

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

## Section 1: Overview

Date: 6/7/2022

### 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 6/7/2022, 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 6/7/2022 are 1,200 cfs resulting in an Old and Middle River Index (OMRI) of -1,500 cfs and 12.8% of inflow diverted (14-day average). The Delta Cross Channel (DCC) gates closed on 5/31/2022 and are projected to remain closed with the possibility of opening on the weekends 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, DCC gate closure and seasonal timing, SaMT estimates an overall low 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 remain low this week based on 0 natural-origin length-at-date (LAD) WR caught in salvage since 4/27/2022. COA 8.6.3 ended on 5/31/2022 and was not triggered during the month of May which further supports that 99-100% of WR have exited the Delta. SaMT considers the potential for SR entrainment into the export facilities to be estimated at low this week. Exports are at minimums and 0 natural-origin LAD SR have been observed at the fish salvage facilities in the prior week. Therefore, entrainment risk into the facilities is estimated to be low due to the majority of SR estimated to have exited the Delta.

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 cfs-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 8.6.4 (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 fall-run (FR) Chinook salmon release groups were released in the Bay on 5/18/2022 and 5/26/2022 and do not meet the needs for ITP COA 8.6.4. The final hatchery surrogate release group of SR from the FRFH was also released in the Bay on 5/10/2022 and 5/11/2022 and did not meet the needs for the ITP COA 8.6.4.

Knights Landing RST and Tisdale RST field leads have pulled their cones and stopped trapping due to elevated water temperatures on the Sacramento River. The Lower Sacramento RST continues to trap fish but, according to their permit, must stop handling listed juvenile fish if the water temperature exceeds 72 degrees Fahrenheit (°F) at the capture site. Under these conditions, listed fish may only be visually identified, counted, and released.

COA 8.6.3 (Mid and Late Season Natural WR Daily Loss Threshold) ended on 5/31/2022.

COA 8.8 (End of OMR Management) requirements for off-ramping OMR management prior to the end of OMR management season on 6/30/2022 include:

- More than 95% of WR and SR have migrated past Chipps Island as determined by SaMT, and
- Daily average water temperature at Mossdale exceeds 22.2° C for 7 non-consecutive days in June, and
- Daily average water temperature at Prisoner's Point exceeds 22.2° C for 7 non-consecutive days in June.

SaMT will be actively monitoring these early OMR offramp requirements.

Table 1: Current Juvenile Fish Distribution

Location	Yet to Enter Delta	In the Delta	Exited the Delta
Young-of-year winter-run Chinook salmon*	Current 0% Last week 0%	Current 0-1% Last Week 1-2%	Current 99-100% Last Week 98-99%
Young-of-year spring-run Chinook salmon	Current 0-1% Last week 1-2%	Current 4-10% Last Week 3-14%	Current 90-95% Last Week 85-95%
Hatchery origin winter-run Chinook salmon	Current 0% Last week 0%	Current 0% Last Week 0%	Current 100% Last Week 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: Low
- Routing Risk:
  - WR: Low
  - SR: Low
- Overall Entrainment Risk:
  - WR: Low
  - SR: Low
- Change in risk of entrainment into the central Delta (increased/decreased risk compared to last week):
  - WR: Similar to the previous week
    - Exposure Risk remains similar to the previous week. SaMT estimates WR presence in the Delta is 0-1% due to historical migration and WR life history. SaMT estimated 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 exited the Delta and the battery life is estimated to have ended. Routing Risk also remains similar for WR this week based on the low presence of WR in the Delta. Temperatures have increased in the past week in the Sacramento River based on RST data from Red Bluff to Knights Landing and are starting to become lethal for WR (>72°F) indicating that most WR are no longer in the watershed. Therefore, the overall entrainment into the central Delta is estimated to be low this week.
  - SR: Similar to the previous week
    - Exposure Risk has remained the same this week based on an estimated 4-10% of natural-origin SR estimated in the Delta. Routing Risk has decreased this week based on the DCC gates projected to remain closed while Freeport flows remain low at 8,000 cfs. Due to 90-95% of SR having already exited the Delta, the overall entrainment into the central Delta is low.

