

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

## Section 1: Overview

Date: 3/22/2022

### 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 March 22, 2022, D-1641 Delta Outflow is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Combined exports on 3/22/2022 are 1,500 cfs resulting in an Old and Middle River Index (OMRI) of -1,300 cfs and 12.9% of inflow diverted (14-day average). These projected OMRI values are more positive than what would be required if the SWP Incidental Take Permit Conditions of Approval (COA) thresholds were to be exceeded. 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 distribution of the juvenile natural origin winter-run (WR) Chinook salmon population estimated to be in the Delta in conjunction with flows forecasted at Freeport, CVP and SWP exports, and OMR flows, result in an overall risk of entrainment into the central and south Delta from the Sacramento River consistent with the previous week and estimated to remain medium. Based on monitoring data, hydrological conditions, and seasonal timing, the Salmon Monitoring Team (SaMT) estimates an overall medium risk of entrainment into the interior Delta from the Sacramento River for young-of-year 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. SaMT does not anticipate COA 8.6.3 (Mid and Late Season Natural WR Chinook Salmon Daily Loss Threshold) to be triggered. OMRI values are more positive than what is required if a COA threshold is exceeded; therefore, if COA 8.6.3 was exceeded there would be no action taken to restrict OMR further. SaMT considers the potential for SR entrainment into the export facilities to be low this week due to no salvage of SR reported for WY 2022 and projected OMRI values.

**Risk Assessment:**

Glenn-Colusa Irrigation District (GCID) continues to observe spring-run Chinook salmon, indicating ongoing downstream passage, yet minimal catch has been observed at the downstream monitoring locations closer to the Delta. SaMT expects to see an increase in catch in the upcoming week at the downstream monitoring locations due to large numbers of spring-run observed at GCID from 3/18/2022 – 3/21/2022.

COA 8.6.4 (Daily SR Hatchery Surrogate Loss Threshold) is in effect until OMR management season ends (COA 8.3.2 Salmonid Presence). The second hatchery surrogate release of fall-run Chinook salmon (FR) from Coleman National Fish Hatchery (CNFH) occurred on 3/18/2022. This release totaled 2,982,466 FR of which 749,368 FR are marked with an adipose fin clip and CWT. SaMT does not anticipate salvage for either of these 2 release groups to exceed the COA 8.6.4 threshold (loss >1,799.59 and loss >1,873.4, respectively).

Table 1: Current Fish Distribution

| Location                                  | Yet to Enter Delta                 | In the Delta                       | Exited the Delta                  |
|---|------------------------------------|------------------------------------|-----------------------------------|
| Young-of-year winter-run Chinook salmon*  | Current 1-10%<br>Last week 1-15%   | Current 75-89%<br>Last Week 80-89% | Current 10-15%<br>Last Week 5-10% |
| Young-of-year spring-run Chinook salmon   | Current 10-30%<br>Last week 15-30% | Current 70-90%<br>Last Week 70-85% | Current 0%<br>Last Week 0%        |
| Hatchery origin winter-run Chinook salmon | Current 75-85%<br>Last week 90-95% | Current 14-20%<br>Last Week 5-9%   | Current 1-5%<br>Last Week 0-1%    |

\*WR were seen in the Beach Seines, Spring Kodiak Trawl, Knights Landing RST, and Chipps Island Trawls this week.

**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: High
  - SR: High
- Routing Risk:
  - WR: Medium
  - SR: Medium
- Overall Entrainment Risk:
  - WR: Medium
  - SR: Medium
- Change in risk of entrainment into the central Delta (increased/decreased risk compared to last week):
  - WR: Anticipated to increase from the previous week
    - Exposure Risk remain similar to the previous week with the majority of WR still estimated to have reached the Delta. The STARS model predicts routing probability into Georgiana Slough to be higher this week at 31% entrainment and Freeport flows have decreased this week, increasing the Routing Risk to medium. Therefore, overall risk of

entrainment of WR into the central Delta remains similar to the previous week and is considered medium.

