

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

## Section 1: Overview

Date: 10/27/2020

### Life Stages Present:

Winter-run Chinook Salmon (juvenile)

Spring-run Chinook Salmon (juvenile)

### Advice to WOMT:

No advice is warranted. At this time, juvenile winter-run Chinook salmon are distributing downstream into the system mostly upstream of GCID with few in the Delta. Juvenile spring-run Chinook salmon are just beginning to emerge and be detected at sampling stations. There is minimal risk of exceeding a Delta Cross Channel (DCC) gate trigger that would require modified gate operations this upcoming week based on older juvenile Chinook salmon presence in the vicinity of the DCC gates. Condition of Approval (COA) 8.6.1 Winter-run Single-year Loss Threshold and 8.6.2 Early-season Natural Winter-run Chinook Salmon Discrete Daily Loss go into effect starting Sunday (11/1/20), but SaMT anticipates no risk of exceeding any juvenile winter-run Chinook salmon cumulative or daily thresholds due to current estimated distribution. However, the distribution of winter-run Chinook salmon indicates they are rearing and holding and a precipitation event could trigger a redistribution of fish into the Delta which will require SaMT to monitor COAs 8.6.1 and 8.6.2 more closely.

### Risk Assessment:

Risk of entrainment to juvenile winter-run Chinook salmon into the interior Delta and at the facilities is similar to last week and considered to be low this week. Cumulative catch of length-at-date (LAD) juvenile winter-run Chinook salmon at GCID has been 839 while 120 LAD juvenile winter-run Chinook salmon have been observed over the last week (10/20/20 to 10/26/20). Another four individual juvenile winter-run Chinook salmon were observed in the monitoring stations as far downstream as the Knights Landing rotary screw traps [(RST) (3 at Tisdale RST, 1 at Knights Landing RST)]. This information along with seasonal timing and RBDD historical passage trends, indicates most of the population occupies the reaches between RBDD and Tisdale. RBDD [river mile (RM) 243] and GCID (RM 205) continue to see numbers of juvenile winter-run Chinook salmon passage, yet minimal to no catch has been observed at beach seine sites at Colusa (RM 143) and Tisdale (RM 119) and at the Tisdale RST (RM 120). Based on current distribution and hydrological conditions, SaMT still estimates that most of the population of juvenile winter-run Chinook salmon (99-100%) are yet to enter the Delta. Risk to juvenile winter-run Chinook salmon entrainment into the interior Delta may decrease while the DCC gates are closed 10/28 and may increase on 10/31 due to the Delta Cross Channel gates opening Saturday morning, but based on the current distribution, risk remains in the low category. USBR indicated that DCC weekly gate closure and weekend opening operations will occur through the month of November.

Risk of entrainment to juvenile spring-run Chinook salmon into the interior Delta and at the facilities is considered to be low this week. Cumulative seasonal catch of LAD juvenile spring-run Chinook salmon at the GCID RST has been 30 fish with 14 LAD spring-run Chinook salmon over the past week. A single LAD juvenile spring-run Chinook salmon was observed in the monitoring stations as far downstream as the Knights Landing RST indicating spring-run juveniles are beginning to enter the Delta. Beginning on 10/21/20, flows in Mill Creek

were greater than 95 cfs indicating river conditions that are consistent with downstream movement of yearling spring-run Chinook salmon out of the tributary into the mainstem upper Sacramento River. SaMT estimates that most of the population of juvenile spring-run Chinook salmon (99-100%) are yet to enter the Delta. Risk to juvenile spring-run Chinook salmon entrainment into the interior Delta this week is similar to juvenile winter-run Chinook salmon regarding DCC gate operations, but based on the current distribution and seasonal timing, risk remains in the low category.

This risk assessment does not address effects to adult fall-run Chinook salmon based on DCC gate operations. Additionally, no juvenile Chinook salmon have been observed in salvage this past week. Currently the controlling factor for exports is water quality in the Delta and may have been a result of wind activity over the weekend. Controlling factors for exports for the upcoming week are anticipated to be water quality or Delta outflow.

