Surrogates (0.25% of total in-river spring-run releases for each release group from the FRFH)
 - Group 1 Loss Threshold: 1,823.00
 - Cumulative Loss: 0
 - Risk of exceeding threshold: Low

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*

8.6.4 Daily Spring-run Chinook Salmon Hatchery Surrogate Loss Threshold. To minimize entrainment of emigrating natural juvenile CHNSR from the Sacramento River and tributaries, including the Feather and Yuba rivers into the channels of the central Delta, south Delta, CCF, and the Banks Pumping Plant, Permittee shall restrict exports based on the presence of hatchery produced CHNSR surrogate groups at the CVP and SWP salvage facilities. CHNSR surrogate groups shall consist of all in-river fall- and spring-run surrogate release groups of Chinook salmon from the Coleman National Fish Hatchery, Feather River Hatchery, and the Nimbus Fish Hatchery.

Each water year between February 1 and June 30 Permittee shall reduce south Delta exports for five consecutive days to achieve a five-day average OMR index no more negative than -3,500 cfs when:

- *Feather River Hatchery coded wire tagged (CWT) CHNSR surrogates (includes both spring- and fall-run hatchery release groups) cumulative loss at the at the CVP and SWP salvage facilities is greater than 0.25% for each release group, OR*
- *Coleman National Fish Hatchery and Nimbus Fish Hatchery CWT fall-run release groups cumulative loss at the at the CVP and SWP salvage facilities is greater than 0.25% of the total in-river releases for each release group.*

This Condition of Approval may be modified through the process described in Condition of Approval 8.6.6 and an amendment to this ITP.

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:

- 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)*
 - At a peak spring tide decreasing into a neap towards the end of the week.
- Turbidity: Not discussed
- Salinity (X2): >81 km on 5/3/2022
- Hydraulic Footprint *(Provide brief description of hydrologic footprint and summary of relevant DSM2 results)*: DSM2 results were discussed during SaMT and a model interpretation is provided this week.
 - North Delta into Interior and Central Delta
Channels 49 (San Joaquin River at Sherman Island) and (Sacramento River at Sherman Island)
This week there was a single scenario modeled. There is no change to fish behavior with a lack of a 2nd (or 3rd) model to compare a baseline scenario to. Thus, the SaMT agreed discussing changed to fish behavior due to modeled conditions was not appropriate.
 - San Joaquin River and Central Delta into South Delta
Channel 6 (San Joaquin River at Head of Old River) and 21 (San Joaquin River upstream of Turner Cut)
This week there was a single scenario modeled. There is no change to fish behavior with a lack of a 2nd (or 3rd) model to compare a baseline scenario to. Thus, the SaMT agreed discussing changed to fish behavior due to modeled conditions was not appropriate.
 - South Delta into Facilities
Channels 148 (Middle River) and 94 (Old River)
This week there was a single scenario modeled. There is no change to fish behavior with a lack of a 2nd (or 3rd) model to compare a baseline scenario to. Thus, the SaMT agreed discussing changed to fish behavior due to modeled conditions was not appropriate.
- Outages:
 - SWP: None projected
 - CVP: None projected
- Exports – range: 5/3/2022 – 5/9/2022
 - SWP: 300 to 600 cfs
 - CVP: 800 to 900 cfs
- Meteorological Forecast: *“Breezy north to east winds will continue today. Much warmer temperatures are expected through Wednesday, then becoming cooler by the weekend. Light rain showers possible for far northern California late Thursday/Friday and the weekend with periods of breezy winds.”*
https://www.wrh.noaa.gov/total_forecast/getprod.php?new&prod=XXXAFDSTO&wfo=sto
- Storm Event Projection:
 - A more energetic shortwave will approach far northern California/southern Oregon around Saturday morning, bringing the region renewed light precipitation chances for the first half of

the weekend. Similar to the late Thursday/Friday wave, only northwest California will receive beneficial precipitation. Temperatures for the weekend and into early next week will be at or below normal.

