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 June 1 – June 7.
Beginning 6/1/2021 the SaMT will begin to monitor criteria to end OMR Management.

b. Winter-run Chinook Salmon summary

No loss of natural winter-run Chinook salmon (LAD) occurred in the past week at the Facilities. No loss of natural winter-run Chinook salmon at the Facilities is likely to occur over the next week. 0-1% of juvenile natural winter-run Chinook salmon from brood year (BY) 2020 are estimated to be present in the Delta. An estimated 98-100% have exited the Delta. The majority of winter-run Chinook salmon are believed to have exited due to behavioral cues from other runs and maturation stage. Acoustic tagged hatchery winter-run Chinook salmon have not been detected entering the Delta and moving past Benicia for several weeks, signifying that this portion of the population is no longer in the system.

c. Spring-run Chinook salmon summary

No loss of natural Central Valley (CV) YOY spring-run Chinook salmon (LAD) has occurred in the past week at the Facilities. Loss of young of year Central Valley spring-run Chinook salmon at the Facilities is likely to occur over the next week. 5-15% of spring-run Chinook salmon are estimated to be in the Delta. 80-95% have exited the Delta. This percentage is likely to increase due to behavioral cues from other runs and maturation stage.

d. Central Valley Steelhead summary

No loss of natural California CV (CCV) steelhead occurred in the past week at the Facilities. Loss of CCV steelhead at the Facilities may occur over the next week and was reset to 0 fish as of April 1 to begin the April 1 through June 15 period. 5-10% of juvenile CCV Steelhead are estimated to be present in the Delta. An estimated 85-95% have exited the Delta. This percentage is likely to increase due to maturation stage and behavioral cues from hatchery releases.

e. Green Sturgeon summary

Loss of green sturgeon at the Facilities is unlikely to occur over the next week due to their rare presence in the South Delta.

f. Delta Smelt summary

Based on distribution patterns over the past decade and rare detections in this water year, Delta Smelt are unlikely to be prevalent in the South Delta. Limited detection data support Delta Smelt being present in Lower Sacramento and in the Sacramento Deep Water Ship Channel. The likelihood of Delta Smelt adult entrainment is low due to seasonal timing. The likelihood of larval entrainment is decreasing compared to the previous seven days due to warming temperatures and seasonal timing. The most recent detections of a Delta Smelt were in the Deep Water Ship channel (8) and the Lower Sacramento stratum (1). The less negative OMR Index values decrease the potential for entrainment of Delta Smelt into the South Delta.

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 current Weekly Fish and Water Operation Outlook document.

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: 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. 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 3/25/2021, 2,095,841 winter-run Chinook salmon were estimated to have passed RBDD compared to a cumulative passage last year of 3,811,843 winter-run Chinook salmon RBDD on 3/25/2020.
    - Hatchery winter-run Chinook salmon: Approximately 302,166 juvenile winter-run Chinook salmon were released from Livingston Stone NFH at Caldwell Park on 1/30/2021. The final estimate for the hatchery JPE released into the Sacramento River from Livingston Stone NFH is 97,888 fish.
    - The JPE for BY 2020 hatchery origin winter-run Chinook salmon juveniles released from Livingston Stone NFH into Battle Creek is 37,232 fish. Approximately 79,024 juvenile winter run Chinook salmon were released from Livingston Stone NFH at Wildcat Road Bridge (north fork Battle Creek) on 3/8/2021. Approximately 44,105 juvenile winter-run Chinook salmon were released from Coleman NFH at Wildcat Road Bridge (north fork Battle Creek) on 3/10/2021. Approximately 37,814 juvenile winter-run Chinook salmon were released from Coleman NFH at Wildcat Road Bridge (north fork Battle Creek) on 3/18/2021.

Spring-run Chinook salmon

- **Delta Life Stages:**
    - Young-of-year (YOY) and Yearlings
- **Brood Year 2020 Productivity:**
    - Natural spring-run Chinook salmon: No JPE has been established for spring-run Chinook salmon. Approximately 99.9% of the juvenile spring-run sized Chinook salmon population for BY 2020 is expected to have passed Red Bluff Diversion dam by this time of the water year (see Ops Outlook) based on historical data.
    - The increase in the number of spring-run Chinook salmon seen at Red Bluff Diversion Dam may be an artefact of the large number of fall-run Chinook salmon released at the Coleman NFH facility.