## Section 1-A: Sacramento River and Confluence

Assessment of risk of entrainment into the central Delta and CVP/SWP facilities for CHNWR and CHNSR in the Sacramento River: (8.1.5.1 C ii, iii, iv and 8.1.5.1 B iii)

- Exposure Risk:
  - CHNWR: Low
  - CHNSR: Low
- Routing Risk:
  - CHNWR: Low
  - CHNSR: Low
- Overall Entrainment Risk:
  - CHNWR: Low
  - CHNSR: Low
- Change in risk of entrainment into the Central Delta (Increased/decreased risk compared to last week):
  - CHNWR: Similar to last week based on similar DCC gate operations, hydrology, operations, and distribution this week compared to last.
  - CHNSR: Increased from last week. 0% were estimated to be in the Delta last week, 0-1% have been estimated to occur in the Delta this week.

## Section 1-B: Facilities Risk

CVP/SWP facilities entrainment risk for CHNWR and CHNSR in the central Delta over the next week (8.1.5.1 D iii, iv, v)

- Exposure Risk:
  - CHNWR: Low
  - CHNSR: Low
- Reporting OMR/Export Risk: (Number and range of OMR bins will vary based on anticipated hydrology and operations)
  - OMR (-1,500 cfs)
    - CHNWR: Low
    - CHNSR: Low
  - OMR (-4,000 cfs)
    - CHNWR: Low
    - CHNSR: 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)
  - Salvage loss at the SWP and CVP facilities compared to estimated remaining population in Delta and upstream of the Delta: No salvage of CESA listed Chinook salmon have been observed in salvage over the past week.
    - Define risk of hitting a threshold, 50%, or 75%, or 100%, and actions to minimize that happening:
      - Natural origin CHNWR:
        - Current Annual Loss: Not applicable. Conditions of Approval was not in effect this month.
        - 50% Threshold based on JPE:
          - Risk of exceeding threshold: Threshold has not yet been determined.

- 75% Threshold based on JPE:
  - Risk of exceeding threshold: Threshold has not yet been determined.
- 100% Threshold based on JPE:
  - Risk of exceeding threshold: Threshold has not yet been determined.
- Hatchery CHNWR:
  - Current Annual Loss: Not applicable. Releases have not occurred.
  - 50% Threshold based on JPE:
    - Risk of exceeding threshold: Not applicable. Threshold has not yet been determined.
  - 75% Threshold based on JPE:
    - Risk of exceeding threshold: Not applicable. Threshold has not yet been determined.
  - 100% Threshold based on JPE:
    - Risk of exceeding threshold: Not applicable. Threshold has not yet been determined.

#### Section 1-D: Daily Loss Threshold Risk

- Daily loss threshold risk and Alternative Actions
  - Salvage loss at the SWP and CVP facilities compared to estimated remaining population in Delta and upstream of the Delta: Currently not applicable for the month of October.
    - Daily loss thresholds hit and subsequent loss and associated operations:
      - Natural origin CHNWR:
        - October monthly daily loss threshold: Currently not applicable for the month of October.
        - November monthly daily loss threshold: 6 older juvenile Chinook salmon
        - Highest daily loss: Currently not applicable for the month of October.
      - Hatchery origin CHNSR:
        - Highest daily loss: Currently not applicable. Releases have not occurred.
      - Hatchery origin CHNSR surrogates:
        - Highest daily loss: Currently not applicable. Releases have not occurred.

## 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](#) (ITP) states that advice to Water Operations Management Team (WOMT) shall be consistent with the Project Description, Conditions of Approval in the ITP, and the applicable ESA authorizations. This week's advice is based on the following Conditions of Approval which are currently applicable:

*List relevant Condition of Approval number and title based on species/life stage, time of year, etc.*

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

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

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

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

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

- Natural CHNWR (loss = 1.17% of JPE)*
- Hatchery CHNWR (loss = 0.12% of JPE)*

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

*Loss of CHNWR at the at the CVP and SWP salvage facilities shall be calculated based on length-at-date criteria.*

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

*CHNWR shall be identified based on the Delta Model length-at-date 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 CHNWR 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 CHNWR 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 CHNWR at the 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 CHNWR 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 CHNWR cumulative loss at the 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 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 CHNSR surrogates. The Salmon Monitoring*

*Team shall use reported real-time salvage counts along with qualitative and quantitative tools to inform risk assessments (see Condition of Approval 8.1.5.1).*