- DCC Gates position: Closed on 11/30/2021 per D-1641 seasonal closure. DCC gates were opened on 4/6/2022 between 1100 to 1200 for maintenance work and possibly opening 5/21/2022 in accordance with D-1641 requirements.
- 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: +700 cfs
 - QWEST will be driven by the San Joaquin pulse flow this week and will range between 200 cfs - 1,000 cfs.

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

| Date | Averaging Period | USGS gauges (cfs) | Index (cfs) |
|-----------|------------------|-------------------|-------------|
| 4/30/2022 | Daily | -2,600 | -1,600 |
| 4/30/2022 | 5-day | -2,100 | -1,500 |
| 4/30/2022 | 14-day | -1,700 | -1,400 |
| 5/2/2022 | Daily | Not Applicable | -1,300 |
| 5/2/2022 | 5-day | Not Applicable | -1,500 |
| 5/2/2022 | 14-day | Not Applicable | -1,300 |

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:
 - Estimated spawning escapement for WR adults contributing to brood year (BY) 2021 is 10,269.
- Redd distribution and fry emergence timing:
 - WR fry passage at RBDD is anticipated to be complete for BY 2021. Juvenile WR are estimated to be in the Delta and exiting as smolts.
 - Estimated juvenile WR passage at RBDD for 4/22/2022 is 572,393 fish, which represents 100.0% of historical passage.
- Juvenile production:
 - https://www.fws.gov/redbluff/rbdd_biweekly_final.html *
 - *This link is temporarily down due to maintenance and will have a new website address soon.
- 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:
 - A release of 123,975 BY 2021 WR occurred on 2/9/2022 and a release of 396,310 BY 2021 WR occurred on 3/2/2022 in the Sacramento River at Caldwell Park Boat Ramp. A subset of 569 total fish were acoustically tagged and many of them have been detected at Butte City Bridge, downstream of the confluence at Tower Bridge in the Sacramento River, and Benicia Bridge. Due to the last detection observed at Benicia Bridge on 3/31/2022, SaMT has agreed that the hatchery WR have moved out of the upper Sacramento River and the majority have exited the Delta. The battery life in the acoustic tags are approximately 60 days, so it is more than likely that SaMT will not receive any more acoustic detections from either release.
https://oceanview.pfeg.noaa.gov/CalFishTrack/pageLSWR_2022.html

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

- Adult escapement estimate: Not available.
- Redd distribution and fry emergence timing:
 - SR parr are present and migrating downstream.
 - Total SR juvenile passage for BY 2021 is 292,189 fish as of 4/22/2022 at RBDD.
- Hatchery release (in-river and downstream):
 - See Table 4
- Distribution of natural SR:
 - See Table 1.
- Distribution of Feather River Fish Hatchery SR:
 - On 3/30/2022, a release 1,458,758 BY 2021 SR were released into the Feather River at Boyd's Pump and Gridley Boat Ramp. 50% of these SR were ad-clipped and coded wired tagged and tracked as a surrogate release group for the SWP's ITP COA 8.6.4 SR Hatchery Surrogate Loss Threshold. These SR are being seen in the real-time monitoring sites in the Lower Sacramento RST and the Lower Feather River RST. Due to only 50% of these SR being marked, SaMT also predicts that many of the natural-origin SR that are being detected in real-time monitoring and at the salvage facilities are from this hatchery release group.

