Weekly Assessment of CVP and SWP Delta Operations on ESA-listed Species

1. Executive Summary

a. Operations anticipated during the week

See Weekly Fish and Water Operation Outlook document for January 19 – January 25

b. Winter-run Chinook Salmon summary

No loss of natural winter-run Chinook salmon (LAD) has occurred in the past week at the State or Federal fish salvage facilities. Loss of natural winter-run Chinook salmon at the Central Valley Project (CVP) and State Water Project (SWP) fish collection facilities is unlikely to occur over the next week. 30-60% of juvenile natural winter-run Chinook salmon from brood year (BY) 2020 are estimated to be present in the Delta. This percentage is likely to increase due to anticipated light precipitation later this week and the maturation of juveniles for this time of year. In addition, releases of hatchery late fall-run Chinook salmon may encourage movement of fish downstream in conjunction with hatchery fish movements. Adult winter-run Chinook salmon are entering the Delta based on historical information.

c. Spring-run Chinook salmon summary

No loss of natural Central Valley (CV) YOY spring-run Chinook salmon has occurred in the past week at the State and Federal fish salvage facilities (Figure 1, Figure 2). Loss of Central Valley spring-run Chinook salmon at the CVP and SWP fish collection facilities is unlikely to occur over the next week. 10-20% of spring-run Chinook salmon are estimated to be in the Delta. This percentage is likely to increase due to anticipated light precipitation later this week. There is a low likelihood that juvenile natural spring-run Chinook salmon from BY 20 are near the DCC gates based on regional monitoring data. YOY spring-run Chinook salmon are nearing the end of emergence from the gravel and are rearing and beginning to move downstream. Yearling spring-run are being detected in the Butte Creek rotary screw trap (RST) and the fyke trap at Parrot Phelan Dam and flow conditions are suitable based on tributary flows in Mill and Deer creeks to stimulate the movement in Sacramento River tributaries. Yearling spring-run Chinook salmon were released on 12/3/2020 from the SCARF facility. The production release of late fall-run Chinook salmon occurred on 1/4/21, with the first group of spring-run Chinook salmon surrogates released four days later, on 1/8/2021 from the Coleman National Fish Hatchery (NFH) facility in Battle Creek. One clipped Chinook salmon was observed at the CVP on 1/18/2021.

d. **Central Valley Steelhead summary**

Loss of natural California CV (CCV) steelhead occurred through 1/14/2021 at the State and Federal fish salvage facilities (2.72 fish on 1/11/2021, the first steelhead of WY 2021; Figure 3, Figure 4). Loss of CCV steelhead at the Central Valley Project (CVP) and State Water Project (SWP) fish collection facilities may occur over the next week. 10-20% of juvenile CCV Steelhead are estimated to be present in the Delta. This percentage is likely to increase due to anticipated light precipitation later this week. Approximately 415,000 hatchery fish were released at Red Bluff since middle of December and an additional 216,500 were

released between 12/28/2020 and 12/29/2020. This is expected to stimulate natural origin fish movement as well. Spawning of adult steelhead is likely occurring in the tributaries.

e. **Green Sturgeon summary**
No loss of green sturgeon has occurred in the past week at the State and Federal fish salvage facilities. Loss of green sturgeon at the Central Valley Project (CVP) and State Water Project (SWP) fish collection facilities is unlikely to occur over the next week. Green sturgeon are more likely to be salvaged during the summer although salvage may occur at any time of year.

f. **Delta Smelt summary**
Based on distribution patterns over the past decade and one recent detection, Delta Smelt are unlikely to be prevalent in the South Delta. Limited detection data support Delta Smelt being present in Suisun Marsh, west of the Sacramento-San Joaquin confluence, and in the Sacramento Deep Water Ship Channel. The distribution of Delta Smelt is expected to extend upstream of the confluence which is supported by historical Spring Kodiak Trawl data analysis. Precipitation is anticipated, and changes to the Freeport flows and turbidity are not expected to reach "First Flush" conditions within the next seven days. The likelihood of Delta Smelt adult entrainment is slightly elevated relative to the previous seven days due seasonal timing. The overall probability of Delta Smelt moving into the south Delta is low. The projected OMR Index limits are at a level that is sufficiently protective. The wind driven turbidity in the central delta has not reached Old River at Bacon Island (OBI) as 1/19/2021. On 1/15/2021, a Delta Smelt was collected in the Sacramento Deep Water Ship Channel for use as FCCL broodstock.

g. **Monitoring Teams summary**
There were no non-consensus issues to report from the Salmon Monitoring Team.
There were no non-consensus issues to report from the Smelt Monitoring Team.

2. Operational and Regulatory Conditions

See Weekly Fish and Water Operation Outlook document for January 19 – January 25.

3. Biology, Distribution, and Evaluation

Winter-run Chinook salmon, Spring-run Chinook salmon, Central Valley Steelhead

POPULATION STATUS

Winter-run Chinook salmon

- **Delta Life Stages**:
  - Juveniles, Adults
- **Brood Year 2020 Productivity:**
  - Natural winter-run Chinook salmon: Preliminary interim juvenile production estimate (JPE) calculations were established for brood year (BY) 2020 winter-run Chinook salmon. The finalized estimate from the Winter-run JPE PWT for total natural production entering the Delta (JPE) is 330,130 winter-run Chinook salmon individuals. NMFS will issue a final winter-run JPE letter to the CVP and SWP shortly. The agencies in the SaMT have previously discussed the thiamine vitamin deficiency that is being observed again in broodstock at the Livingston Stone

National Fish Hatchery (NFH) similar to last year's observations. Last year the thiamine deficiency appeared to negatively affect survival of juvenile fish as they migrate downstream towards the Delta. Estimated winter-run Chinook salmon passage at Red Bluff Diversion dam (RBDD) is greater than recent years (BY 2014 – 2018) with the exception of BY 2019. By 1/14/2021, 1,972,734 winter-run Chinook salmon were estimated to have passed RBDD compared to a cumulative passage of 3,781,229 winter-run Chinook salmon RBDD on 1/14/2020.