- SR: Anticipated to increase from the previous week
  - Exposure Risk remain similar to the previous week with the majority of SR estimated to have reached the Delta. Routing Risk has increased this week to medium due to Freeport flows decreasing, entrainment into Georgiana increasing to 31%, and an anticipated pulse of SR entering the Delta in the upcoming week. Therefore, the overall entrainment into the central Delta remains similar to the previous week and is considered medium.

#### Section 1-B: Facilities Risk

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

- Exposure Risk:
  - WR: Low
  - SR: Low
- Reporting OMR/Export Risk:
  - Baseline OMR (-1,300 cfs)
    - WR: Low
    - SR: Low
  - Scenario 1 OMR: (-500 cfs)
    - WR: Low
    - SR: Low
  - Scenario 2 OMR: (-2,500 cfs)
    - WR: Low
    - SR: Low
- Overall Entrainment Risk:
  - WR: Low
  - SR: Low
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
  - WR: Consistent with the previous week
    - Reporting OMR/Export Risk and Exposure Risk remain similar to the previous week due to exports being restricted. No WR were caught in salvage during the previous week. Therefore, the overall entrainment risk into the facilities remains consistent with the previous week and is considered low.
  - SR: Consistent with the previous week
    - Reporting OMR/Export Risk and Exposure Risk remains similar to the previous week. OMRI values are more positive than expected at this time because of Delta Outflow requirements. No SR have been caught in salvage for WY 2022. Therefore, the overall entrainment risk remains consistent with the previous week and is considered low.

#### Section 1-C: Annual Loss Threshold Risk

- Annual loss threshold risk and Alternative Actions (8.1.5.1. E I, ii, iii and 8.1.5.1 F I, ii)
  - Loss at the SWP and CVP facilities compared to the estimated remaining population in the Delta and upstream of the Delta: Salvage of California Endangered Species Act (CESA)-listed Chinook salmon has 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: 20.56
    - 50% Threshold based on natural WR JPE: 731.47
      - Risk of exceeding threshold: Low
    - 75% Threshold based on natural WR JPE: 1,097.21
      - Risk of exceeding threshold: Low
    - 100% Threshold based on natural 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: 0
    - 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: 3.52
          - Risk of exceeding threshold: Low
      - COA 8.6.4 Daily SR Hatchery Surrogate Loss Threshold
        - Hatchery Origin Young-of-Year SR Surrogates [0.25% of total in-river fall-run releases for each release group from Coleman National Fish Hatchery (CNFH)]:
          - Group 1 Loss Threshold: 1,799.59
            - Highest Daily Loss: 0
            - Risk of exceeding threshold: Low
          - Group 2 Loss Threshold: 1,873.42
            - Highest Daily 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:

- Antecedent Actions:
- Water Temperature:
  - Mossdale (MSD): <https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=MSD>
    - Number of days threshold exceeded: Not applicable until June.
  - Prisoners Point (PPT): <https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=PPT&end=2021-01-20>
    - Number of days threshold exceeded: Not applicable until June.
- Tidal Cycle: (*Spring/Neap. Note if tidal cycle has potential to affect south Delta hydrology or X2*)
  - Beginning of a neap tide this week.
- Turbidity: Not discussed
- Salinity (X2): 79.3 km on 3/22/2022
- Hydraulic Footprint (*Provide brief description of hydrologic footprint and summary of relevant DSM2 results*): DSM2 results were ran this week and discussed during SaMT. However, due to the 400 cfs difference between modeled scenarios, SaMT agreed that discussing changes to fish behavior due to modeled conditions was not appropriate given such a small difference.
- Outages:
  - SWP: None projected
  - CVP: Planned outage on 3/23/2022 from 0800 to 1200 hours.
- Exports – range: 3/22/2022 – 3/28/2022
  - SWP: 0 to 1,000 cfs
  - CVP: 800 to 1,800 cfs
- Meteorological Forecast: *“Dry with breezy north to east wind today. Very warm weather continues with high temperatures 10-25 degrees above normal through the week. Cooler over the weekend with a pattern change and possible precipitation.”*  
[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)
- Storm Event Projection:
  - Above average temperatures will continue on Saturday but will continue a slight cooling trend as we sit on the western edge of the strong ridge. Troughing will be building over the Pacific and this will bring a period of unsettled and uncertain weather on Sunday into the early part of next week. Temperatures will continue to cool and should become more seasonal by Sunday.
- DCC Gates position: Closed on 11/30/2021 per D-1641 seasonal closure.
- Sacramento River flow at Freeport: <https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=FPT>
- San Joaquin River flow at Vernalis:
  - [https://cdec.water.ca.gov/jspplot/jspPlotServlet.jsp?sensor\\_no=1689&end=&geom=&interval=&cookies=](https://cdec.water.ca.gov/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: 800 cfs
  - QWEST was 1,000 cfs to 1,300 cfs earlier in the week but will continue around 800 cfs throughout the end of the week.