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*
 - Two groups of acoustically tagged hatchery FR were released from CNFH on 4/5/2022 and 4/7/2022. These fish are mainly being detected in the Upper Sacramento River and downstream of the confluence. One hatchery FR was detected at Benicia Bridge on 4/17/2022. A few more hatchery FR have been detected at Butte, Meridian, and Tower Bridge over the past week with the last detection at I-80 Bridge on 4/30/2022.
<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 Lower Sacramento 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_ismj_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/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

- 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> (5/3/2022) | <u>DCC</u> | <u>Georgiana Slough</u> | <u>Sacramento River</u> | <u>Sutter and Steamboat Slough</u> | <u>Yolo Bypass</u> |
|---|------------|-----------------------------|-----------------------------|--|------------------------|
| Late Fall-Run Proportion of Entrainment | N/A | 0.33 | 0.44 | 0.23 | N/A |
| Late Fall-Run Survival | N/A | 0.15 | 0.46 | 0.34 | N/A |
| Winter-Run Proportion of Entrainment | N/A | 0.14 | 0.57 | 0.29 | N/A |
| Winter-Run Survival | N/A | 0.00041 | 0.0011 | 0.0055 | N/A |

- The STARS Model has been recently updated to include a separate category for WR Chinook salmon entrainment, which includes a new covariate (Yolo Bypass) and has been included in the table above.
- Tillotson entrainment model or other entrainment models as they become available: The entrainment tool estimates a median loss of 0 and a maximum loss of 21 WR this week (SacPas last updated on 5/3/2022). <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 | Winter-run = 9-30% estimated in the Delta; Spring-run = 20-45% estimated in the Delta | Possible increase in presence of SR | 5/3/22 | Based on 5/3/22 SaMT discussion |
| Winter-run yearly loss (8.6.1) | Nov. 1 - Jun. 30 | In effect WY 2022 loss = 1462.94 | Natural CHNWR (loss = 1.17% of JPE) 50% of 1.17% of JPE = 731.47 Hatchery CHNWR (loss = 0.12% of JPE) 50% of 0.12% of JPE = 90.93 | Current yearly WR loss (natural LAD) = 90.61 Current yearly WR loss (hatchery) = 6.71 | Possible salvage of both natural and hatchery WR | 5/3/22 | Based on salvage data from 5/2/22 |
| 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 | 1/17/22 | NA |

| <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 | 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>January 1 – 31: 0.000635 * 125,038 = 7.94</p> <p>February 1 – 29: 0.0000991 * 125,038 = 12.39</p> <p>March 1 – 31: 0.000146 * 125,038 = 18.26</p> <p>April 1 – 30: 0.0000507 * 125,038 = 6.34</p> <p><u>May 1 – 31:</u> <u>0.000077 *</u> <u>125,038= 9.63</u></p> | Possible salvage of older juvenile Chinook salmon | 5/3/22 | Based on salvage data from 5/2/22 |

| <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 | In effect | <p>Coleman National Fish Hatchery (CNFH) Group 1: 0.25% of total in-river CWT fall-run release (total of 7 CWT #s) Group 2: 0.25% of total in-river CWT fall-run release (total of 7 CWT #s) Group 3: 0.25% of total in-river CWT fall-run release (total of 10 CWT #s) Group 4: 0.25% of total in-river CWT fall-run release (total of 4 CWT #s)</p> <p>Feather River Fish Hatchery (FRFH) Group 1: 0.25% of total in-river CWT spring-run release (total of 2 CWT #s)</p> | <p>CNFH Group 1: $0.0025 * 719,838 = 1,799.60$</p> <p>CNFH Group 2: $0.0025 * 749,368 = 1,873.42$</p> <p>CNFH Group 3: $0.0025 * 1,058,439 = 2,646.10$</p> <p>CNFH Group 4: $0.0025 * 339,094 = 847.74$</p> <p>FRFH Group 1: $0.0025 * 729,199 = 1,823.00$</p> | <p>CNFH Group 1 release occurred on 3/15/2022 Cumulative Loss: 0</p> <p>CNFH Group 2 release occurred on 3/18/2022 Cumulative Loss: 0</p> <p>CNFH Group 3 release occurred on 3/31/2022 – 4/1/2022 Cumulative Loss: 4.33</p> <p>CNFH Group 4 release occurred on 4/5/2022 and 4/7/2022 Cumulative Loss: 4.33</p> <p>FRFH Group 1 release occurred on 3/30/2022 Cumulative Loss: 0</p> | 5/3/22 | 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 |
| 2/2/2022-2/3/2022 | CNFH | Winter | 05 65 96 | 200 | 200 | 100% | Sacramento River at Sycamore Grove Boat Launch | CWT, Ad-Clip, and left-pelvic | USFWS | Experimental (Jumpstart) |
| 2/9/2022 | LSNFH | Winter | 05 58 58 | 75,078 | 75,078 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 2/9/2022 | LSNFH | Winter | 05 65 10 | 48,897 | 48,897 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 2/14/2022 | SCARF | Spring | 06 15 55 | 57,478 | 57,478 | 100% | San Joaquin River at Highway 140 | CWT and Ad-Clip | CDFW | SJRRP |

