

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

## Section 1: Overview

Date: 12/15/2020

### Life Stages Present:

Winter-run Chinook Salmon (juvenile)

Winter-run Chinook Salmon (adult)

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 Sacramento River system, with most fish remaining upstream of Colusa. Very few juvenile winter-run Chinook salmon have been detected downstream of GCID as they migrate towards the Delta. Although fish are largely absent from detections by Delta monitoring programs, given the seasonal timing and river conditions, the Salmon Monitoring Team (SaMT) estimates that up to 7% of the juvenile winter-run Chinook salmon population is now present in the Delta. Precipitation events forecasted for later this week are anticipated to increase juvenile distribution into the Delta, therefore elevating exposure risk, however, overall risk of entrainment into the interior and south Delta from the Sacramento River remains low. Additionally, adult winter-run Chinook salmon are beginning to enter the Delta and Sacramento River. Currently there are no operations, such as an open Delta Cross Channel (DCC) gate, that would delay upstream adult migration. By late November, juvenile spring-run Chinook salmon are emerging from the gravel and beginning to move downstream as fry. A small number of juvenile spring-run Chinook salmon have been detected at monitoring stations within the Sacramento River and upper Delta regions. The DCC gates are currently closed and will potentially remain closed until mid-May 2021, per Reclamation's Proposed Action (PA) operations description for the DCC gates. Water quality concerns between November and January may necessitate a DCC gate opening as current combined exports are reduced almost down to health and safety standards (i.e., 1,500 cfs combined exports). 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 have been in effect since 11/1/2020, but the SaMT anticipates only a minimal risk of exceeding any juvenile winter-run Chinook salmon cumulative or daily loss thresholds due to the current estimated distributions of fish, trapping conditions, and forecasted weather conditions for the next week. However, current seasonal timing and the distribution of winter-run Chinook salmon indicates they are rearing and holding in the middle section of the Sacramento River, and any significant precipitation events in the next couple of weeks could trigger a substantial redistribution of fish into the Delta, which will require SaMT to monitor COAs 8.6.1 and 8.6.2 more closely. Currently, the controlling factor for exports is water quality requirements in the Delta and it is anticipated to be controlling during the upcoming week.

### Risk Assessment:

Overall risk of entrainment of juvenile winter-run Chinook salmon into the interior Delta is similar to last week and is still considered to be low for this week based on minimal observations of fish in the Delta. RBDD (river

mile [RM] 243) and GCID (RM 205) continue to observe juvenile winter-run Chinook salmon, indicating ongoing passage at these locations, yet minimal to no catch has been observed at the downstream monitoring locations. Cumulative catch of length-at-date (LAD) juvenile winter-run Chinook salmon at GCID is 1,119 fish with 38 LAD juvenile winter-run Chinook salmon observed over the last week (12/7/20 to 12/13/20). No juvenile winter-run Chinook salmon were observed at any Delta monitoring stations over the last week. This information along with seasonal timing and RBDD historical passage trends, indicates most of the population occupies the reaches between RBDD and Colusa. In the reach between RBDD and Colusa, the river is more sinuous than the lower reaches of the Sacramento River and includes a number of side channels that increase the overall edge habitat available to rearing fish. This edge habitat may provide additional upstream rearing areas. SaMT estimates that most of the juvenile winter-run Chinook salmon population (93-97%) has yet to enter the Delta. However, SaMT members agree that current hydrological conditions (i.e., low turbidity and low flows) reduces the trap capture efficiencies of various downstream monitoring sites; therefore, more fish may have distributed downstream than is estimated from the observations of catch from the downstream monitoring sites. DCC gates are currently closed and will remain closed through mid-May 2021, per the PA operations description for the DCC gates. Water quality concerns between December and January may necessitate a DCC gate opening as combined exports are reduced almost down to health and safety standards. With the precipitation event forecasted for Wednesday (12/16) evening, flows measured at Freeport are forecasted to be slightly higher compared to the previous week, yet still remain less than identified thresholds that can mute the tidal effects in the vicinity of the Georgiana Slough junction. Vernalis flows are also forecasted to be slightly higher compared to the previous week. Based on low flows in the Sacramento River this week, SaMT estimates a similar risk of juvenile Chinook salmon routing into the interior from the mainstem as was estimated for last week and remains at a “medium” risk level. Based on the current in-Delta distribution of juvenile winter-run Chinook salmon and seasonal timing, the overall risk of entrainment into the interior Delta still remains low. Overall risk of entrainment at the facilities remains similar to last week and still remains low. The forecasted range of operations for this upcoming week includes a high level of exports generating OMR flows of -5,000 cfs, resulting in a medium risk of routing into the south Delta towards the export facilities for fish already present in the interior Delta. However, this level of exports is unlikely to be operated to, based on current Delta water quality conditions. The risk of entrainment at the facilities and exceeding a daily discrete loss threshold remains in the low category. The low risk of entrainment is based on the low numbers of fish believed to be in the central and south Delta at this time.