*8.6.2 Early-season Natural Winter-run Chinook Salmon Discrete Daily Loss Threshold. To minimize entrainment, salvage, and take of early-migrating natural CHNWR Permittee shall restrict south Delta exports for five consecutive days to achieve a five-day average OMR index no more negative than -5,000 cfs when daily loss of older juveniles (natural older juvenile Chinook salmon and yearling CHNSR used as a surrogate for CHNWR) at the SWP and CVP salvage facilities exceeds the following thresholds:*

- From November 1 – November 30: 6 older juvenile Chinook salmon*
- From December 1 – December 31: 26 older juvenile Chinook salmon*

*All natural older juvenile Chinook salmon juveniles shall be identified based on the Delta Model length-at-date criteria. Loss shall be calculated for the South Delta Export Facilities using the equation provided in CDFW 2018 (Attachment 6). This Condition of Approval may be modified through the process described in Condition of Approval 8.6.6 and an amendment to this ITP.*

#### **Discussion of Conditions of Approval**

*Provide sentence or two addressing criteria for each Condition of Approval listed in “Basis for Advice” section. Refer to data below where appropriate.*

Per Conditions of Approval 8.1.4 and 8.1.5, SaMT has provided advice and accompanying risk assessment to WOMT.

Per Conditions of Approval 8.6.1 and 8.6.2, SaMT does not believe either condition is at risk of exceeding thresholds.

### Section 3: Hydrology and Operations

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

#### Section 3-A: Water operations conditions 8.1.5.1 A. i, iii:

- Antecedent Actions: (*e.g. DCC gate closure and actions such as integrated early winter pulse protection, etc.*)  
DCC gates will close on 10/28/20 and will remain closed until the morning of 10/31/20 in response to a Mokelumne River pulse flow (895 AF) released 10/27/20 through 10/29/20. Beginning 11/1/20, USBR will operate to weekly closures and weekend openings of the DCC through the duration of the month.
- Current Controlling Factor(s):
  - SWP: Delta water quality
  - CVP: Delta water quality
- Water Temperature:
  - Mossdale: 57.8°F on 10/26/20
    - Number of days threshold exceeded: Not applicable until June.
  - Prisoners Point: 64.0°F on 10/26/20
    - 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*)
  - NMFS asked USBR and DWR if the full moon on Saturday (10/31/20) would make conditions worse for water quality due to a spring tide. USBR and DWR do not anticipate any impacts.
- Turbidity:
  - 8.3.1 Turbidity at FPT Dec 1 to Jan 31
- Salinity: X2: > 81km
- Hydraulic Footprint (*Provide brief description of hydrologic footprint and summary of relevant DSM2 results*):
  - DSM2 runs did not occur this week and results were not provided to SaMT.

#### Section 3-B: Water Operations Outlook 8.1.5.1 A. ii:

- Outages:
  - SWP: Will be shut down next week (11/2/20-11/6/20) for maintenance. Exports will be 0 except for early water draw into Clifton Court to allow boat operation. DWR plans to treat the forebay for aquatic weeds during the shutdown, pending permission from the services.
  - CVP: None
- Exports
  - SWP: 1,000 cfs
  - CVP: 1,800 cfs
- Meteorological Forecast: *Precipitation, wind, air temperature. Are conditions (i.e. flow, turbidity, water temp) expected to change?*
  - Local elevated fire weather concerns continue through tomorrow morning in the mountains due to gusty winds and low humidity. Lighter winds, above average temperatures, and very dry conditions are expected tomorrow through early next week.
- Storm Event Projection: None

#### Section 3-C: Projected Conditions 8.1.5.1 A. iii:

- DCC Gates position: Closed (10/28/2020 – 10/31/2020)
- Sacramento River flow at Freeport: 6,500 – 8,000 cfs

- San Joaquin River flow at Vernalis: 400 – 2,000 cfs
- Qwest: Not discussed.
- Old River at Bacon Island Turbidity: *Is turbidity at Bacon Island (OBI) expected to change due to precipitation, wind, operations, or other factors?* Not discussed.
- Freeport Turbidity: *Is turbidity at Freeport (FPT) expected to change due to precipitation, wind, operations, or other factors?* Not discussed.
- Expected changes in South Delta Exports:
  - CCF: 0 – 2,000 cfs
  - Tracy: 1,800 – 2,700 cfs