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

| Date      | Averaging Period | USGS gauges (cfs) | Index (cfs) |
|-----------|------------------|-------------------|-------------|
| 3/19/2022 | Daily            | -2,000            | -2,300      |
| 3/19/2022 | 5-day            | -2,600            | -1,900      |
| 3/19/2022 | 14-day           | -1,800            | -1,200      |
| 3/21/2022 | Daily            | Not Applicable    | -1,300      |
| 3/21/2022 | 5-day            | Not Applicable    | -1,300      |
| 3/21/2022 | 14-day           | Not Applicable    | -1,200      |

## 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 presence is drawing to a close for BY 2021. Estimated juvenile WR passage at RBDD for 3/11/2022 is 572,188 fish, which represents 99.3% of historical passage.
- Juvenile production:
  - [https://www.fws.gov/redbluff/rbdd\\_biweekly\\_final.html](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 winter-run Chinook salmon occurred on 2/9/2022 and a release of 396,310 BY 2021 winter-run Chinook salmon 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 and downstream of the confluence at Tower Bridge in the Sacramento River. These fish are starting to distribute farther downstream and many being acoustically detected passing Benicia Bridge.  
[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: Not available.
- Redd distribution and fry emergence timing:
  - Juvenile SR fry are present and migrating downstream to rear.
  - Total SR juvenile passage for BY 2021 is 111,027 fish as of 3/11/2022 at RBDD.
  - GCID has seen an increase in catch of juvenile spring-run from 3/18/2022 – 3/21/2022, which may indicate increased catch in the upcoming week in the real-time monitoring locations downstream.
- Hatchery release (in-river and downstream):
  - See Table 4
- Distribution of natural SR:
  - See Table 1.
- Distribution of Feather River Fish Hatchery SR:
  - Releases have not occurred.

#### Section 4-C: Additional Data Sources to Assess Sensitivity to Entrainment into the Central and South Delta

##### 8.1.5.1.C & D

- Acoustic telemetry: *Summary of acoustic telemetry tracking*
  - <https://oceanview.pfeg.noaa.gov/CalFishTrack/>
- Trawls:
  - Sacramento Trawl:  
[https://www.fws.gov/lodi/juvenile\\_fish\\_monitoring\\_program/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/djfm/?dir=Mossdale%20trawls%20CHN-POD%20species%202012-Present](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](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\\_ismp\\_2021.html](https://www.fws.gov/redbluff/RBDD%20JSM%20Biweekly/2021/rbdd_ismp_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](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](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><br>(3/22/2022)                   | <u>DCC</u> | <u>Georgiana<br/>Slough</u> | <u>Sacramento<br/>River</u> | <u>Sutter and<br/>Steamboat<br/>Slough</u> | <u>Yolo<br/>Bypass</u> |
|---|------------|-----------------------------|-----------------------------|--|------------------------|
| Late Fall-Run<br>Proportion of<br>Entrainment | 0          | 0.31                        | 0.45                        | 0.25                                       | NA                     |
| Late Fall-Run<br>Survival                     | NA         | 0.16                        | 0.49                        | 0.37                                       | NA                     |
| Winter-Run<br>Proportion of<br>Entrainment    | NA         | 0.14                        | 0.58                        | 0.29                                       | 0                      |
| Winter-Run<br>Survival                        | NA         | 0.04                        | 0.13                        | 0.38                                       | NA                     |