#### 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 (-1,200 cfs)
    - WR: Low
    - SR: Low
  - Scenario 1 OMR: (-1,400 cfs)
    - WR: Low
    - SR: Low
  - Scenario 2 OMR: (-1,900 cfs)
    - WR: Medium
    - SR: Medium
- 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 the previous week
    - Reporting OMR/Export Risk and Exposure Risk remain similar this week due to 0 LAD WR salvaged at the salvage facilities since 4/27/2022 and minimum exports expected for the rest of the season. Additional salvage of WR at the facilities is unlikely for the rest of the season given that SaMT estimates that 99-100% of juvenile WR have exited the Delta. Therefore, the overall entrainment risk into the facilities continues to remain low this week.
  - SR: Similar to the previous week
    - Reporting OMR/Export Risk and Exposure Risk have remained similar this week. Exports continue to be maintained at no greater than 1,500 cfs and 0 natural-origin LAD SR were observed at the salvage facilities in the prior week. In addition, SaMT estimates that 90-95% of SR have exited the Delta, which reduces the likelihood that additional SR salvage will occur this season. Therefore, the overall entrainment risk into the facilities is estimated to be medium.

#### 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 not 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: 73.04\*
          - \* The fish observed on 4/16/2022 originally classified as a natural-origin WR Chinook salmon has been re-classified based on genetic ID as a natural steelhead. The WY 2022 loss value has been updated accordingly.
        - 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 8.6.4 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.*

*8.6.4 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.*

**8.8 End of OMR Management.** *Permittee shall operate the Project to meet the requirements included 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 to ensure that*

*entrainment and take of Covered Species is minimized during the OMR Management season through June 30, or until the following species-specific off-ramps occur:*

- *LFS and DS: Daily mean water temperature at CCF is greater than 25°C (77°F) for three consecutive days.*
- *CHNWR and CHNSR:*
  - *More than 95% of CHNWR and CHNSR have migrated past Chipps Island as determined by the Salmon Monitoring Team, AND*
  - *Daily average water temperature at Mossdale exceeds 22.2°C for 7 non-consecutive days in June, AND*
  - *Daily average water temperature at Prisoner's Point exceeds 22.2°C for 7 non-consecutive days in June*

### 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: (e.g., Actions such as integrated early winter pulse protection, etc.)
  - N/A
- Water Temperature (ITP COA 8.8 threshold: daily average water temperature exceeds 22.2° C for 7 non-consecutive days in June):
  - Mossdale (MSD): <https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=MSD>
    - Number of days threshold exceeded: 1
    - Days exceeded: 6/2/2022
  - Prisoners Point (PPT): <https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=PPT&end=2021-01-20>
    - Number of days threshold exceeded: 0
- Tidal Cycle: *(Spring/Neap. Note if tidal cycle has potential to affect south Delta hydrology or X2)*
  - Currently in a neap tide then will be moving into a spring tide next week.
- Turbidity: Not discussed
- Salinity (X2): >81 km on 6/7/2022
  - Hydraulic Footprint *(Provide brief description of hydrologic footprint and summary of relevant DSM2 results)*: DSM2 results were not discussed during SaMT this week.
- Outages:
  - SWP: None projected
  - CVP: None projected
- Exports: 6/7/2022 – 6/14/2022
  - SWP: 300 to 700 cfs
  - CVP: 800 to 900 cfs
- Meteorological Forecast: *“Warming and drying trend with triple digit heat by late-week for the Central Valley. Slight chance for showers far northern California Saturday/Sunday.”*  
[https://www.wrh.noaa.gov/total\\_forecast/getprod.php?new&prod=XXXAFDSTO&wfo=sto](https://www.wrh.noaa.gov/total_forecast/getprod.php?new&prod=XXXAFDSTO&wfo=sto)
  - This site will be switching to a new link on 6/14/2022:  
<https://www.weather.gov/wrh/TextProduct?product=XXXAFDST>
- Weather/Storm Event Projection:
  - Hydrological conditions will not provide an opportunity for a storm flex change in exports that allows for an OMRI more negative than -5,000 cfs. Current forecast shows a 20 to 30 percent chance for precipitation to reach Shasta County early Saturday morning. By Saturday evening precipitation chances increase for the central to northern Sacramento Valley. Generally light accumulations are expected. This system will increase humidity values as well as decrease heat risk over northern California by Sunday. However, Saturday will likely still be hot for most will high pressure overhead. A northerly breeze may develop as this system departs the region leading to a drying and slow warming trend early next week.
- 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 hours for maintenance work. DCC gates opened for the Memorial Day weekend on 5/27/2022 and were closed on 5/31/2022. DCC gates are projected to remain closed through June to help reduce salinity in the west Delta to meet the TUCO salinity requirement at