Table 1: Comparison of OMR and OMR Index

Date	Averaging Period	USGS gauges (cfs)	Index
Not Available	Daily	Not Available	Not Available
Not Available	5-day	Not Available	Not Available
Not Available	14-day	Not Available	Not Available
Not Available	Daily	Not Applicable	Gauge data and index values were not discussed during the SaMT call, but a range of OMR Index values was provided in the outlook: -1,500 to -4,000 cfs
Not Available	5-day	Not Applicable	Gauge data and index values were not discussed during the SaMT call, but a range of OMR Index values was provided in the outlook: -1,500 to -4,000 cfs
Not Available	14-day	Not Applicable	Gauge data and index values were not discussed during the SaMT call, but a range of OMR Index values was provided in the outlook: -1,500 to -4,000 cfs

## Section 4: Distribution and Biology

### 8.1.5.1.B Assessment of biological information for CHNWR and CHNSR.

#### Section 4-A: CHNWR population status 8.1.5.1.B i

- Adult escapement estimate: Not available
- Redd distribution and fry emergence timing: Eggs are currently in the gravel and BY2020 total passage through 10/20/2020 is 1,467,024. Average historic passage (2005-2019) as of 10/20/2020 indicates 73.1% with one standard deviation of 17.7% have passed Red Bluff Diversion Dam.
- Juvenile production estimate: Not available
- Livingston Stone National Fish Hatchery release: Not applicable. Releases have not occurred.
- Distribution of natural CHNWR:
  - % of juveniles upstream of the Delta: 99-100%
  - % of juveniles in Delta: 0-1%
  - % of juveniles past Chipps Island: 0%
- Distribution of Livingston Stone National Fish Hatchery CHNWR:
  - % of juveniles upstream of the Delta: Not applicable. Releases have not occurred.
  - % of juveniles in Delta: Not applicable. Releases have not occurred.
  - % of juveniles past Chipps Island: Not applicable. Releases have not occurred.
- Distribution of Battle Creek CHNWR:
  - % of juveniles upstream of the Delta: Not applicable.
  - % of juveniles in Delta: Not applicable.
  - % of juveniles past Chipps Island: Not applicable.
- Change in risk of entrainment into the central Delta:
  - Change in routing risk of entrainment into the central Delta: (*comparison to previous week*) Still low and similar to last week based on similar DCC gate operations, hydrology, and distribution from last week to this week.

#### Section 4-B: CHNSR population status 8.1.5.1.B ii

- Adult escapement estimate: Not available
- Redd distribution and fry emergence timing: Adult CHNSR are spawning and eggs are currently in gravel.
- Hatchery release (in-river and downstream): No hatchery releases at this time.
- Distribution of natural CHNSR:
  - % of juveniles upstream of the Delta: 99-100%
  - % of juveniles in Delta: 0-1%
  - % of juveniles past Chipps Island: 0%
- Distribution of Feather River Fish Hatchery CHNSR:
  - % of juveniles upstream of the Delta: Not applicable. Releases have not occurred.
  - % of juveniles in Delta: Not applicable. Releases have not occurred.
  - % of juveniles past Chipps Island: Not applicable. Releases have not occurred.
- Change in risk of entrainment into the central Delta:
  - Change in routing risk of entrainment into the central Delta (*comparison to previous week*) Increased from last week. 0% were estimated to be in the Delta last week, 0-1% have been estimated to occur in the Delta this week.