- Few observations of natural winter-run Chinook salmon from brood year 202 (BY 2020) have been observed downstream of the Glenn-Colusa Irrigation District's (GCID) monitoring location this water year.
- Hatchery winter-run Chinook salmon: No hatchery winter-run Chinook salmon have been released in WY 2021 to date. Preliminary estimate for the hatchery JPE released into the Sacramento River from Livingston Stone NFH is 97,588 fish.

<u>Spring-run Chinook salmon</u>

- **Delta Life Stages:**
  - Young-of-year (YOY) and Yearlings
  - First hatchery releases of yearling spring-run Chinook salmon from the SCARF facility occurred on 12/3/2020
  - First hatchery releases of yearling spring-run Chinook salmon surrogates from Coleman NFH facility occurred on 1/8/2021.
- **Brood Year 2020 Productivity:**
  - Natural spring-run Chinook salmon: No JPE has been established for spring-run Chinook salmon. Approximately 20.5% of the juvenile spring-run sized Chinook salmon population for BY 20 is expected to have passed passing Red Bluff Diversion dam as of 1/18 (see Ops Outlook) based on historical data.
  - Hatchery spring-run Chinook salmon surrogates: First hatchery releases of yearling spring-run Chinook salmon surrogates in WY 2021 from Coleman NFH facility occurred on 1/8/2021.
  - The agencies in the SaMT discussed the thiamine vitamin deficiency that is also currently being observed again in winter-run Chinook salmon broodstock at the Livingston Stone NFH similar to last year's observations. Last year the thiamine deficiency appeared to negatively affect survival of juvenile fish as they migrate downstream towards the Delta. The thiamine deficiency issue is also likely impacting spring-run Chinook salmon. The Feather River Fish Hatchery experienced issues with infertile males. It is expected that the Feather River Hatchery will only meet about half of their production goals. On the Feather River, a larger than historical number of spring-run adults that entered the system and were tagged appear to be spawning in-river instead of returning to the hatchery. This is one reason that low returns are being observed at the hatcheries.

<u>Central Valley Steelhead</u>

- **Delta Life Stages**:
  - Spawning Adults, Kelts, Juveniles
- **Brood Year 2020 Productivity:**
  - Spawner abundance: There is limited information about the adult steelhead population. It is estimated to be small, contributing to the limited productivity of the population.

- Natural steelhead: No JPE has been established for steelhead. Data are limited.
- Hatchery steelhead: Reclamation's Proposed Action has no hatchery steelhead triggers.
- Approximately 415,000 steelhead from Coleman NFH were released at Red Bluff in the first half of December, part of the CCV Steelhead DPS.
- Approximately 216,500 steelhead from Coleman NFH were released into the Sacramento River from December 28-29, 2020, which are part of the CCV Steelhead DPS.

DISTRIBUTION

Winter-run Chinook Salmon

- **Current Distribution:**
  - On 1/19/2021, SaMT estimated 30-60% of juvenile winter-run Chinook salmon were present in the Delta (Table 1). In October, the GCID RSTs observed 583 winter-run Chinook salmon juveniles (by length at date criteria) in their daily catches. In November, the GCID RSTs observed 138 winter-run Chinook salmon juveniles (by length at date criteria) in daily catches. In December, the GCID RSTs have observed 246 winter-run Chinook salmon juveniles (by length at date criteria) in daily catches. In January (through 1/18/2021), the GCID RSTs have observed 34 winter-run Chinook salmon juveniles (by length at date criteria) in daily catches. Since few winter-run Chinook salmon have been observed in RST monitoring locations farther downstream (0 at Tisdale 1/11/2021 – 1/13/2021; 2 at Knights Landing 1/11/2021 – 1/18/2021), the fish appear to still be holding in the middle reaches of the Sacramento River.
  - Catch indices are calculated daily for juvenile winter-run Chinook salmon observed in RSTs at Knights Landing (Knights Landing Catch Index, KLCI) and Sacramento Trawl and Beach Seine (Sacramento Seine Catch Index, SCI Trawl and SCI Beach Seine) monitoring locations (Table 2). No catch indices for juvenile salmonid migration were triggered during the past week.
  - Mean daily flow and percent change (Wilkins Slough (WLK), Deer Creek (DCV), Mill Creek (MLM); cfs from CDEC) and temperature and percent change (Knights Landing RST (KL); °F from RST) are monitored as alerts for juvenile salmonid migration (Table 3). Mill Creek and Deer Creek alerts for juvenile salmonid migration were triggered 7 of the 7 days during the past week.
- **Historic Trends**
  - Based on historical trends in salvage, 19.8% of winter-run Chinook salmon should have been observed in salvage by this time of the water year (Table 4). If historic trends in salvage were to continue winter-run Chinook salmon loss is expected to remain the same over the next week (Figure 1, Figure 2). Hatchery winter-run Chinook salmon have not been released into the Sacramento River in WY 2021.
- **Forecasted Distribution within Central Valley and Delta regions**
  - Movement of winter-run Chinook salmon juveniles into the lower reaches of the Sacramento River and upper Delta are likely to increase with precipitation events and increasing river flows and turbidity. However, the agencies in the SaMT do not believe that significant precipitation events are likely to occur over the next week (see Ops Outlook) but given the seasonal timing (mid-January) any precipitation during a very dry period may stimulate fish movement. Furthermore, based on the time of year, and the maturation of juvenile fish, downstream migration is expected to continue even without any substantial precipitation events occurring. The STARS model projects route-specific proportion of entrainment, survival, and travel times

(Table 5). This model does not estimate entrainment into the lower Sacramento River sloughs (i.e. Three-Mile Slough). The DCC gates were closed 12/1/20 and are expected to remain closed through mid-May 2021. There may be a need to open the DCC gates to meet D-1641 water quality standards (see Operations Outlook document).
    - Anticipated light to moderate precipitation this week in the northern Sacramento Valley should stimulate fish movement.
    - The entrainment tool estimates a median loss of 0 fish and a maximum loss of 9 fish during this week (SacPAS last updated on 1/13/21).