| | | | | | | | | | | |
|--------------------------|-------|--------|----------|---------|---------|------|--|----------------------------------|-------|-----------------------------|
| 2/23/2022- 2/24/2022 | CNFH | Winter | 05 65 96 | 200 | 200 | 100% | Sacramento River at Sycamore Grove Boat Launch | CWT, Ad-Clip, and left-pelvic | USFWS | Experimental (Jumpstart) |
| 3/2/2022 | LSNFH | Winter | 05 61 77 | 31,099 | 31,099 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 3/2/2022 | LSNFH | Winter | 05 61 78 | 42,996 | 42,996 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 3/2/2022 | LSNFH | Winter | 05 61 79 | 47,780 | 47,780 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 3/2/2022 | LSNFH | Winter | 05 65 07 | 48,138 | 48,138 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 3/2/2022 | LSNFH | Winter | 05 65 08 | 47,247 | 47,247 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 3/2/2022 | LSNFH | Winter | 05 65 09 | 47,656 | 47,656 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 3/2/2022 | LSNFH | Winter | 05 65 11 | 47,532 | 47,532 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 3/2/2022 | LSNFH | Winter | 05 65 12 | 46,553 | 46,553 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 3/2/2022 | LSNFH | Winter | 05 65 13 | 37,309 | 37,309 | 100% | Sacramento River at Caldwell Park Boat Ramp | CWT and Ad-Clip | USFWS | Production |
| 3/15/2022 | CNFH | Fall | 05 65 99 | 102,861 | 407,249 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/15/2022 | CNFH | Fall | 05 66 01 | 101,412 | 402,453 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/15/2022 | CNFH | Fall | 05 66 02 | 106,433 | 424,193 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/15/2022 | CNFH | Fall | 05 66 03 | 84,458 | 335,925 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/15/2022 | CNFH | Fall | 05 66 04 | 121,538 | 486,152 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/15/2022 | CNFH | Fall | 05 66 05 | 105,540 | 421,213 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/15/2022 | CNFH | Fall | 05 66 06 | 97,596 | 388,199 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/16/2022 – 3/17/2022 | CNFH | Winter | 05 65 96 | 51,376 | 51,376 | 100% | North Fork Battle Creek, Manton, CA | CWT, Ad-Clip and left pelvic | USFWS | Jumpstart |
| 3/16/2022 – 3/17/2022 | CNFH | Winter | 05 65 97 | 8,661 | 8,661 | 100% | North Fork Battle Creek, Manton, CA | CWT, Ad-Clip and left pelvic | USFWS | Jumpstart |
| 3/16/2022 – 3/17/2022 | CNFH | Winter | 05 65 91 | 43,852 | 43,852 | 100% | North Fork Battle Creek, Manton, CA | CWT, Ad-Clip and left pelvic | USFWS | Jumpstart |
| 3/16/2022 – 3/17/2022 | CNFH | Winter | 05 65 98 | 10,568 | 10,568 | 100% | North Fork Battle Creek, Manton, CA | CWT, Ad-Clip and left pelvic | USFWS | Jumpstart |
| 3/16/2022 – 3/17/2022 | CNFH | Winter | 05 65 32 | 22,501 | 22,501 | 100% | North Fork Battle Creek, Manton, CA | CWT, Ad-Clip and left pelvic | USFWS | Jumpstart |
| 3/18/2022 | CNFH | Fall | 05 66 07 | 111,556 | 444,578 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |

| | | | | | | | | | | |
|----------------------|-------|--------|----------|---------|---------|------|--|-----------------|-------|--------------|
| 3/18/2022 | CNFH | Fall | 05 66 08 | 105,374 | 418,847 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/18/2022 | CNFH | Fall | 05 66 09 | 95,292 | 378,318 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/18/2022 | CNFH | Fall | 05 66 10 | 112,035 | 445,793 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/18/2022 | CNFH | Fall | 05 66 11 | 105,316 | 418,354 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/18/2022 | CNFH | Fall | 05 66 12 | 113,114 | 449,852 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/18/2022 | CNFH | Fall | 05 66 13 | 106,681 | 426,724 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/18/2022 | SCARF | Spring | 06 22 06 | 20,598 | 20,598 | 100% | San Joaquin River at Highway 140 | CWT and Ad-Clip | CDFW | SJRRP |
| 3/30/2022 | FRFH | Spring | 06 28 63 | 370,628 | 741,256 | 50% | Boyd's Pump Launch Ramp | CWT and Ad-Clip | CDFW | Production |
| 3/30/2022 | FRFH | Spring | 06 28 64 | 358,571 | 717,502 | 50% | Gridley Boat Ramp | CWT and Ad-Clip | CDFW | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-14 | 105,309 | 419,595 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-15 | 97,363 | 386,529 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-16 | 111,532 | 443,071 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-17 | 97,234 | 387,178 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-18 | 102,618 | 406,999 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-19 | 99,140 | 394,112 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-20 | 104,313 | 417,250 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-21 | 118,925 | 475,701 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-22 | 112,706 | 450,824 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 3/31/2022 – 4/1/2022 | CNFH | Fall | 05-66-23 | 109,299 | 437,195 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 4/5/2022 | CNFH | Fall | 05 66 29 | 87,174 | 87,174 | 100% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Experimental |
| 4/5/2022 | CNFH | Fall | 05 66 30 | 84,150 | 84,150 | 100% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Experimental |
| 4/7/2022 | CNFH | Fall | 05 66 28 | 87,442 | 87,442 | 100% | Sacramento River at Butte City Boat Ramp | CWT and Ad-Clip | USFWS | Experimental |
| 4/7/2022 | CNFH | Fall | 05 66 31 | 80,328 | 80,328 | 100% | Sacramento River at Butte City Boat Ramp | CWT and Ad-Clip | USFWS | Experimental |
| 4/14/2022 | CNFH | Fall | 05 66 24 | 107,822 | 431,288 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 4/14/2022 | CNFH | Fall | 05 66 25 | 106,076 | 424,302 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |

| | | | | | | | | | | |
|-----------|------|------|----------|---------|---------|-----|-------------------------------------|-----------------|-------|------------|
| 4/14/2022 | CNFH | Fall | 05 66 26 | 112,449 | 449,797 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 4/14/2022 | CNFH | Fall | 05 66 27 | 118,519 | 474,074 | 25% | Battle Creek at CNFH | CWT and Ad-Clip | USFWS | Production |
| 4/19/2022 | MOK | Fall | 06 29 55 | 109,000 | 436,000 | 25% | San Joaquin River at Sherman Island | CWT and Ad-Clip | CDFW | Production |
| 4/20/2022 | MOK | Fall | 06 29 56 | 109,000 | 436,000 | 25% | San Joaquin River at Sherman Island | CWT and Ad-Clip | CDFW | Production |
| 4/28/2022 | MOK | Fall | 06 29 57 | 109,000 | 436,000 | 25% | San Joaquin at Sherman Island | CWT and Ad-Clip | CDFW | Production |
| 4/29/2022 | NIM | Fall | 06 29 65 | 166,000 | 665,000 | 25% | Mare Island at San Pablo Bay | CWT and Ad-Clip | CDFW | Production |

*These releases are hatchery yearling spring-run Chinook salmon surrogates that are tracked for COA 8.7 OMR Flexibility During Delta Excess Conditions.