## Section 4-C: Additional data sources to assess sensitivity to entrainment into the central and south Delta

### 8.1.5.1.C & D

- In-Delta distribution of CHNWR and CHNSR: 0-1% of CHNWR estimated to be present in the Delta. 0-1% of spring-run Chinook estimated to be present in the Delta.
- Acoustic telemetry: *Summary of acoustic telemetry tracking*
  - No results at this time.
- Trawls: *List all relevant trawl surveys and brief overview of data. Insert tables, PDFs or other information as attachment at end of document. Include interruptions to sampling or other relevant information (e.g. canceled surveys, dropped stations, etc.)*
  - No catch of CESA listed salmon.
- Rotary Screw Traps: *List all relevant rotary screw trap surveys and brief overview of data. Insert tables, PDFs or other information as attachment at end of document. Include interruptions to sampling or other relevant information (e.g. canceled surveys, dropped stations, etc.)*
  - GCID: 14 CHNSR and 120 CHNWR, and 6 CHNLFR (10/20/2020 – 10/26/2020).
  - Tisdale: 3 CHNWR (10/20/20 – 10/26/20)
  - Knights Landing: 1 CHNSR and 1 CHNWR (10/20/2020 – 10/26/2020)
- Seines: *List all relevant seine surveys and brief overview of data. Insert tables, PDFs or other information as attachment at end of document. Include interruptions to sampling or other relevant information (e.g. canceled surveys, dropped stations, etc.)*
  - 1 spring-run was observed at the Tisdale boat ramp.
- Hatchery release notifications: *List all relevant hatchery release notifications*
  - No hatchery releases this past week.
- 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*
  - Not applicable at this time.
- Distribution of juvenile CHNWR and CHNSR estimated to be in the lower Sacramento River and northern Delta: 0-1% of CHNWR estimated to be present in the northern Delta. 0-1% of CHNSR estimated to be present in the northern Delta.
- Distribution of hatchery produced salmon indicated by real-time acoustic tracking of AT/CWT paired releases: Not applicable
- Anticipated emigration to continue into the Delta:
  - Fish are distributing downstream of their spawning grounds, potentially waiting for environmental cues to trigger movement into the Delta.
- Flows in the Sacramento River predicted with upcoming storm events:
  - No storms predicted.
- DCC gate position: Closed until 10/31 at 1000 hours and will close again Monday 11/2/20 at 1000 hours.
- Prediction of tidal interaction at Georgiana Slough (*Inflow to Delta from Sacramento River and the interaction of the muting of tidal effects around Georgiana Slough*): See routing analysis below.
- Precipitation in the forecast for the week and river flows effecting routing into central and interior Delta: None

- Routing analysis: STARS analysis was ran 10/27/2020 and indicates the following routing probabilities at the following junctions into different routes through the Delta. 8% at the Delta Cross Channel, 27% at Georgiana Slough, 24% at Sutter and Steamboat Slough, and 39% would remain in the Sacramento River. These results are reflective of the latest DCC gate change order.
- Trend analysis: *Provide brief description of historic trends if relevant (e.g. salvage patterns, onset of spawning, etc.). Refer to data or publications as needed:* Not available
- Survival analysis (*e.g. Zeug and Cavallo CWT model*): Not available
- Tillotson entrainment model or other entrainment models as they become available: Not applicable
- Salvage trends in relation to OMRI: *Provide overview of salvage data and insert salvage table as attachment at end of document:* Not applicable as there has been no salvage of CESA listed salmon for water year 2021.
- Future export modifications: *Describe anticipated or potential changes to exports:* Not applicable at this time.

## Appendix 1: CDFW Monitoring Program Data

Table 2: CDFW Juvenile Monitoring Programs

Location	Tisdale RST	Knights Landing RST	Delta Sturgeon Tagging and Monitoring
<b>Sample Dates</b>	10/20/20-10/26/20	10/20/20-10/26/20	10/20/20-10/22/20
<b>FR Chinook</b>	0	0	
<b>SR Chinook</b>	0	1	
<b>WR Chinook</b>	3	1	
<b>LFR Chinook</b>	0	0	
<b>Chinook (ad-clip)</b>	0	0	
<b>Steelhead (natural)</b>	0	0	
<b>Steelhead (ad-clip)</b>	0	0	
<b>Green Sturgeon</b>	0	0	No new tags applied. 4 juvenile GS detected north of Sherman Lake.
<b>Flows (avg. cfs)</b>	3,544	3,708	
<b>W. Temp. (avg. °F)</b>	61	62.0	
<b>Turbidity (avg. NTU)</b>	6.0	4.83	

Table 3: CDFW Adult Chinook Salmon Monitoring Surveys

<b>Location</b>	<b>American River Carcass Survey</b>	<b>Stanislaus River Carcass Survey</b>
<b>Sample Dates</b>	10/19/2020-10/22/2020	10/19/20-10/23/20
<b>Live Fish</b>	Not Applicable	20
<b>Redds</b>	Not Applicable	1
<b>Carcasses</b>	28	0
<b>AD-clipped</b>	12	0
<b>Spawn Condition</b>	Prespawn Mortality: 88% (7/8)	Not Applicable
<b>Flows (avg. cfs)</b>	1,679	567
<b>W. Temp. (avg. °F)</b>	64.9	NA

## Appendix 2: Salvage Data

Table 4: SaMT Update. Reporting period is 10/19/20 through 10/25/20. Prepared by Geir Aasen on 10/26/20. These are preliminary results and are subject to revision.