Spring-run Chinook salmon

- **Current Distribution**
    - On 1/19/2021 SaMT estimated 10-20% of juvenile CV spring-run Chinook salmon were present in the Delta (Table 1). Mill Creek and Deer Creek flows were recorded higher than 95 cfs seven times over the past week (1/11/2021 – 1/17/2021; Table 3). This is indicative that yearling spring-run Chinook salmon may begin to move out of tributaries into the mainstem Sacramento River, yearling spring-run Chinook salmon have also been detected in the Butte Creek monitoring locations. No unmarked spring-run Chinook salmon were observed at the Knights Landing RST or Tisdale RST in the past week.
    - No juvenile young-of-year CV spring-run Chinook salmon (LAD) have been observed near the DCC gates. Yearling CV spring run Chinook salmon may be migrating downstream based on increased flows in the Sacramento River tributaries and have been observed at the Butte Creek monitoring locations. Historical monitoring data does not detect YOY spring-run Chinook salmon in the Delta at this time. Mill Creek and Deer Creek flows were greater than 95 cfs seven days during the past week indicating that downstream migration of yearling spring-run Chinook salmon may occur soon.
    - One clipped Chinook salmon was observed at the CVP on 1/18/2021.
- **Historical Trends**
    - Based on historical trends in salvage, 0% of spring-run Chinook salmon should have been observed in salvage by this time of the water year (Table 4). If historic trends in salvage were to continue spring-run Chinook salmon loss is expected to remain the same over the next week. Spring-run surrogate Chinook salmon were released into the Sacramento River at Battle Creek 1/8/2021. Release Group 2 and Release Group 3 may be held at Coleman NFH facility through 2/12/2021.
- **Forecasted Distribution within Central Valley and Delta regions**
    - Movement of juvenile spring-run Chinook salmon into the lower reaches of the Sacramento River and upper Delta are likely to occur with precipitation events and increasing river flows and turbidity (see Weekly Fish and Water Operation Outlook document).
    - Anticipated light to moderate precipitation this week in the northern Sacramento Valley should stimulate fish movement.

Central Valley Steelhead

- **Current Distribution**
    - On 1/19/2021 SaMT estimated 10-20% of juvenile CCV steelhead were present in the Delta (Table 1).
- **Historical Trends**

- Based on historical trends in salvage, 6.3% of juvenile CCV steelhead should have been observed in salvage by this time of the water year. If historic trends in salvage were to continue juvenile CCV steelhead loss is expected that it may increase over the next week.

- **Forecasted Distribution within Central Valley and Delta regions**
  - No juvenile Central Valley steelhead have been observed near the DCC gates in regional monitoring efforts and historical monitoring data does not detect juvenile steelhead in the Delta at this time. Three hatchery steelhead were observed at Knights Landing this past week (1/11/2021 – 1/18/2021). SaMT estimated that 10-20% of the population of CCV steelhead may be present in the Delta at this time. Closure of the DCC gates would reduce exposure and possible entrainment of juvenile CCV steelhead into the interior Delta via the DCC gates. The first steelhead in salvage for WY 2021 occurred 1/11/2021 at the CVP (Figure 3, Figure 4).
  - Anticipated light to moderate precipitation this week in the northern Sacramento Valley stimulate fish movement.
  - The entrainment tool predicts a median loss of 0 fish will occur with a maximum loss of 16 fish (SacPAS last updated on 1/13/21).

TABLE 1. Distribution estimates

Location	**Yet to Enter Delta**	**In the Delta**	**Exited the Delta (Past Chipps Island)**
Young-of-year (YOY) winter-run Chinook salmon	40-70%	30-60%	0%
YOY spring-run Chinook salmon	80-90%	10-20%	0%
YOY hatchery winter-run Chinook salmon	N/A	N/A	N/A
Natural origin steelhead	80-90%	10-20%	0%

TABLE 2. Catch indices for juvenile winter-run Chinook salmon observed in RSTs at Knights Landing (Knights Landing Catch Index, KLCI) and Sacramento Trawl and Beach Seine (Sacramento Seine Catch Index, SCI Trawl and SCI Beach Seine) monitoring locations

Date	KLCI Winter Chinook	KLCI Older Chinook	SCI Trawl	SCI Beach Seines	Trigger Exceeded: Catch Index ≥ 5	Trigger Exceeded: Catch Index $3 < X \leq 5$
1/17/2021	0	0	0			
1/16/2021	0	0	0			
1/15/2021	0.869	0.869				
1/14/2021	0.94	0.94				
1/13/2021	0.94	0.94				
1/12/2021	0	0				
1/11/2021	0	0				

TABLE 3. Mean daily flow and percent change (Wilkins Slough (WLK), Deer Creek (DCV), Mill Creek (MLM); cfs from CDEC) and temperature and percent change (Knights Landing RST (KL); °F from RST)

Date	MLM mean daily flow (cfs)	MLM flow % change	MLM Alert	DCV mean daily flow (cfs)	DCV flow % change	DCV Alert	WLK mean daily flow (cfs)	KL water temp (°F)	WLK-KNL: Alert
1/17/2021	119.5	-1.4%	Flow>95 cfs	119.0	-2.3%	Flow>95 cfs	4830.4		
1/16/2021	121.2	-4.2%	Flow>95 cfs	121.8	-6.2%	Flow>95 cfs	4984.8	51.4	
1/15/2021	126.5	-13.3	Flow>95 cfs	129.8	-10.9%	Flow>95 cfs	4780.5	51.1	
1/14/2021	145.8	26.1%	Flow>95 cfs	145.8	27.8%	Flow>95 cfs	4478.4	50.6	
1/13/2021	115.7	3.8%	Flow>95 cfs	114.1	4.9%	Flow>95 cfs	4669.9	49.9	
1/12/2021	111.4	-1.5%	Flow>95 cfs	108.8	-3.7%	Flow>95 cfs	4792.6	49.1	
1/11/2021	113.2	-2.5%	Flow>95 cfs	113.0	-3.6%	Flow>95 cfs	4835.7	48.7	

TABLE 4. Historic migration and salvage patterns.