- Hatchery spring-run Chinook salmon surrogates: First hatchery releases of yearling spring-run Chinook salmon surrogates from Coleman NFH facility occurred on 1/8/2021, second hatchery releases occurred on 1/22/2021, third hatchery releases occurred on 1/29/2021.
- First hatchery releases of yearling spring-run Chinook salmon from the SCARF facility occurred on 12/3/2020, a second hatchery releases of BY 2020 fish occurred on 1/26/2021. A third hatchery release of yearling spring-run Chinook salmon from BY 2020 from the SCARF facility occurred 3/2/2021.
- Approximately 514,027 spring-run Chinook salmon from BY 2020 from the Feather River Hatchery were released on 3/19/2021 at Boyd's Pump Boat Launch on the Feather River.
- The agencies in the SaMT discussed the thiamine vitamin deficiency that was observed in winter run Chinook salmon broodstock at the Livingston Stone NFH in BY 2020. 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 were being observed at the hatcheries in 2020.

<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:
    - 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 12/28/2020-12/29/2020, which are part of the CCV Steelhead DPS.
    - Approximately 220,500 steelhead from Feather River Hatchery were released between 2/8/2021 - 2/12/2021 into the Feather River at Boyd's Pump.
    - Approximately 440,500 hatchery steelhead were released between 2/10/2021 - 2/21/2021 from the Nimbus Fish Hatchery into the American River at Sunrise.
    - Approximately 170,000 BY20 hatchery steelhead were released between 2/16/2021 - 2/17/2021 from the Mokelumne River Fish Hatchery into the Mokelumne River at New Hope Landing.
    - Approximately 120,000 BY20 hatchery steelhead were released 3/11/2021 – 3/12/2021 from the Mokelumne River Fish Hatchery into the Mokelumne River at New Hope Landing.

- Approximately 60,000 BY20 hatchery steelhead were released 3/19/2021 from the Mokelumne River Fish Hatchery into the Mokelumne River at New Hope Landing.

DISTRIBUTION

Winter-run Chinook Salmon

- **Current Distribution:**
  - On 6/1/2021, SaMT estimated 0-1% of juvenile winter-run Chinook salmon were present in the Delta and 98-100% were estimated to have exited the Delta (Table 1).
  - No natural or hatchery winter-run Chinook salmon were observed in key monitoring locations this past week (Table 2).
- **Historic Trends**
  - Based on historical trends in salvage, 100% of winter-run Chinook salmon should have been observed in salvage by this time of the water year (Table 3). Based on historic trends in salvage, no more winter-run Chinook salmon loss is expected until the next cohort.
- **Forecasted Distribution within Central Valley and Delta regions**
  - 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 4). 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 until further notice (note: the gates opened for several brief tests on 5/5/2021).
  - The entrainment tool estimates a median loss of 0 fish and a maximum loss of 0 fish during this week (SacPAS last updated on 5/26/21, Figure 1, Table 5a-5b).
  - This week, due to Memorial Day remembrance on 5/30/2021, there are no DSM2 model runs.
  - Multiple fish from the production group have been detected at Benicia Bridge. Multiple fish from the Battle Creek Jump Start release group have been detected at the Tower Bridge, US50I80 Bridge, and Georgiana Slough. One fish from Release Group 2 was detected at Benicia Bridge on 4/5/2021, no fish from Release Group 3 have been detected at Benicia Bridge. Fish were detected most recently on 5/8/2021 at Benicia Bridge.

Spring-run Chinook salmon

- **Current Distribution**
  - The SaMT believes there is higher degree of uncertainty in spring-run Chinook salmon distribution than winter-run Chinook salmon due to the presence of spring-run sized Chinook salmon emigrating from upper Sacramento River tributaries late in April and May and the relative abundance of these fish in the juvenile spring run Chinook salmon population. Furthermore, the size of unmarked fall-run Chinook salmon juveniles from hatcheries releases overlap with the size of natural-origin spring-run Chinook salmon making it difficult to distinguish between hatchery fall-run and natural spring-run Chinook salmon.
  - On 6/1/2021 SaMT estimated 5-15% of juvenile CV spring-run Chinook salmon were present in the Delta (Table 1)
  - No natural or hatchery spring-run Chinook salmon was observed in key monitoring locations this past week (Table 6).