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 |
| 1/31/2022-2/4/2022 | NIM | N/A | 424,000 | 424,000 | 100% | Lower American River at Sunrise Boat Ramp | Ad-Clip | CDFW | Production |
| 1/31/2022-2/1/2022 | MOK | 06-15-29 | 57,065 | 57,065 | 100% | Mokelumne River at Feist Ranch | CWT and Ad-Clip | CDFW | Production |
| 2/4/2022-2/11/2022 | FRFH | N/A | 495,000 | 495,000 | 100% | Boyd's Pump | Ad-Clip | CDFW | Production |
| 2/28/2022 | MOK | N/A | 60,000 | 60,000 | 100% | Mokelumne River at Feist Ranch | Ad-Clip | CDFW | Production |
| 4/4/2022 – 4/5/2022 | MOK | N/A | 50,000 | 50,000 | 100% | Mokelumne River at Feist Ranch | Ad-Clip and Right Maxillary Clip | CDFW | Production |

Table 6. COA 8.6.4 Young-of-Year Spring-run Chinook Salmon Hatchery Surrogate Summary Table, WY 2022.

| Hatchery | Release Group | Date | Race | Total Fish Released | CWT Fish | Tag Codes | Loss Threshold |
|--------------------------------|---------------|-----------------------|--------|---------------------|-----------|-----------|----------------|
| Coleman National Fish Hatchery | Group 1 | 3/15/2022 | Fall | 2,865,384 | 719,939 | 05 65 99 | 1,799.6 |
| | | | | | | 05 66 01 | |
| | | | | | | 05 66 02 | |
| | | | | | | 05 66 03 | |
| | | | | | | 05 66 04 | |
| | | | | | | 05 66 05 | |
| | | | | | | 05 66 06 | |
| | Group 2 | 3/18/2022 | Fall | 2,982,466 | 749,368 | 05 66 07 | 1,873.42 |
| | | | | | | 05 66 08 | |
| | | | | | | 05 66 09 | |
| | | | | | | 05 66 10 | |
| | | | | | | 05 66 11 | |
| | | | | | | 05 66 12 | |
| | | | | | | 05 66 13 | |
| | Group 3 | 3/31/2022 – 4/1/2022 | Fall | 4,218,454 | 1,058,439 | 05 66 14 | 2,646.10 |
| | | | | | | 05 66 15 | |
| | | | | | | 05 66 16 | |
| | | | | | | 05 66 17 | |
| | | | | | | 05 66 18 | |
| | | | | | | 05 66 19 | |
| | | | | | | 05 66 20 | |
| | | | | | | 05 66 22 | |
| | | | | | | 05 66 22 | |
| | | | | | | 05 66 23 | |
| | Group 4 | 4/5/2022 and 4/7/2022 | Fall | 339,094 | 339,094 | 05 66 29 | 847.74 |
| | | | | | | 05 66 30 | |
| | | | | | | 05 66 28 | |
| | | | | | | 05 66 31 | |
| | | | | | | | |
| Feather River Fish Hatchery | Group 1 | 3/30/2022 | Spring | 1,458,758 | 729,199 | 06 28 63 | 1,822.99 |
| | | | | | | 06 28 64 | |

| | | | | | | | |
|----------------------|----|----|----|----|----|----|---|
| | NA | NA | NA | NA | NA | NA | This release group will be released in the Bay. There is no substitute group planned. |
| | | | | | | | |
| Nimbus Fish Hatchery | NA | NA | NA | NA | NA | NA | Both of these groups will be released in the Bay. See CNFH Groups 3 and 4 above as substitute groups. |