Date (1/18)	Red Bluff Diversion Dam	Tisdale RST	Knights Landing RST	Sac Trawl (Sherwood) Catch Index	Chipps Island Trawl Catch Index	Salvage
Chinook, Winter-run, Unclipped	97.3% (95.3%,99.4%) BY: 2011 - 2019	73.0% (43.5%,102.5 %) BY: 2011 - 2019	70.0% (40.3%,99.6%) BY: 2011 - 2019	37.7% (8.7%,66.7%) BY: 2011 - 2019	2.5% (-1.3%,6.4%) BY: 2011 - 2019	19.8% (3.2%,36.4%)
Chinook, Spring-run, Unclipped	20.5% (5.3%,35.6%) BY: 2011 - 2019	34.6% (2.0%,67.1%) BY: 2011 - 2019	23.4% (-3.0%,49.7%) BY: 2011 - 2019	4.6% (-3.4%,12.5%) BY: 2011 - 2019	0.0% (0.0%,0.0%) BY: 2011 - 2019	0.0% (-0.0%,0.0%)
Steelhead, Unclipped (Dec – March)						6.3% (-4.8%,17.4%)

TABLE 5. STARS model output

Date (1/15)	DCC	Georgiana Slough	Sacramento River	Sutter and Steamboat
Proportion of Entrainment	NA	31%	44%	24%
Survival	NA	15%	49%	36%
Travel Time	NA	18.8 d	11.4 d	11.8 d

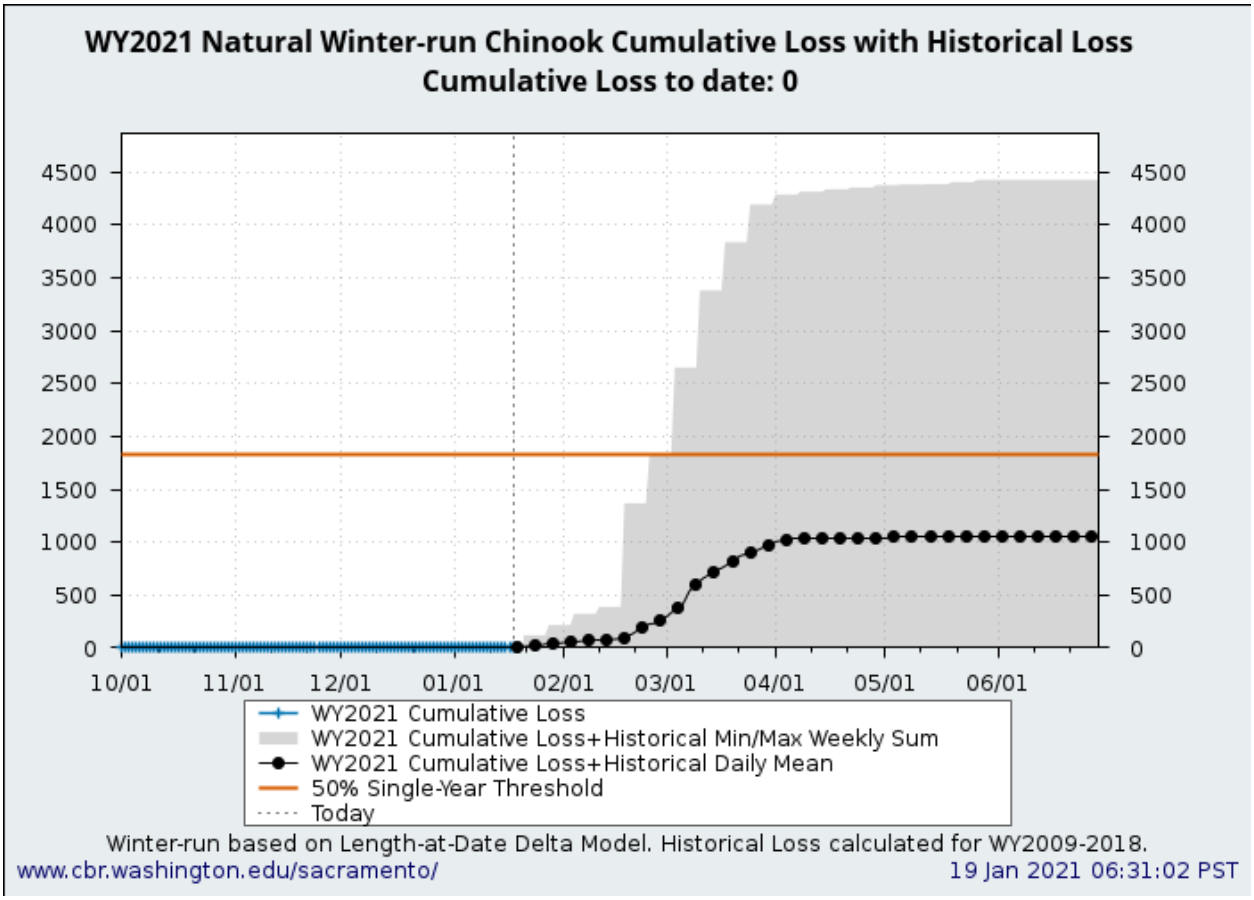

FIGURE 1. WY2021 natural winter-run Chinook salmon cumulative loss values through salvage season. Values depicted are not genetically corrected. No loss has occurred in WY2021. Based on historical cumulative loss values from 2009 – 2018, WY2021 observed loss (and potential future loss) are not likely to exceed the 50% loss threshold this week.