- The STARS Model has been recently updated to include a separate category for WR Chinook salmon entrainment, which includes 2 new covariates (Yolo Bypass and Interior Delta). 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 WR Chinook salmon and a maximum loss of 41 WR Chinook salmon during this week (SacPas last updated on 3/22/2022).  
<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<br><i>(when ≥ 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 = 75-89% estimated in the Delta;<br><br>Spring-run = 70-90% estimated in the Delta | Possible increase in presence of WR and SR       | <b>3/22/22</b>      | Based on 3/22/22 SaMT discussion   |
| Winter-run yearly loss (8.6.1)               | Nov. 1 - Jun. 30  | In effect<br>WY 2022 loss = 1462.94 | Natural CHNWR (loss = 1.17% of JPE)<br>50% of 1.17% of JPE = 731.47<br><br>Hatchery CHNWR (loss = 0.12% of JPE)<br>50% of 0.12% of JPE = 90.93 | Current yearly WR loss (natural LAD) = 20.56<br><br>Current yearly WR loss (hatchery) = 0     | Possible salvage of both natural and hatchery WR | <b>3/22/22</b>      | Based on salvage data from 3/22/22 |
| 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<br><br>12/1-12/31: loss of 26/day unclipped older juv. Chinook salmon            | NA  | NA   | <b>1/17/22</b>      | NA                                 |



|  |                  |           |   |  |   |                |                                    |
|--|------------------|-----------|---|--|---|----------------|------------------------------------|
| 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 *<br/>125,038 = 7.94</p> <p>February 1 – 29: 0.0000991 *<br/>125,038 = 12.39</p> <p><u>March 1 – 31:</u><br/><u>0.000146 *</u><br/><u>125,038 = 18.26</u></p> <p>April 1 – 30: 0.0000507 *<br/>125,038 = 6.34</p> <p>May 1 – 31: 0.000077 *<br/>125,038 = 9.63</p> | Possible additional salvage of older juvenile Chinook salmon  | <b>3/22/22</b> | Based on salvage data from 3/22/22 |
| Spring-run surrogate protection (8.6.4)  | Feb. 1 - Jun. 30 | In effect | <p>Coleman National Fish Hatchery (CNFH) Group 1:<br/>0.25% of total in-river CWT fall-run release (total of 7 CWT #s)</p> <p>Group 2:<br/>0.25% of total in-river CWT fall-run release (total of 7 CWT #s)</p>                             | <p>CNFH Group 1: 0.0025 * 719,838 = 1,799.59</p> <p>CNFH Group 2: 0.0025 * 749,368 = 1,873.42</p>  | <p>CNFH Group 1 release occurred on 3/15/2022</p> <p>CNFH Group 2 release occurred on 3/18/2022</p> | <b>3/22/22</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      |

\*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 | FRH      | 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   |

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  |                |
|                                | Group 2       | 3/18/2022 | Fall | 2,982,466           | 749,368  | 05 66 06  | 1,873.42       |
|                                |               |           |      |                     |          | 05 66 07  |                |
|                                |               |           |      |                     |          | 05 66 08  |                |
|                                |               |           |      |                     |          | 05 66 09  |                |
|                                |               |           |      |                     |          | 05 66 10  |                |
|                                |               |           |      |                     |          | 05 66 11  |                |
|                                |               |           |      |                     |          | 05 66 12  |                |
| 05 66 13                       |               |           |      |                     |          |           |                |
| Feather River Fish Hatchery    | NA            | NA        | NA   | NA                  | NA       | NA        | NA             |
| Nimbus Fish Hatchery           | NA            | NA        | NA   | NA                  | NA       | NA        | NA             |