Threemile Sough; however, there is the potential to open the gates again in June 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/jspplot/jspPlotServlet.jsp?sensor_no=1689&end=&geom=&interval=&cookies=)
  - [https://cdec.water.ca.gov/guidance\\_plots/VNS\\_gp.html](https://cdec.water.ca.gov/guidance_plots/VNS_gp.html)
- QWEST: 0 cfs
  - QWEST is expected to remain 0 for the next 5 days then stay in the 0 cfs to -500 cfs range due to the spring tide.
- Future export modifications: *Describe anticipated or potential changes to exports*
  - Combined exports were 1,200 cfs on 5/31/2022. Middle River Barrier in-water work started on 5/10/2022 and closure of the weir occurred on 5/18/2022 with all six flap gates tied open. Old River Tracy Barrier in-water work began on 5/11/2022 and closure of the weir started on 5/27/2022 with completion occurring on 5/28/2022. Culvert operation began on 6/1/2022 for both the Middle River Barrier and Old River Tracy Barrier. Grant Line Canal in-water work began on 5/20/2022 and closure of the weir is occurring today 6/7/2022. Culvert operation is scheduled to start on 6/7/2022 for the Grant Line Canal Barrier.

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

Date	Averaging Period	USGS gauges (cfs)	OMR Index (cfs)
6/4/2022	Daily	-200	-1,400
6/4/2022	5-day	-1,500	-1,400
6/4/2022	14-day	-1,900	-1,600
6/6/2022	Daily	Not Applicable	-1,400
6/6/2022	5-day	Not Applicable	-1,400
6/6/2022	14-day	Not Applicable	-1,500

## 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.
  - Adults that will contribute to BY 2022 have mostly passed through the Delta system and are holding and spawning in the Keswick area.
- 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 5/20/2022 is 572,568 fish, which represents 100.0% of historical passage.
- Juvenile production:
  - [Red Bluff Diversion Dam Juvenile Fish Monitoring | U.S. Fish & Wildlife Service \(fws.gov\)](#) \*
  - \*This link is to the updated RBDD website where reports will be posted once they are fully 508 compliant.
- 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 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](https://oceanview.pfeg.noaa.gov/CalFishTrack/pageLSWR_2022.html)

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

- Adult escapement estimate:
  - SR carcass counts not available.
  - SR adults that will contribute to BY 2022 have entered the Delta system and are moving upstream to hold in the over summer habitats.
- Redd distribution and fry emergence timing:
  - Egg incubation and fry emergence is complete for this season. SR parr are present and migrating downstream.
  - Total SR juvenile passage for BY 2021 is 308,547 fish as of 6/3/2022 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, 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 have been seen in the real-time monitoring sites in the Lower Sacramento rotary screw trap (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. Since temperatures on the Sacramento River have been increasing and detections for SR are decreasing, SaMT estimates that these fish have most likely exited the Delta.