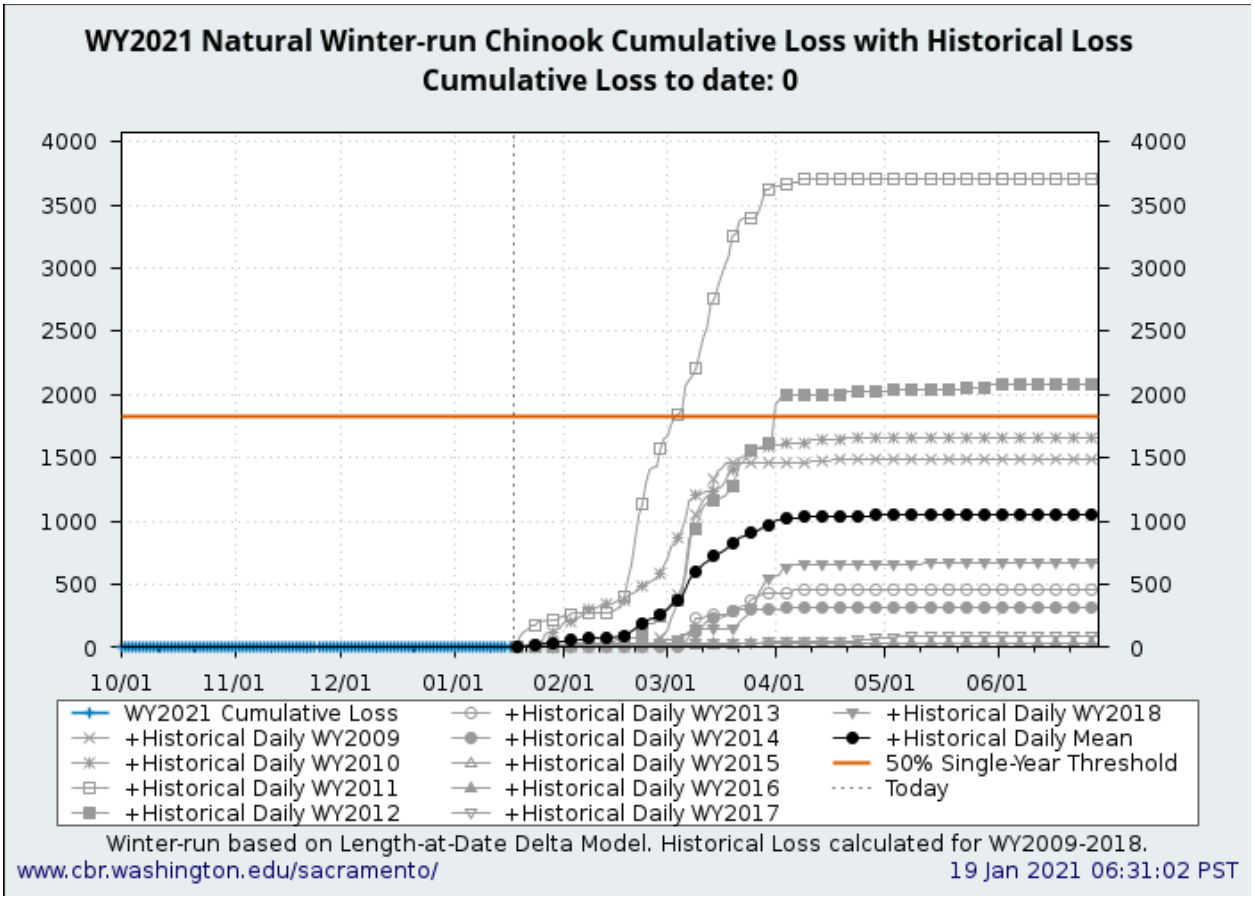

FIGURE 2. Daily natural winter-run Chinook salmon loss accumulates towards single-year loss threshold. Based on historical cumulative loss values from 2009 – 2018, WY2021 observed loss (and potential future loss) are not likely to exceed the 50% loss threshold this week.