Risk of entrainment to juvenile spring-run Chinook salmon into the interior Delta is similar to last week and is still considered to be. Cumulative seasonal catch of LAD juvenile spring-run Chinook salmon at the GCID RST is 54 fish, with two juveniles observed over the past week (12/7/20 to 12/13/20). Beginning on 10/21/20, flows in Mill Creek have been greater than 95 cfs indicating river conditions that are consistent with downstream movement of yearling spring-run Chinook salmon out of the tributaries and into the mainstem upper Sacramento River. Flows were greater than 95 cfs in Deer Creek beginning 12/12/20 also consistent with river conditions that are associated with downstream movement of yearling spring-run Chinook salmon. Monitoring in Butte Creek also indicates yearling spring-run Chinook salmon are moving downstream in this tributary towards the Sacramento River. SaMT estimates that most of the population of young-of-year juvenile spring-run Chinook salmon (97-99%) has yet to enter the Delta. Routing risk of juvenile spring-run Chinook salmon into the interior Delta this week is similar to that for juvenile winter-run Chinook salmon regarding DCC gate operations and hydrology. Based on the current distribution and seasonal timing, overall risk of entrainment

into the interior Delta remains low. Overall risk of entrainment at the facilities remains similar to last week and continues to remain low. The range of exports and more negative OMR forecasted will have similar effects upon juvenile spring-run Chinook salmon as described for juvenile winter-run Chinook salmon. Based on fish distribution in the central and south Delta, the risk of entrainment at the facilities remains in the low category.

No juvenile Chinook salmon have been observed in salvage this past week. Currently the controlling factor for exports is water quality in the Delta. Controlling factors for exports for the upcoming week are still anticipated to be due to Delta water quality.

## 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: Medium
  - CHNSR: Medium
- Overall Entrainment Risk:
  - CHNWR: Low
  - CHNSR: Low
- Change in risk of entrainment into the Central Delta (Increased/decreased risk compared to last week):
  - CHNWR: Exposure risk remains similar to last week based on similar hydrology and upstream distribution. Currently, only 3-7% of the juvenile CHNWR population is estimated be present in the Delta for this week. Precipitation events forecasted for later this week are anticipated to increase distribution into the Delta. However, exposure risk is estimated to remain low based on current distribution estimates. Routing risk is considered to be medium. DCC gates have been closed since 12/1/20 and are anticipated to remain closed until mid-May 2021. Sacramento flows measured at Freeport are forecasted to be higher compared to the previous week, yet still remain less than identified thresholds that mute the tidal effects in the vicinity of the Georgiana Slough junction. Stronger tidal influence at the Georgiana Slough junction with the Sacramento River can redirect additional river flows into the Georgiana Slough route from upstream during the incoming flood tide. Vernalis flows are forecasted to be higher compared to the previous week. The high range of the forecasted level of exports is -5,000 cfs resulting in a medium risk of routing into the south Delta towards the export facilities for fish already present in the interior Delta. Based on the current in-Delta distribution, seasonal timing, and forecasted operations, overall risk of entrainment into the interior Delta remains low.
  - CHNSR: Exposure risk remains similar to last week based on low numbers of juvenile CHNSR in the system and their distribution primarily upstream of Knights Landing. Currently, 1-3% of the young-of-year CHNSR population is estimated to be present in the Delta this week. Precipitation events forecasted for later this week are anticipated to increase distribution into the Delta. However, exposure risk is estimated to remain low based on current distribution estimates. Routing risk is similar to the effects described for CHNWR based on DCC gate configuration and Sacramento River flows at Freeport, and routing risk is considered to be medium. The forecasted level of exports is also expected to have similar effects as described for CHNWR. Based on the current in-Delta distribution, seasonal timing, and forecasted operations, overall risk of entrainment into the interior Delta remains low.