#### 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*
  - A paired release of acoustically tagged, CNFH hatchery FR were released at Battle Creek (4/5/2022 – upper group) and Butte City on the Sacramento River (4/7/2022 – downstream group). These fish were mainly detected in the upper Sacramento River and only 11 fish detected at Benicia (last detection 5/8/2022). As of 5/19/2022, 16 FR have been detected in the Sacramento River below Georgiana. 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/>
- Trawls:
  - Sacramento Trawl: [https://www.fws.gov/lodi/juvenile\\_fish\\_monitoring\\_program/difmp/?dir=Sacramento%20trawls%20CHN-POD%20species%202012-Present](https://www.fws.gov/lodi/juvenile_fish_monitoring_program/difmp/?dir=Sacramento%20trawls%20CHN-POD%20species%202012-Present)
  - Mossdale Trawl: [https://www.fws.gov/lodi/juvenile\\_fish\\_monitoring\\_program/difmp/?dir=Mossdale%20trawls%20CHN-POD%20species%202012-Present](https://www.fws.gov/lodi/juvenile_fish_monitoring_program/difmp/?dir=Mossdale%20trawls%20CHN-POD%20species%202012-Present)
  - Chipps Island Trawl: [https://www.fws.gov/lodi/juvenile\\_fish\\_monitoring\\_program/difmp/?dir=Beach%20seines%20CHN-POD%20species%202012-Present](https://www.fws.gov/lodi/juvenile_fish_monitoring_program/difmp/?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\\_jsmp\\_2021.html](https://www.fws.gov/redbluff/RBDD%20JSM%20Biweekly/2021/rbdd_jsmp_2021.html)
  - Butte Creek Rotary Screw Trap Data: <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](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.*
  - Cramer Fish Sciences conducted genetic analyses on observed Chinook salmon in salvage through 4/25/2022. All samples, including those identified as LAD WR, were genetically confirmed as non-winter-run and were identified as either SR, FR, or Late Fall-run (LFR).
- Anticipated emigration to continue into the Delta:  
[http://www.cbr.washington.edu/sacramento/data/query\\_hrt.html](http://www.cbr.washington.edu/sacramento/data/query_hrt.html) and  
[http://www.cbr.washington.edu/sacramento/data/query\\_salvage\\_hrt.html](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> (6/7/2022)	<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	0.31	0.44	0.25	N/A
Late Fall-Run Survival	N/A	0.16	0.49	0.36	N/A
Winter-Run Proportion of Entrainment	N/A	0.13	0.58	0.29	N/A
Winter-Run Survival	N/A	0.00036	0.00075	0.0027	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 and a maximum loss of 0 WR this week (SacPas last updated on 6/7/2022).  
<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 <math>\geq 5\%</math> 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 = 0-1% estimated in the Delta;  Spring-run = 4-10% estimated in the Delta	Possible presence of SR	<b>6/7/22</b>	Based on 6/7/22 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) = 73.04  Current yearly WR loss (hatchery) = 6.71	Salvage unlikely for both natural and hatchery WR	<b>6/7/22</b>	Based on salvage data from 6/6/22
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	<b>1/17/22</b>	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	Not in effect	<p>January 1 – 31: 0.00635% of the CHNWR JPE</p> <p>February 1 – 28: 0.00991% of the CHNWR JPE</p> <p>March 1 – 31: 0.0146% of the CHNWR JPE</p> <p>April 1 – 30: 0.00507% of the CHNWR JPE</p> <p>May 1 – 31: 0.0077% of the CHNWR JPE</p>	<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>May 1 – 31: 0.000077 * 125,038 = 9.63</p>	Salvage unlikely for older juvenile Chinook salmon	<b>6/7/22</b>	Based on salvage data from 5/31/22