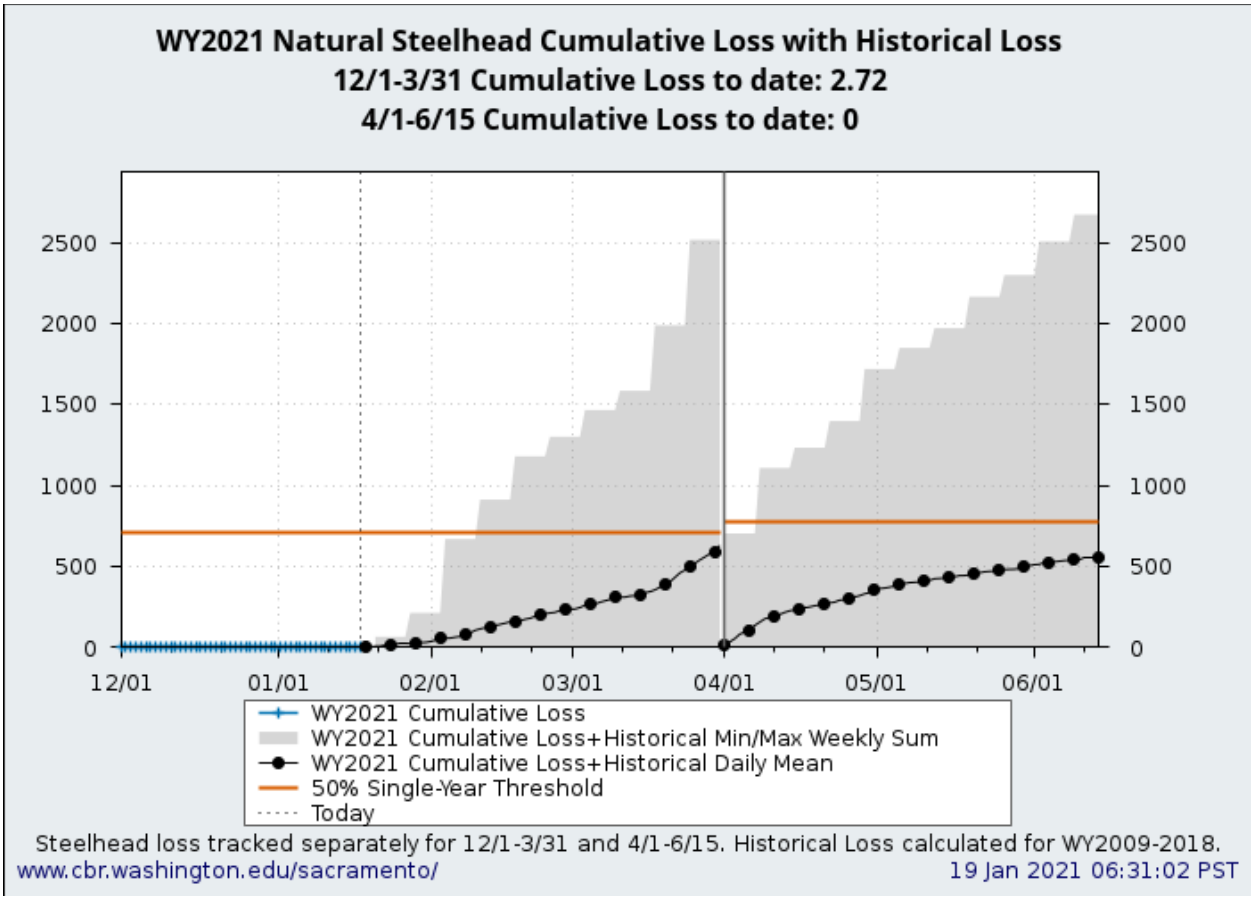

FIGURE 3. WY2021 natural steelhead cumulative loss values through salvage season: December 1 – March 31, April 1 – June 15. Based on historical cumulative loss values from 2009 – 2018, WY2021 observed loss (and potential future loss) are not likely to exceed the 50% loss threshold this week. The first steelhead loss occurred 1/18/2021.

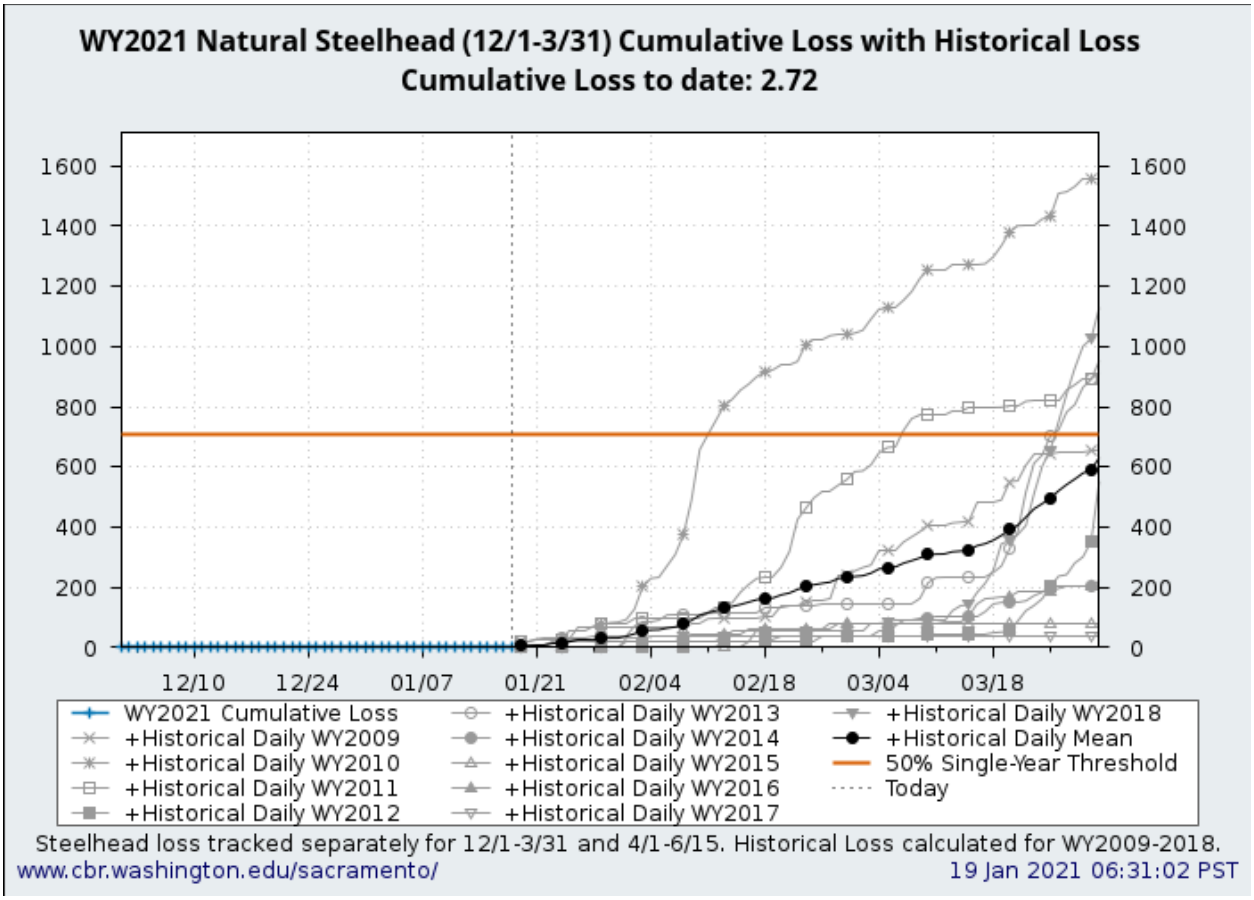

FIGURE 4. Daily natural steelhead loss accumulates towards single-year loss threshold: December 1 – March 31. Based on historical cumulative loss values from 2009 – 2018, WY2021 observed loss (and potential future loss) are not likely to exceed the 50% loss threshold this week.

EVALUATION

1. **After January 1, are more than 5% of juveniles from one or more salmonid species present in the Delta?**
   Greater than 5% of juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead are likely present in the Delta.
2. **Does the operational outlook's ranges impact fish movement and change the potential distribution of fish?**
   i. **Potential effects within the 7 days (near-term) in the operations outlook.**
   It appears that there is an increased risk of salmonids being exposed to export facilities and OMR flow is expected to remain at or below -5,000 cfs this upcoming week. The SaMT anticipates an increased number of salmonids entering the Delta currently due to hatchery steelhead and yearling spring-run Chinook salmon surrogate releases and the forecast for slight to moderate precipitation occurring later in the week.
   ii. **Potential effects longer than the 7 days (longer-term) in the operations outlook.**

The members of SaMT are not confident in projecting beyond 7 days due to uncertainty regarding weather forecasting. Precipitation is forecasted for later this week, and again in the middle of next week. Furthermore, if current trends were to continue then it is anticipated that more fish may appear at export facilities as fish begin to outmigrate based on historical trends.