- The first, second, and third spring-run surrogate Chinook salmon groups were released into the Sacramento River at Battle Creek on 1/8/2021, 1/22/2021, and 1/29/2021, respectively. Fish from release group number 2 (released on 1/22/2021) have been observed at the Delta facilities, total loss equal to 6.4 fish.

- **Historical Trends**
  - Based on historical trends in salvage, 98.3% of YOY spring-run Chinook salmon were observed in salvage by this time of the water year (Table 3). Wild spring-run Chinook salmon loss occurred during the past week. If historic trends in salvage were to continue YOY spring-run Chinook salmon loss could potentially increase over the next week.
- **Forecasted Distribution within Central Valley and Delta regions**
  - This week, due to Memorial Day remembrance on 5/30/2021, there are no DSM2 model runs.
  - Young-of-the year hatchery spring-run Chinook salmon from both acoustically tagged release groups from the Feather River Fish Hatchery have been detected at the Sacramento receivers, at Georgiana Slough, and at Benicia Bridge. Last Benicia detections were on 4/8/2021 (Group 1) and 4/14/2021 (Group 2).

<u>Central Valley Steelhead</u>

- **Current Distribution**
  - On 6/1/2021 SaMT estimated 5-10% of juvenile CCV steelhead were present in the Delta (Table 1).
  - Combined total loss of hatchery steelhead equals 342 fish as of 5/30/2021.
  - Combined total loss of natural steelhead between December 1 and March 31 equals 41.2 fish as of 3/31/2021.
  - Combined total loss of natural steelhead between April 1 and June 15 equals 49.9 fish as of 5/30/2021.
- **Historical Trends**
  - Based on historical trends in salvage, 100% (December through March) and 90.5% (April through June 15) 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 to increase over the next week.
- **Forecasted Distribution within Central Valley and Delta regions**
  - No natural or hatchery steelhead were observed in key monitoring locations this past week (Table 7).
  - SaMT estimated that 5-10% of the population of CCV steelhead may be present in the Delta at this time and 85-95% have exited the Delta past Chipps Island. Closure of the DCC gates would reduce exposure and possible entrainment of juvenile CCV steelhead into the interior Delta via the DCC gates. Natural steelhead loss for WY 2021 is 91 fish.
  - The entrainment tool predicts a median loss of 0 fish will occur with a maximum loss of 17 fish (SacPAS last updated on 5/26/21, Figure 1, Table 5a-5b).
  - This week, due to Memorial Day remembrance on 5/30/2021, there are no DSM2 model runs.
  - Steelhead from all three release groups released on the San Joaquin River at Durham Ferry, Stockton, and Head of Old River between 3/23/2021 and 3/26/2021 have been detected at Benicia Bridge receivers.

- Steelhead released between 4/13/2021 and 4/16/2021 at Head of Old River, Durham Ferry, and Stockton have been detected at Quimby Island both on Holland Cut and Old River, at the SWP Radial Gates, and at Benicia (all three release groups).

TABLE 1. Salmonid distribution estimates

Location	**Yet to Enter Delta**	**In the Delta**	**Exited the Delta**
Young-of-year (YOY) winter-run Chinook salmon	0-1%	0-1%	98-100%
YOY spring-run Chinook salmon	0-5%	5-15%	80-95%
YOY hatchery winter-run Chinook salmon*	0%	0-1%	99-100%
Natural origin steelhead	0-5%	5-10%	85-95%

* Estimation of YOY hatchery winter-run Chinook salmon is complicated by multiple releases over a long period of time (with additional releases yet to occur).

TABLE 2. Winter-run Chinook salmon weekly observations by monitoring location

	Dates	**Unmarked (natural) winter-run Chinook salmon**	**Marked (hatchery) winter-run Chinook salmon**
GCID	5/25 – 5/28	0	0
Knights Landing	No data		
Tisdale	5/25 – 5/26	0	0
Sacramento Trawl	5/23 – 5/29	0	0
Beach Seines	5/23 – 5/29	0	0
SKT	Not sampling		
EDSM	Not sampling		
Chipps Island Trawl	5/23 – 5/29	0	0

TABLE 3. Historic migration and salvage patterns.