<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: <math>0.0025 * 719,838 = 1,799.60</math></p> <p>CNFH Group 2: <math>0.0025 * 749,368 = 1,873.42</math></p> <p>CNFH Group 3: <math>0.0025 * 1,058,439 = 2,646.10</math></p> <p>CNFH Group 4: <math>0.0025 * 339,094 = 847.74</math></p> <p>FRFH Group 1: <math>0.0025 * 729,199 = 1,823.00</math></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>	<b>6/7/22</b>	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>
End of OMR Management (8.8)	Jan – Jun. 30	In effect	<ul style="list-style-type: none"> <li>o More than 95% of WR and SR have migrated past Chipps Island as determined by SaMT, AND</li> <li>o Daily average water temperature at Mossdale exceeds 22.2°C (71.96oF) for 7 non-consecutive days in June, AND</li> <li>o Daily average water temperature at Prisoner’s Point exceeds 22.2°C (71.76oF) for 7 non-consecutive days in June</li> </ul>	<ul style="list-style-type: none"> <li>% of SR migrated past Chipps: 85-95%</li> <li>% of WR migrated past Chipps: 98-99%</li> <li>Mossdale (MSD): <ul style="list-style-type: none"> <li>▪ Number of days threshold exceeded: 1</li> </ul> </li> <li>Prisoners Point (PPT): <ul style="list-style-type: none"> <li>▪ Number of days threshold exceeded: 0</li> </ul> </li> </ul>	Potential for Mossdale and Prisoners Point to exceed 22°C this week	<b>6/7/22</b>	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
3/30/2022	SCARF	Spring	06-23-47	4,489	4,489	100%	San Joaquin River at Highway 140	CWT and Ad-Clip	CDFW	SJRRP
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
4/27/2022	MER	Fall	06 15 87	53,556	53,556	100%	Sherman Island Net Pen	CWT and Ad-Clip	CDFW	Production
4/27/2022	MER	Fall	06 15 27	35,182	35,182	100%	Sherman Island Net Pen	CWT and Ad-Clip	CDFW	Production
4/27/2022	MER	Fall	NA	0	2,178	0%	Sherman Island Net Pen	No Mark	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
5/4/2022	MOK	Fall	06 29 58	108,750	435,000	25%	San Joaquin at Sherman Island	CWT and Ad-Clip	CDFW	Production
5/5/2022	MOK	Fall	06 29 59	108,750	435,000	25%	San Joaquin at Sherman Island	CWT and Ad-Clip	CDFW	Production
5/6/2022	MOK	Fall	06 29 48	121,250	485,000	25%	San Francisco Bay at Fort Baker	CWT and Ad-Clip	CDFW	Production
5/10/2022	FRFH	Spring	06 28 65	363,448	480,310	75%	Mare Island at San Pablo Bay	CWT and Ad-Clip	CDFW	Production
5/11/2022	FRFH	Spring	06 28 66	354,960	478,720	75%	Mare Island at San Pablo Bay	CWT and Ad-Clip	CDFW	Production
5/13/2022	MOK	Fall	06 29 60	108,750	435,000	25%	San Joaquin River at Sherman Island	CWT and Ad-Clip	CDFW	Production
5/15/2022 – 5/16/2022	FRFH	Fall	06 19 58	249,321	998,480	25%	Mare Island at San Pablo Bay	CWT and Ad-Clip	CDFW	Production
5/18/2022	NIM	Fall	06 29 69	210,000	840,000	25%	Conoco at San Pablo Bay	CWT and Ad-Clip	CDFW	Production
5/19/2022	FRFH	Fall	06 19 57	255,215	1,016,254	25%	Conoco at San Pablo Bay	CWT and Ad-Clip	CDFW	Production
5/20/2022	MOK	Fall	06 29 61	108,750	435,000	25%	Sherman Island Net Pen	CWT and Ad-Clip	CDFW	Production
5/21/2022	MOK	Fall	06 29 64	108,750	435,000	25%	Sherman Island Net Pen	CWT and Ad-Clip	CDFW	Production
5/24/2022	MOK	Fall	06 29 49	121,250	485,000	25%	Fort Baker	CWT and Ad-Clip	CDFW	Production
5/25/2022	MOK	Fall	06 29 53	160,000	160,000	25%	Santa Cruz Wharf	CWT and Ad-Clip	CDFW	Production
5/25/2022	FRFH	Fall	06 08 87	82,415	342,019	25%	Mare Island at San Pablo Bay	CWT and Ad-Clip	CDFW	Production

5/25/2022	FRFH	Fall	06 08 88	85,432	330,017	25%	Mare Island at San Pablo Bay	CWT and Ad-Clip	CDFW	Production
5/26/2022	MOK	Fall	06 29 52	160,000	160,000	25%	Monterey Pier	CWT and Ad-Clip	CDFW	Production
5/26/2022	NIM	Fall	06 29 67	167,000	667,000	25%	Mare Island at San Pablo Bay	CWT and Ad-Clip	CDFW	Production
5/27/2022	MOK	Fall	06 29 54	34,125	136,500	25%	San Francisco Bay at Fort Baker	CWT and Ad-Clip	CDFW	Production
5/27/2022	MOK	Fall	06 12 80	88,750	355,000	25%	San Francisco Bay at Fort Baker	CWT and Ad-Clip	CDFW	Production
6/2/2022	NIM	Fall	06 29 68	212,602	851,193	25%	Mare Island at San Pablo Bay	CWT and Ad-Clip	CDFW	Production
6/2/2022	NIM	Fall	06 86 65	5,743	22,972	25%	Mare Island at San Pablo Bay	CWT and Ad-Clip	CDFW	Production
6/4/2022	FRFH	Fall	06 28 90	83,994	336,468	25%	San Quentin at San Francisco Bay	CWT and Ad-Clip	CDFW	Production
6/4/2022	FRFH	Fall	06 08 96	84,277	337,591	25%	San Quentin at San Francisco Bay	CWT and Ad-Clip	CDFW	Production
6/4/2022	FRFH	Fall	06 08 86	83,563	335,212	25%	San Quentin at San Francisco Bay	CWT and Ad-Clip	CDFW	Production
6/5/2022	FRFH	Fall	06 29 54	62,500	250,000	25%	Pillar Point	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 was released in the Bay on 5/10/2022 and 5/11/2022. There is no substitute group planned.
Nimbus Fish Hatchery	NA	NA	NA	NA	NA	NA	This release group was released in the Bay on 5/18/2022 and 5/26/2022. See CNFH Groups 3 and 4 above as substitute groups.