3. **What is the likelihood of increased loss exceeding the next annual loss threshold (50%, 75% or 90% of threshold) resulting in OMR management actions based on population distribution, abundance, and behavior of fish in the Delta?**
   Reduced exports at the facilities reduces risk of entraining ESA-listed species.
   Winter-run Chinook salmon
   Total juvenile winter-run Chinook salmon (LAD) loss is 0 fish (as of 1/18/2021). The agencies in the SaMT assessed the likelihood of exceeding the next annual loss threshold and believe that loss occurring in the next week is unlikely to lead to exceedance of the 50% single-year loss threshold.
   Spring-run Chinook salmon
   Total juvenile spring-run Chinook salmon (LAD) loss is 0 fish (as of 1/18/2021). The first group of yearling spring-run surrogate Chinook salmon hatchery fish were released 1/8/2021 in Battle Creek.
   Central Valley Steelhead
   Total juvenile steelhead loss is 2.72 fish (as of 1/18/2021). The first steelhead of the season was salvaged 1/11/2021 but the agencies in the SaMT assessed the likelihood of exceeding the next annual loss threshold and believe that loss occurring in the next week is unlikely to lead to exceedance of the 50% single-year loss threshold.
4. **If an annual loss threshold has been exceeded, do continued OMR restrictions benefit fish movement and survival based on real-time information?**
   Winter-run Chinook salmon
   The annual loss threshold for winter-run Chinook salmon has not been exceeded in WY 2021.
   Spring-run Chinook salmon
   The annual loss threshold for spring-run Chinook salmon has not been exceeded in WY 2021.
   Central Valley Steelhead
   The annual loss threshold for steelhead (December 1 – March 31) has not been exceeded in WY 2021.
5. **If OMR is more negative than -5,000 cfs are there changes in spawning, rearing, foraging, sheltering, or migration behavior beyond those anticipated to occur under OMR management at -5,000 cfs?**
   OMR index levels in the upcoming week are not anticipated to be more negative than -5,000 cfs.

Green Sturgeon

POPULATION STATUS

- **Delta Life Stages:**
  - Adults and Juveniles
- **Juvenile Abundance:**
  - No empirical estimates of the juvenile population (ages 0 – 3) in the Delta are available. Information about their rearing and distribution patterns within the Delta is limited. In 2019, 73 larval green sturgeon and six juvenile green sturgeon were observed at the Red Bluff Diversion Dam fish monitoring RSTs in the upper Sacramento River. In WY 2019, no green sturgeon were observed at the Delta fish salvage facilities. In WY 2020, two green were caught at the Delta fish salvage facilities (salvage = 8).

DISTRIBUTION

- **Current Distribution**
    - Juvenile and adult green present in the San Joaquin and Sacramento rivers and Delta during the next week. Acoustically tagged green sturgeon have been detected and remain in the vicinity of Sherman Island.

- **Historical Trends**
    - Juvenile and adult green sturgeon are historically present in the San Joaquin and Sacramento rivers and Delta.

- **Forecasted Distribution within Central Valley and Delta regions**
    - Juvenile and adult green sturgeon are present in the San Joaquin and Sacramento rivers and Delta during the next week.

EVALUATION

1. **Is there likely to be salvage that may exceed the annual loss limit?**
   Currently, green sturgeon salvage is 0 fish (as of 1/3/2021). No salvage of green sturgeon has occurred in the past week at the CVP and SWP fish salvage facilities. The agencies in the SaMT assessed the likelihood of salvage occurring in the next week is unlikely to occur.

Delta Smelt

POPULATION STATUS

- **Delta Smelt Life Stages:**
    - Adult
- **Brood Year 2020:**
    - **Abundance estimate**: The most recent population abundance estimate for Delta Smelt was 1,057. This estimate was calculated from the sampling between 1/04/2021-1/8/2021. The last Delta Smelt to contribute to the abundance estimate was collected on 1/6/2021. It was a 51 mm, juvenile Delta Smelt with no expression was collected in the Sacramento Deep Water Ship Channel by EDSM. Prior to this EDSM last collected a juvenile Delta Smelt (57mm) on 11/9/2020 in the Suisun Marsh stratum. The most recent collection of Delta Smelt was on 1/15/2021 for FCCL broodstock. In order to reduce handling stress broodstock collections do not take additional data such as length or expression and are treated as adults in this assessment.
    - **Biological Conditions**: The Smelt Monitoring Team discussed the most recent monitoring data (Table 4) and considered professional opinion on the historical trends in regional distribution. Based on those discussions, the agency participants on SMT estimate Delta Smelt subadult/adults should be holding in the Suisun Marsh and west of the Sacramento-San Joaquin confluence in anticipation of migration but analysis of historic Spring Kodiak Trawl (SKT) supports Delta Smelt distribution above the confluence and less tightly correlated to X2 position (available upon request from USFWS) They are also present in the Sacramento Deep Water Ship Channel.

DISTRIBUTION

- **Current Distribution**

- Real time detection data is currently limited to EDSM sampling, and SLS. Due to the low number of detections of Delta Smelt, the SMT is also closely monitoring FCCL Broodstock Collections to inform distribution estimates. Since there are only two recent detections, the Smelt Monitoring Team's capacity to estimate where Delta Smelt are within the Delta is limited. .
- The last Delta Smelt detection was Delta Smelt on 1/15/2021 in the Sacramento Deep Water Ship Channel as part of the FCCL broodstock collections. Larval sampling is not being conducted at the state or federal salvage facilities.

TABLE 6. Summary of recently reported detections of Delta Smelt by Region and Salvage Facilities between 1/12/2021 and 1/19/2021. Start and End dates reflect period of time between updates to SMT. Regional categories are determined from EDSM sampling. Delta Smelt >58mm FL are considered adults.