Date 6/1)	**Red Bluff Diversion Dam**	**Tisdale RST**	**Knights Landing RST**	**Sac Trawl (Sherwood) Catch Index**	**Chipps Island Trawl Catch Index**	**Salvage**
Chinook, Winter-run, Unclipped	100.0% (100.0%,100.0%)	100.0% (100.0%,100.0%)	100.0% (100.0%,100.0%)	100.0% (100.0%,100.0%)	100.0% (100.0%,100.0%)	100.0% (100.0%,100.0%)
Chinook, Spring-run, Unclipped	99.9% (99.9%,100.0%)	100.0% (100.0%,100.0%)	100.0% (100.0%,100.0%)	100.0% (100.0%,100.0%)	99.8% (99.5%,100.1%)	98.3% (96.0%,100.5%)
Steelhead, Unclipped (April - June)						90.5% (80.2%,100.9%)

TABLE 4. STARS model output.

Date (5/31)	DCC	Georgiana Slough	Sacramento River	Sutter and Steamboat
Proportion of Entrainment		33%	44%	24%
Survival		0.14	0.47	0.33
Travel Time		20.0 d	12.2 d	12.4 d

TABLE 5a-5b. WY 2021 loss and salvage predictor data: a) Predicted weekly loss of winter-run Chinook salmon and steelhead at CVP and SWP facilities. b) Environmental details, current and forecast.

Week	34	35
a)	**Model**	
Steelhead median	0	0
Steelhead high	3	17
Winter-run Chinook median	0	0
Winter-run Chinook high	0	0
b)	**Data**	**Forecast**
Temperature (Mallard Island, C)	18.0	18.0
Precipitation (5-d running sum, inches)	0.00	0.00
Old + Middle river flows (cfs)	-1719	-1719
Sacramento River flow (Freeport, cfs)	7987	7987
DCC Gates	open	closed
San Joaquin River flow (Vernalis, cfs)	811	811
Export	975	975

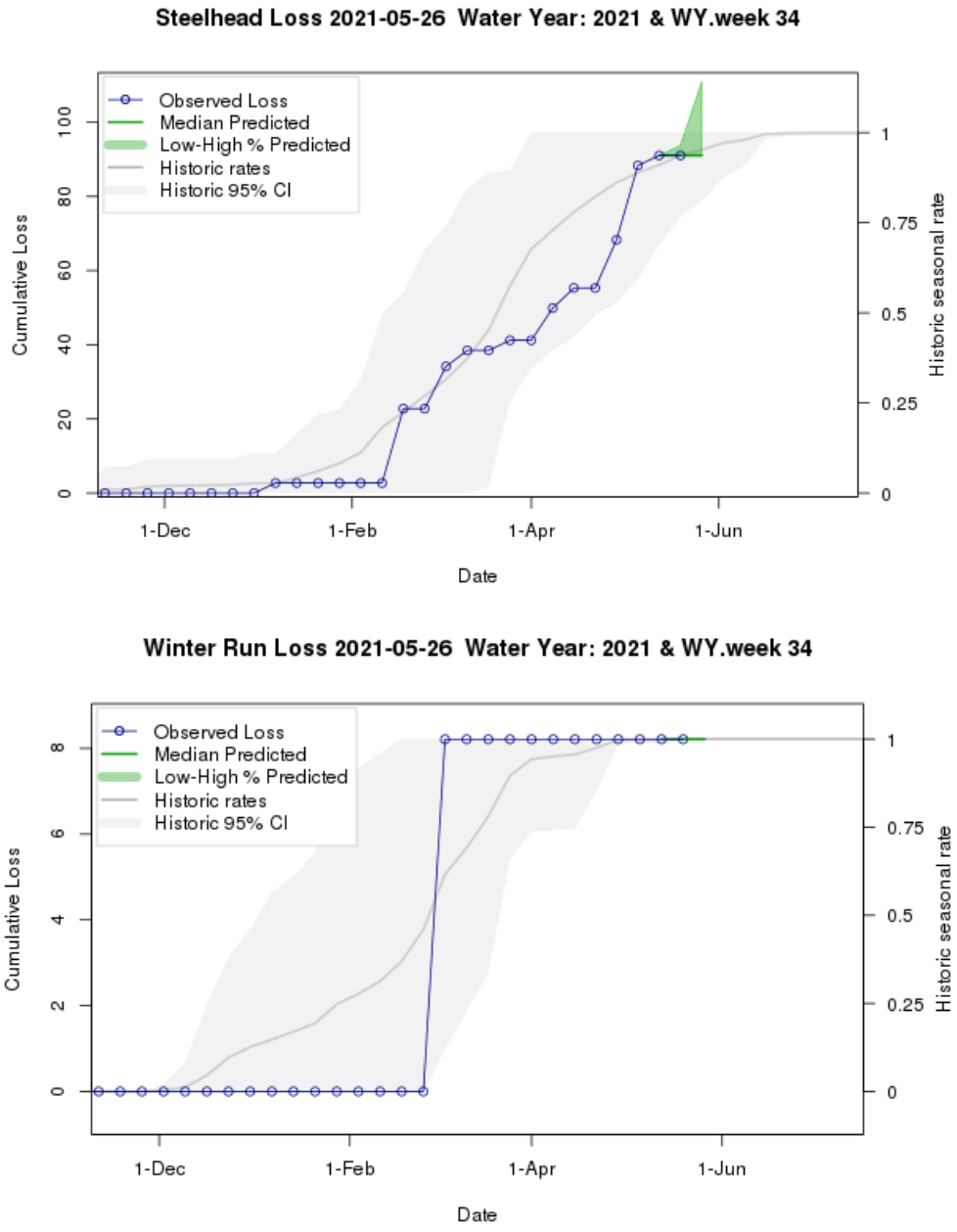
TABLE 6. Spring-run Chinook salmon weekly observations by monitoring location