Criteria	19-Oct	20-Oct	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct	Trend <sup>1</sup>	Weekly Summary
Wild older juvenile CS Loss Density <sup>2</sup>	0	0	0	0	0	0	0	→	0
Wild Steelhead Loss Density <sup>2</sup>	0	0	0	0	0	0	0	→	0
SWP daily export (acre-feet)	560	560	560	467	601	519	560	→	547
CVP daily export (acre-feet)	6,854	6,821	5,404	5,388	5,371	5,372	5,356	→	5,795
SWP reduced counts <sup>3</sup>	None	None	None	None	None	None	None	Not Applicable	Not Applicable
CVP reduced counts <sup>3</sup>	None	None	None	None	None	None	None	Not Applicable	Not Applicable

<sup>1</sup> Trend is the current value compared to the previous week.

<sup>2</sup> Loss density equals number of fish lost divided by thousand acre-feet. Loss is equal to the estimated number of fish lost at the CVP and SWP Delta export facilities based on estimated salvage.

<sup>3</sup> Reduced counts are the percentage of time that routine salvage sample times were less than 30 minutes per two hours of salvage and export operations.

Table 5: Chinook salmon weekly salvage and loss combined for both the SWP and the CVP fish collection facilities. Race is determined by size at date of capture. Hatchery origin fish are determined by the lack of adipose fin. Prepared by Geir Aasen on 10/26/20. These are preliminary results and are subject to revision.

Category	Salvage <sup>4</sup>	Loss <sup>5</sup>	Trend
Wild winter-run	0	0	→
Wild spring-run	0	0	→
Wild late Fall-run	0	0	→
Wild fall-run	0	0	→
Hatchery winter-run	0	0	→
Hatchery spring-run	0	0	→
Hatchery late Fall-run	0	0	→
Hatchery fall-run	0	0	→
Total	0	0	Not Applicable

Table 6: Chinook salmon cumulative salvage and loss for Water Year 2021 combined for both the SWP and the CVP fish collection facilities. Race is determined by size at date of capture. Hatchery origin fish are determined by the lack of adipose fin. Prepared by Geir Aasen on 10/26/20. These are preliminary results and are subject to revision.

Category	Salvage <sup>4</sup>	Loss <sup>5</sup>	Trend
Wild winter-run	0	0	→
Wild spring-run	0	0	→
Wild late Fall-run	0	0	→
Wild fall-run	0	0	→
Hatchery winter-run	0	0	→
Hatchery spring-run	0	0	→
Hatchery late Fall-run	0	0	→
Hatchery fall-run	0	0	→
Total	0	0	Not Applicable

Table 7: Steelhead weekly salvage and loss combined for both the SWP and the CVP fish collection facilities. Hatchery origin fish are determined by the lack of adipose fin. Prepared by Geir Aasen on 10/26/20. These are preliminary results and are subject to revision.

Category	Salvage <sup>4</sup>	Loss <sup>5</sup>	Trend
Wild steelhead	0	0	→
Hatchery steelhead	0	0	→
Total	0	0	Not Applicable

<sup>4</sup> Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time.

<sup>5</sup> State Water Project loss is equal to salvage multiplied by 4.33. Central Valley Project loss is equal to salvage multiplied by 0.68.

Table 8: Steelhead cumulative salvage and loss for Water Year 2021 combined for both the SWP and the CVP fish collection facilities. Hatchery origin fish are determined by the lack of adipose fin. Prepared by Geir Aasen on 10/26/20. These are preliminary results and are subject to revision.

Category	Salvage <sup>6</sup>	Loss <sup>7</sup>	Trend
Wild steelhead	0	0	→
Hatchery steelhead	0	0	→
Total	0	0	Not Applicable

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<sup>6</sup> Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time.

<sup>7</sup> State Water Project loss is equal to salvage multiplied by 4.33. Central Valley Project loss is equal to salvage multiplied by 0.68.