Life Stage	North	South	West	Far West	Salvage
Adult	1	0	0	0	0
Larvae/Juvenile	0	0	0	0	0

TABLE 7. Summary of recent Delta Smelt detections reported since last assessment and the total detections for the current water year. Notes reflect latest information on reported detections or completion of survey for the water year and include both larval and adult detections.

Sampling Method	New Detections	WY2021	Notes
EDSM	0	2	Phase 1 begins 11/30/20 Last Detection: 1/6/2021
SKT	0		SKT. 01/5-8/2021
SLS	0	0	Survey 1:Processing Survey 2 begins : 1/25/2021
20-mm	0	0	Begins: March
Bay Study	0	0	Suspended due to COVID-19 restrictions
FMWT	0	0	Ended 12/15/2020
Chipps Island Trawl	0	0	5 day per week sampling began 12/7/2020 Ends: mid-May. See Attachment A
Brood Stock Collections	1	1	Last Catch: 1/15/2021

- **Historical Trends**
  - Based on historical analysis of SKT, the centroid of Delta Smelt distribution is anticipated to be above the Sacramento-San Joaquin confluence but less closely correlated to X2 which is currently estimated to be at 92 km..
  - The recent Delta Smelt detection in the Deep Water ship channel is upstream of the confluence, but may be a freshwater resident and not representative of the migratory life history patterns in Delta Smelt (Hobbs 2019).

- **Forecasted Distribution within Central Valley and Delta regions**

- Delta Smelt distribution is not expected to change in the next seven days since first flush conditions that would trigger migration are not anticipated. However, predicting the distribution is currently difficult because detection data is limited to one individual and historic patterns may not be representative of the low population levels of Delta Smelt.

ABIOTIC CONDITIONS

- **Turbidity**
  - Precipitation is anticipated in the next seven days, and changes in Freeport flows and turbidity (Table 8) that would create "First Flush" conditions are not expected by the agency representatives of the SMT. High winds occurred over the weekend and are expect through 1/20/2021 which have increased turbidity at in Frank's Tract and Holland Cut. The area of high turbidity has not reached OBI as of 1/19/2021 but will be monitored by the SMT. TABLE 8. Relevant Environmental Factors to the current management actions for Delta Smelt.

Date Reported	FPT 3 Day Running Avg. of Daily Flows (cfs)	FPT 3 Day Running Avg. of Turbidity (FNU)
1/19/2021	8461	4.97

- **X2 Conditions**
  - X2 is estimated to be greater than 10 km upstream of the confluence of San Joaquin and Sacramento Rivers.
- **Other Environmental Conditions**
  - The Smelt Monitoring Team expects environmental conditions for the next seven days to remain stable with continued seasonally decreasing temperatures.
  - The Fish and Water Operation Outlook OMR Index values are expected to range between –1,000 to –3,500 cfs between 1/12/2021 and 1/19/2021. .
  - Real time tracking of environmental conditions, relevant thresholds and Delta Smelt catch data are updated daily at: http://www.cbr.washington.edu/sacramento/workgroups/delta_smelt.html

EVALUATION

1. **Between December 1 and January 31, has any first flush condition been exceeded?**

   The running 3-day average flows and running 3-day average turbidity at Freeport (Table 8) have not exceeded the triggers for "First Flush" conditions. Based on the forecasted weekend storm's predicted amount of rain, "First Flush" conditions are not expected in the next seven days.

2. **Do DSM have a high risk of migration and dispersal into areas at high risk of future entrainment? (December 1- January 31)**

   Based on distribution patterns over the past decade and one recent detection , Delta Smelt are unlikely to be prevalent in the South Delta. The detection on 11/9/2020 supported Delta Smelt being present in Suisun Marsh and west of the Sacramento-San Joaquin confluence. The most recent detections on 1/6/2021 and 1/15/2021 supports a presence of the species in the Sacramento Deep Water Ship Channel, but may represent the freshwater resident population and not representative of the migratory life history pattern. Based on historical analysis of SKT, the centroid of Delta Smelt distribution is anticipated to be above the confluence of the Sacramento-San Joaquin confluence, and less tightly correlated to the X2 which is currently estimated to be at 94 km . Since "First Flush" conditions are not expected to be met within the next seven days, it is unlikely that Delta Smelt will migrate into areas with a high risk of entrainment. The range of OMR values is expected to be -1,000 to –3,500 cfs and

QWEST is expected to be negative . As the season progresses, the risk that Delta Smelt may migrate even if "First Flush" conditions are not met will increase.

3. **Has a spent female been collected?**
   This question is not applicable until Turbidity Bridge Avoidance begins.

4. **If OMR of -2000 does not reduce OBI turbidity below 12NTU/FNU, what OMR target is deemed protective between -2000 and -5000?**
   This question is not applicable until Turbidity Bridge Avoidance begins.

5. **If OBI is 12NTU, what do other station locations show?**
   This question is not applicable until Turbidity Bridge Avoidance begins.

6. **If OBI is 12NTU, is a turbidity bridge avoidance action not warranted? What is the supporting information?**
   This question is not applicable until Turbidity Bridge Avoidance begins.

7. **After March 15 and if QWEST is negative, are Larval or juvenile DSM within the entrainment zone of the CVP and SWP pumps based on surveys?**
   This question is not applicable until March 15th.

8. **Based on real-time spatial distribution of Delta Smelt and currently available turbidity information, what is the OMR level between -3,500 and -5,000 cfs that manages weekly entrainment in the context of annual larval and juvenile entrainment levels?**
   This question is not applicable until March 15th.

9. **What do hydrodynamic models, informed by EDSM or other relevant data, suggest the estimated percentage of larval and juvenile DSM that could be entrained may be?**
   This question is not applicable until March 15th.

DELTA SMELT REFERENCES

Hobbs, J. A., Lewis, L. S., Willmes, M., Denney, C., & Bush, E. (2019). Complex life histories discovered in a critically endangered fish. Scientific Reports, 9(1). https://doi.org/10.1038/s41598-019-52273-8