	Dates	**Unmarked (natural) spring-run Chinook salmon**	**Marked (hatchery) spring-run Chinook salmon**
GCID	5/25 – 5/28	0	0
Knights Landing	No data		
Tisdale	5/25 – 5/26	0	0
Sacramento Trawl	5/23 – 5/29	0	0
Beach Seines	5/23 – 5/29	0	0
SKT	Not sampling		
EDSM	Not sampling		
Chipps Island Trawl	5/23 – 5/29	0	0

TABLE 7. Steelhead weekly observations by monitoring location

	Dates	**Unmarked (natural) steelhead**	**Marked (hatchery) steelhead**
GCID	5/25 – 5/28	0	0
Knights Landing	No data		
Tisdale	5/25 – 5/26	0	0
Sacramento Trawl	5/23 – 5/29	0	0
Beach Seines	5/23 – 5/29	0	0
SKT	Not sampling		
EDSM	Not sampling		
Chipps Island Trawl	5/23 – 5/29	0	0

FIGURE 1. Predicted weekly loss of steelhead and winter-run Chinook salmon at the CVP and SWP facilities.



EVALUATION

1. **After January 1, are more than 5% of juveniles from one or more salmonid species present in the Delta?**

   Yes. Greater than 5% of YOY spring-run Chinook salmon are in the Delta (5-15%) and greater than 5% of natural steelhead are in the Delta (5-10%). 0-1% of natural winter-run Chinook salmon are 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.**
   OMR flow is expected to remain at or below -5,000 cfs this upcoming week. The SaMT anticipates decreasing numbers of salmonids entering the Delta currently due to time of year and increased upstream mortality associated with environmental conditions (e.g., water temperature). The most recent releases are unlikely to have an impact as they were released in the western Delta and SF Bay estuary. The effect of previous hatchery releases is diminishing as the hatchery-released fish exit the Delta.

   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. Based on warming temperatures, fewer fish are anticipated to appear at the export facilities. It is unlikely that the hatchery winter-run 50% yearly loss threshold will be exceeded this year.

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?**

   Winter-run Chinook salmon

   Total juvenile natural winter-run Chinook salmon (LAD) loss is 8.21 fish (as of 5/30/2021). The agencies in the SaMT assessed the likelihood of exceeding the next annual loss threshold and believe that loss occurring in the next week or for the rest of the OMR Management season is unlikely to lead to exceedance of the 50% single-year loss threshold.

   Spring-run Chinook salmon

   Loss for yearling spring-run surrogate is low (refer to Ops Outlook Table 2). The agencies in the SaMT assessed the likelihood of exceeding annual loss threshold and believe that loss occurring in the next week is unlikely to lead to exceeding the hatchery spring-run surrogate threshold.

   Central Valley Steelhead

   For the period of April 1 through June 15, total juvenile natural steelhead loss is 49.9 fish (as of 5/30/2021). 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. Reclamation's Proposed Action has no hatchery steelhead triggers, but hatchery steelhead loss is likely to increase. For the period of December 1 through March 31, total juvenile natural steelhead loss is 41.2 fish (as of 3/31/2021). The annual loss and 50% single-year loss thresholds were not exceeded.