## 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 (-1,200 cfs)
    - CHNWR: Low
    - CHNSR: Low
  - OMR (-5,000 cfs)
    - CHNWR: Medium
    - CHNSR: Medium
- Overall Entrainment Risk:
  - CHNWR: Low
  - CHNSR: Low
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
  - CHNWR: Exposure risk is similar to last week based on forecasted hydrology and upstream distribution of the juvenile CHNWR population this week compared to last week (3-7% of the juvenile population are estimated to be present in the Delta this week). The high range of the forecasted level of exports will generate an OMR flow of -5,000 cfs, resulting in a medium risk of entrainment into the export facilities for fish already present in the south Delta. No fish have been observed in salvage for water year 2021 and based on fish distribution in the central and south Delta, overall risk of entrainment at the facilities remains in the low category.
  - CHNSR: Exposure risk is similar to last week based on forecasted hydrology and upstream distribution of the juvenile CHNSR population this week compared to last week (1-3% of the juvenile population are estimated to be present in the Delta this week). The range of exports forecasted over the upcoming week are the same as those described for CHNWR. No fish have been observed in salvage for water year 2021, and based on fish distribution in the central and south Delta, overall risk of entrainment at the facilities remains in the low category. Additionally, the Salmon Conservation and Research Facility released approximately 5,100 CHNSR yearlings into the San Joaquin River as part of the San Joaquin River Restoration Program, 500 of which are PIT tagged. These fish are covered under a *de minimus* clause and will not affect export operations but may influence natural-origin juvenile fish to redistribute downstream.

#### 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 over the past week.
    - Define risk of hitting a threshold, 50%, or 75%, or 100%, and actions to minimize that from happening:
      - Natural origin CHNWR:
        - Current Annual Loss: 0
        - 50% Threshold based on natural CHNWR JPE:

- Risk of exceeding threshold: Threshold has not yet been determined.
- 75% Threshold based on natural CHNWR JPE:
  - Risk of exceeding threshold: Threshold has not yet been determined.
- 100% Threshold based on natural CHNWR JPE:
  - Risk of exceeding threshold: Threshold has not yet been determined.
- Hatchery CHNWR:
  - Current Annual Loss: Not applicable. Releases have not yet occurred.
  - 50% Threshold based on hatchery CHNWR JPE:
    - Risk of exceeding threshold: Not applicable. Threshold has not yet been determined.
  - 75% Threshold based on hatchery CHNWR JPE:
    - Risk of exceeding threshold: Not applicable. Threshold has not yet been determined.
  - 100% Threshold based on hatchery CHNWR 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:
    - Daily loss thresholds hit and subsequent loss and associated operations:
      - Natural origin CHNWR:
        - December monthly daily loss threshold: 26 older juvenile Chinook salmon per day
        - Highest daily loss: 0
      - Hatchery origin CHNWR:
        - Highest daily loss: Currently not applicable. Releases have not yet occurred.
      - Hatchery origin CHNSR:
        - Highest daily loss: Currently not applicable. Releases have not yet occurred.
      - Hatchery origin CHNSR surrogates:
        - Highest daily loss: Currently not applicable. Releases have not yet 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, COA in the ITP, and the applicable ESA authorizations. This week's advice is based on the following COAs which are currently applicable:

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

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

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

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

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

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

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

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

*Loss of CHNWR at the CVP and SWP salvage facilities shall be calculated based on LAD criteria for run assignment.*