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 natural or hatchery winter-run Chinook salmon has not been exceeded in WY 2021.

Spring-run Chinook salmon

The annual loss threshold for hatchery spring-run Chinook salmon surrogates has not been exceeded in WY 2021.

Central Valley Steelhead

The annual loss threshold for steelhead (December 1 – March 31) was not exceeded in WY 2021.

The annual loss threshold (April 1 – June 15) 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. In 2020, 157 larval green sturgeon and six juvenile green sturgeon were observed at the Red Bluff Diversion Dam fish monitoring RSTs in the upper Sacramento River (this represents approximately 10% of the population distribution because sampling wasn't conducted from March 2020 – June 2020 due to Covid).

DISTRIBUTION

- **Current Distribution**
    - Information about their rearing and distribution patterns within the Delta is limited.
    - Juvenile and adult green sturgeon 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.
    - One dead green sturgeon was collected on the Skinner Delta Fish Protective Facility trash rack (1/22/2021).
- **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 5/30/2021). 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:**
  - Adults and Larvae
- **Brood Year 2020:**

  Abundance estimate: The most recent population abundance estimates for Delta Smelt is 14,442 for Age-0. This estimate was calculated from the sampling between 5/3/2021-5/7/2021. The most recent detections of a Delta Smelt were two on 5/6/21, a 24.8 mm FL (EDSM) caught in the Lower Sacramento Stratum and 25.0 mm FL (20-mm Survey) caught in the Deep Water Ship Channel. FCCL Broodstock collections are complete for WY2021.

  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. Recent detections have been in the Sacramento Deep Water Ship Channel or the Lower Sacramento stratum. Larval Delta Smelt have been detected confirming spawning has occurred.

DISTRIBUTION

- **Current Distribution**
  - Real time detection data is currently limited to EDSM sampling, and 20 mm Survey. Since April there were only nine detections, and the Smelt Monitoring Team's capacity to estimate where Delta Smelt are within the Delta is limited. Most detections have occurred in the Deep Water Ship Channel and the Lower Sacramento.
  - The last Delta Smelt detections were on 5/6/2021 in the Lower Sacramento and Deep Water Ship Channel stratum.
  - Larval sampling began at the Skinner Fish Facility (SFF) on 2/22/2021 and the Tracy Fish Collection Facility (TFCF) on 2/15/2021. No larval Delta Smelt have been detected at either facility. The Smelt Monitoring Team began considering when to end larval sampling on 5/25/2021.

TABLE 8. Summary of recently reported detections of Delta Smelt by Region and Salvage Facilities between 5/25/2021 and 6/1/2021. 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	0	0	0	0	0
Larvae/Juvenile	0	0	0	0	0

TABLE 9. 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	11	Phase 2 began 3/29/2021 Last Detection: 5/6/2021
SKT	0	0	SKT : Complete for WY2021
SLS	0	0	Surveys complete for WY2021
20-mm	0	1	Survey 3: Processing Survey 4: Processing Survey 5: Processing Survey 6: 6/1-4/2021
Bay Study	0	0	Started: Complete
FMWT	0	0	Ended 12/15/2020
Chipps Island Trawl	0	0	Ongoing 3 days per week sampling
Brood Stock Collections	0	2	Collections complete for WY2021
Total	___	14	Sum of all Delta Smelt observed during the OMR Management Season

- **Historical Trends**
  - Delta Smelt detections in the Sacramento Deep Water ship channel indicate presence upstream of the confluence, but may be freshwater residents and not representative of the migratory life history patterns in Delta Smelt (Hobbs 2019).
  - The three station daily average temperature remains above 12 degrees Celsius. Temperatures are continuing to rise and spawning is expected to be decreasing.
  - Historically the highest peak in salvage is in May and the second highest is in June (Grimaldo et al 2009; figure 5)
- **Forecasted Distribution within Central Valley and Delta regions**
  - Predicting the distribution of adult Delta Smelt is currently difficult because detection data is limited to a few individuals and historic patterns may not be representative of the low population levels. None of the detections have been in the central or south delta.
  - Delta Smelt larval distribution is difficult to estimate beyond the Deep Water Ship Channel and the Lower Sacramento stratum since these are the only locations in which larval Delta Smelt have been detected. EDSM does not sample the south Delta during phase II.
  - The SMT is using turbidity as a surrogate for adult Delta Smelt presence and in making assessments of the likelihood of entrainment for larval Delta Smelt.