*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 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 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 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 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 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 LAD 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 were closed 12/1/20 and will remain closed until mid-May 2021 per Reclamation's PA description of DCC operations.
- Current Controlling Factor(s):
  - SWP: Delta water quality
  - CVP: Delta water quality
- Water Temperature:
  - Mossdale (MSD): 50.8°F on 12/14/20
    - Number of days threshold exceeded: Not applicable until June.
  - Prisoners Point (PPT): 51.0°F on 12/14/20
    - 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)*
  - Current combined exports are being held at 1,600 cfs and will be adjusted based on upcoming tidal interactions. There is an upcoming spring tide as well as forecasted precipitation late this week. Tidal effects and water quality station data are being monitored closely for any opportunity to modify exports this upcoming week.
- Turbidity:
  - 8.3.1 Turbidity at FPT Dec 1 to Jan 31 (3-day running average)
    - 3.48 FNU as of 12/14/20.
- 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: None, no reported reductions in fish salvage counts
  - CVP: None, no reported reductions in fish salvage counts
- Exports
  - SWP: 800 cfs
  - CVP: 800 cfs
- Meteorological Forecast: *Precipitation, wind, air temperature. Are conditions (i.e. flow, turbidity, water temp) expected to change?*
  - Light, scattered showers may continue through this evening, with some local areas of valley fog seen in the morning. A winter storm will impact Northern California Wednesday (12/16) into Thursday (12/17) bringing widespread rain and mountain snow. Dry weather returns Friday (12/18).
- Storm Event Projection:

- Wednesday (12/16) will start out dry with some areas of fog likely in the Sacramento Valley and northern San Joaquin Valley. Some high clouds overnight may inhibit fog development in some locations. A weather system is then expected to move through the region tomorrow afternoon and continue through Thursday (12/17) bringing widespread rain and mountain snow to Northern California. Snow levels Wednesday and Wednesday evening begin at higher pass levels, dropping overnight to roughly 4,500 to 5,000 feet on Thursday. The heaviest snow is still expected overnight mainly above 5,500 feet which is indicated by a Winter Weather Advisory. Later Thursday morning and afternoon, some light snow may still be lingering across the Sierra down to about 4,500 feet, although amounts will be minimal at this point. As for the Valley, the forecast is on track for the heaviest rainfall to be late Wednesday into Thursday morning, with precipitation becoming more scattered and retreating towards the mountains Thursday afternoon. By Thursday night, dry weather is expected to return to the area which will continue into Friday (12/18).

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

- DCC Gates position: Closed 12/1/20 until mid-May 2021 per PA DCC gate operations.
- Sacramento River flow at Freeport: 7,500 – 10,500 cfs
- San Joaquin River flow at Vernalis: 800 – 1,100 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: 800 – 3,500 cfs
  - Tracy: 800 – 1,800 cfs

Table 1: Comparison of OMR gauge and OMR Index

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
12/12/20	Daily	-1,800	-1,600
12/12/20	5-day	-1,800	-1,600
12/12/20	14-day	-2,400	-2,300
12/14/20	Daily	Not Applicable	-1,500
12/14/20	5-day	Not Applicable	-1,600

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
12/14/20	14-day	Not Applicable	-2,000

## 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:
  - Adult escapement for brood year (BY) 2020 is not yet available, although the current preliminary estimate from carcass counts is 6,392 total adults and 3,904 female spawners.
  - Adults that will contribute to BY 2021 are beginning to enter the Delta system.
- Redd distribution and fry emergence timing: BY2020 total passage at Red Bluff Diversion Dam through 12/1/20 is 1,835,780 fish. Average historic passage (2010-2019) as of 12/1/20 indicates 92.5% (one standard deviation of 6.0%) have passed Red Bluff Diversion Dam.
- Juvenile production estimate: Not available
- Livingston Stone National Fish Hatchery release: Not applicable. Releases have not occurred. Preliminary information from the Livingston Stone National Fish Hatchery indicates issues potentially related to thiamine deficiency in returning adults may impact the final supplemental goal. Releases are tentatively planned for early February.
- Distribution of natural CHNWR:
  - % of juveniles upstream of the Delta: 93-97%
  - % of juveniles in Delta: 3-7%
  - % 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:
  - See 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)

#### 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 likely to have completed their spawning by mid-November. Egg incubation and fry emergence is currently occurring. BY2020 total passage at Red Bluff Diversion Dam through 12/1/20 is 103,536 fish.
- Hatchery release (in-river and downstream): No CHNSR hatchery releases have occurred in the Sacramento River at this time. CHNSR egg collection at the Feather River Hatchery ended on 10/2/20. Preliminary information from the Feather River Hatchery indicates issues potentially related to thiamine deficiency in returning adults which has impacted the final production goal. In addition, reduced numbers of tagged CHNSR adults returned to the hatchery this fall and remained in-river to spawn which may also contribute to the low hatchery production this year.
- Distribution of natural CHNSR:

- % of juveniles upstream of the Delta: 97-99%
- % of juveniles in Delta: 1-3%
- % 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:
  - See 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)

#### 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: See Section 4-A: CHNWR population status 8.1.5.1.B i and Section 4-B CHNSR population status 8.1.5.1.B ii.
- 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: 38 CHNWR, 2 CHNSR, 30 CHNFR, 4 CHNLFR (12/7/20 – 12/13/20)
- 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.)*
  - No catch of CESA listed salmon.
- Hatchery release notifications: *List all relevant hatchery release notifications*
  - On December 16, 2020, the USFWS released approximately 140,445 brood year 2020 steelhead from Coleman National Fish Hatchery into the Sacramento River at Sycamore Grove boat ramp in Red Bluff, CA. This release group is 100% marked (adipose fin clip) and has an estimated average fork length of 195 mm.
  - *Note: This information may be deemed relevant as there is a potential emigration influence on CESA listed species present upstream of the Delta.*
- 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 hatchery produced salmon indicated by real-time acoustic tracking of AT/CWT paired releases: Not applicable

- Anticipated emigration to continue into the Delta:
  - CHNWR and CHNSR are distributing and rearing downstream of their spawning grounds. Hydrological and meteorological environmental cues could trigger movement into the Delta.
- Flows in the Sacramento River predicted with upcoming storm events:
  - See Section 3-A: Water operations conditions 8.1.5.1 A. i, iii and the routing analysis below.
- DCC gate position:
  - Closed 12/1/20 until late May 2021 per Reclamation's PA description for DCC gate operations.
- 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 Section 3-A: Water operations conditions 8.1.5.1 A. i, iii and the routing analysis below.
- Precipitation in the forecast for the week and river flows affecting routing into central and interior Delta:
  - Please see Section 3-B: Water Operations Outlook 8.1.5.1 A. ii: Storm Event Projection.
- Routing analysis:
  - STARS analysis was run 12/13/2020 with results presented in Table 2 below. These results are reflective of the latest DCC gate change order and reflect the gate closure through mid-May.

Table 2: STARS Model Output

Date: 12/6/20	DCC	Georgiana Slough	Sacramento River	Sutter and Steamboat Sloughs
Proportion of Entrainment	Not Applicable	30%	45%	25%
Survival	Not Applicable	16%	49%	35%
Travel Time	Not Applicable	18.7 days	11.4 days	12.1 days

- 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:*

Table 3: Historic Migration and Salvage Patterns for unclipped CHNWR and CHNSR averaged from 2005-2019 as reported on SacPAS ([http://www.cbr.washington.edu/sacramento/data/query\\_hrt.html](http://www.cbr.washington.edu/sacramento/data/query_hrt.html)) with associated 95% confidence interval. These values are provided for context only.

Date: 12/13/20	RBDD RST	Tisdale RST	Knights Landing RST	Sac Trawl	Chipps Island Trawl	Salvage
CHNWR	94.70% (92.3-97.1%)	52.60% (28.2-77.0%)	53.1% (28.7-77.6%)	27.8% (1.3-54.2%)	0.6% (-0.7-1.8%)	1.1% (-0.6-2.7%)
CHNSR	20.8% (6.3-35.3%)	14.8% (-7.0-36.6%)	13.2% (-6.1-32.5%)	1.7% (-0.4-3.8%)	0.0% (0.0-0.0%)	0.0% (0.0-0.0%)

- 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.

**Notes:**

The LTO OMR Guidance Document and agenda have been updated and were finalized December 8<sup>th</sup>. The objectives of the SaMT are to assess impacts of operations on salmonids and green sturgeon and provide information to WOMT to reduce impacts. From the ITP perspective the SaMT assesses risk of entrainment in the central and south Delta as well as entrainment into the south Delta export facilities for winter-run and spring-run Chinook salmon. By the end of each SaMT call, clear advice to WOMT or a description of any disagreements will be drafted. This advice or description should be consistent with discussion during the SaMT call. SaMT members should expect to see the following weekly products: Operations Outlook, Reclamation Assessment, Meeting Notes, and ITP Risk Assessment for winter-run and spring-run Chinook salmon.



## Appendix 1: SaMT Monitoring Program Data

Table 4: Fish Monitoring Data for 12/15/20 Meeting. The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length.