ABIOTIC CONDITIONS

- **Turbidity**
  - Changes in Freeport flows and turbidity (Table 6) that would create "First Flush" conditions did not occur in WY 2021.
  - As of 4/1/2021 turbidity the turbidity bridge avoidance trigger of 12 NTU at OBI off ramped.
  - As of 5/31/2021 turbidity continues to be less than 12 FNU at OBI, and is stable at other central and south Delta stations (see Attachment B).
  - South Delta Turbidity conditions are not expected to increase and impact the likelihood of entraining Delta Smelt in the next seven days.

TABLE 10. Relevant Environmental Factors to the current management actions for Delta Smelt.

Date Reported	OBI Daily Average Turbidity (FNU)	Clifton Court Daily Average Temperature	# of Consecutive Days above 77°F
5/31/2021	4.48	21.97°C/71.55°F	0

- **X2 Conditions**
  - X2 is estimated to be at 89.3 km on the Sacramento River.
  - When X2 is above 81 km, the SMT uses the X2_EC_Graph.xlxs tool to estimate the position of X2 for both the Sacramento and San Joaquin Rivers and assumes the average of the two is representative of an approximate X2 position.
- **Other Environmental Conditions**
  - The Fish and Water Operation Outlook OMR Index values are expected to range between -1,300 to –1,800 cfs from 6/1/2021 to 6/8/2021.
  - The SMT began monitoring the end of OMR management temperature criteria on 5/18/2021.
  - 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 did not exceeded the triggers for "First Flush" conditions in WY2021.
2. **Do DSM have a high risk of migration and dispersal into areas at high risk of future entrainment? (December 1- January 31)**
   Delta Smelt were not detected in the South Delta between 12/1/2021 and 1/31/2021. The detection on 11/9/2020 supported Delta Smelt being present in Suisun Marsh and west of the Sacramento-San Joaquin confluence. Additional detections on the 6th, 15th , 21st and 26th of January support a presence of the species in the Sacramento Deep Water Ship Channel, but these fish may represent the freshwater resident population and may not be representative of the migratory life history pattern.
3. **Has a spent female been collected?**
   A spent female Delta Smelt was not observed before 4/1/2021 in WY2021.
4. **If OMR of -2000 does not reduce OBI turbidity below 12NTU/FNU, what OMR target is deemed protective between -2000 and -5000?**

As of 4/1/2021 the turbidity bridge avoidance trigger of 12 NTU at OBI off ramped. OBI turbidity is currently below 12 FNU.

5. **If OBI is 12 NTU/FNU, what do other station locations show?**
   OBI turbidity is currently below 12 FNU. The daily average turbidities on 5/31/2021 at Prisoners Point (4.3 NTU), Holland Cut (4.98 FNU) and Victoria Canal (2.83 NTU) are stable and not expected to increase notably in the next seven days.
6. **If OBI is 12 NTU/FNU, is a turbidity bridge avoidance action not warranted? What is the supporting information?**
   As of 4/1/2021 turbidity the turbidity bridge avoidance trigger of 12 NTU at OBI off ramped.
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?**
   As of 6/1/2021, QWEST is expected to be slightly negative over the next seven day period. No larval or juvenile Delta Smelt have been observed in the South Delta as of 6/1/2021.
8. **Based on real-time spatial distribution of Delta Smelt and currently available turbidity information, should OMR be managed to no more negative than -3,500?**
   Delta Smelt are unlikely to be present in the South Delta based on limited detection information this season. Turbidity in the South Delta remains low across most stations (See Attachment B) and there does not appear to be any widespread increases as of 5/31/2021. The OMR index range is between –1,300 to –1,800 cfs for the next seven days and will be protective. This pattern is expected to continue and there is no expected need to manage OMR to no more negative than -3,500 cfs.
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?**
   With only nine detections in the Deep Water Ship Channel and Lower Sacramento stratum there is not enough data on Delta Smelt to inform hydrodynamic models, and the SMT cannot estimate the percentage of larval and juvenile entrainment.