Location	GCID RST <sup>1</sup>	Tisdale RST	Knights Landing RST	Beach Seines	Sacramento Trawl	Chippis Is. Midwater Trawl	Mosssdale Kodiak Trawl
Sample Date	12/7-12/13	12/7-12/13	12/8-12/14	12/8, 12/9	12/7, 12/8	12/8, 12/9	Not Available
Fall-run Chinook	6 juveniles	0	0	0	0	0	Not Available
Spring-run Chinook	0	0	0	0	0	0	Not Available
Winter-run Chinook	74 juveniles	0	0	0	0	0	Not Available
Late Fall-run Chinook	0	0	0	0	0	0	Not Available
Chinook (ad-clip)	0	0	0	0	0	0	Not Available
Steelhead (wild)	0	0	0	0	0	0	Not Available
Steelhead (ad-clip)	0	0	0	0	0	0	Not Available
Green Sturgeon	0	0	0	0	0	0	Not Available
Flows (avg. cfs)	284	4,112	4,036	Not Applicable	Not Applicable	Not Applicable	Not Applicable
W. Temp. (avg. °F)	51.6	49.4	49.5	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Turbidity (avg. NTU)	4.9	2.9	1.93	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Table 5: Delta Sturgeon Tagging and Monitoring

Date Range	Comments
12/8/20 and 12/10/20	<ul style="list-style-type: none"> <li>No new tags applied this past week.</li> <li>17 juvenile GS, 1 juvenile WS, and 1 adult WS detected in the Sacramento River north of Sherman Lake.</li> </ul>

<sup>1</sup> GCID running at ½ cone all week.

Table 6: CDFW Adult Monitoring Surveys

Location	American River Carcass Survey	Stanislaus River Carcass Survey
Sample Dates	12/7/20-12/11/20	Not Available
Live Fish	Not Available	Not Available
Redds	Not Available	Not Available
Carcasses	2,190	Not Available
Ad-clipped	846	Not Available
Spawn Condition	Prespawn Mortality: 38% (156/411)	Not Available
Flows (avg. cfs)	1,323	Not Available
W. Temp (avg. °F)	54.1	Not Available

## Appendix 2: Salvage Data

Table 7: SaMT Update. Reporting period is 12/7/20 through 12/13/20. Prepared by Geir Aasen on 12/14/20 at 1346 hours. These are preliminary results and are subject to revision.

Criteria	7-Dec	8-Dec	9-Dec	10-Dec	11-Dec	12-Dec	13-Dec	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>3,2</sup>	0	0	0	0	0	0	0	→	0
SWP daily export (acre-feet)	2,098	1,680	1,679	1,249	1,680	1,680	1,261	↘	1,618
CVP daily export (acre-feet)	1,634	1,651	1,640	1,645	1,637	1,647	1,647	↘	1,643
SWP reduced counts <sup>3</sup>	None	None	None	None	None	None	None	Not Applicable	Not Applicable
CVP reduced counts <sup>4,3</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 8: Chinook salmon weekly salvage and loss combined for both the SWP and the CVP fish collection facilities. Race is determined by LAD on the date of capture. Hatchery origin fish are determined by the lack of adipose fin. Prepared by Geir Aasen on 12/14/20 at 1346 hours. These are preliminary results and are subject to revision.

Category	Salvage <sup>1</sup>	Loss <sup>2</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 9: 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 LAD on the date of capture. Hatchery origin fish are determined by the lack of adipose fin. Prepared by Geir Aasen on 12/14/20 at 1346 hours. These are preliminary results and are subject to revision.

Category	Salvage <sup>54</sup>	Loss <sup>62</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 10: 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 12/14/20 at 1346 hours. These are preliminary results and are subject to revision.

Category	Salvage <sup>54</sup>	Loss <sup>62</sup>	Trend
Wild steelhead	0	0	→
Hatchery steelhead	0	0	→
Total	0	0	Not Applicable

<sup>1</sup> Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time.

<sup>2</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 11: 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 12/14/20 at 1346 hours. These are preliminary results and are subject to revision.

Category	Salvage <sup>1</sup>	Loss <sup>2</sup>	Trend
Wild steelhead	0	0	→
Hatchery steelhead	0	0	→
Total	0	0	Not Applicable

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<sup>1</sup> Salvage is equal to the estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time.

<sup>2</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.