DELTA SMELT REFERENCES

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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

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Attachment B: Delta Turbidity Report

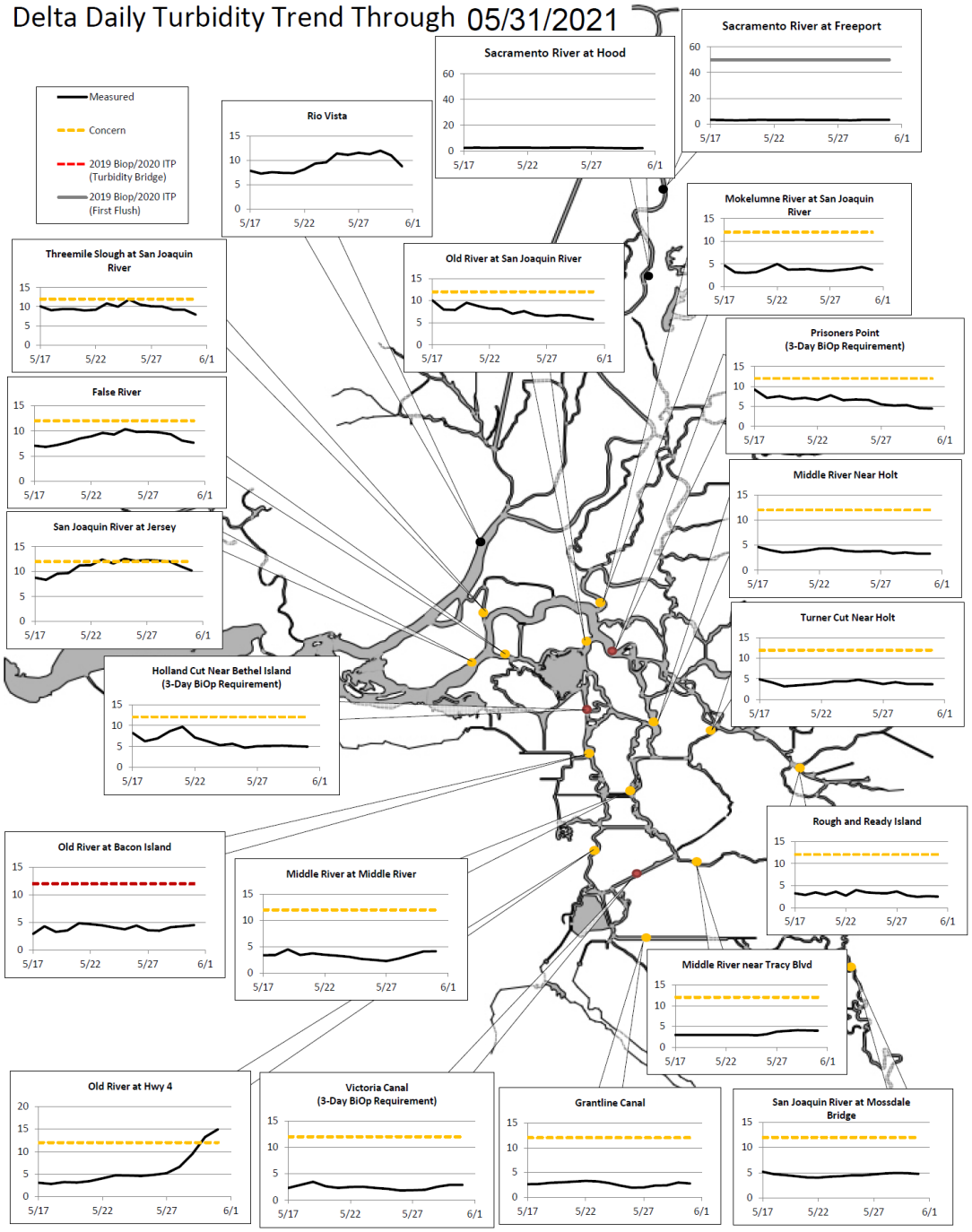
Department of Water Resources
Division of Operations and Maintenance
SWP Water Operations Office

Delta Turbidity Conditions Report

For conditions through: May 31, 2021

General Conditions:

Inflows:		
	Freeport	5960 CFS
	Yolo Bypass	377 CFS
	Vernalis	650 CFS
	Cosumnes	36 CFS
	Mokelumne	153 CFS
	Calaveras	170 CFS
Exports:		
	Clifton Court	287 CFS
	Jones	799 CFS
Other:		
	OMR (Index)	-1570 CFS
	QWEST	-401 CFS
	NDOI	3710 CFS



OBI station Turbidity values are CDEC daily data.
All other sations Turbidity values are daily average calculated from CDEC event data.