BUREAU OF RECLAMATION

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

November 28, 2023

Executive Summary

Operational Conditions

See Weekly Fish and Water Operation Outlook document for November 28 – December 5.

Winter-run Chinook Salmon

No loss of natural winter-run Chinook Salmon (by length at date, 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 may occur over the next week. 1-3% of juvenile natural winter-run Chinook Salmon from brood year (BY) 2023 are estimated to be present in the Delta.

Spring-run Chinook Salmon

No loss of natural spring-run Chinook Salmon (by length at date, LAD) has occurred in the past week at the State or Federal fish salvage facilities. 0% of juvenile natural spring-run Chinook Salmon was estimated in the Delta. It is unlikely that juvenile natural spring-run Chinook Salmon from BY 2023 are present near the DCC gates; CV spring-run Chinook Salmon adults have nearly completed spawning and eggs are in gravel. The DCC closure is unlikely to affect natural spring-run Chinook Salmon in the next seven days.

Central Valley Steelhead

Loss of natural California CV (CCV) steelhead has not occurred in the past week at the Federal or State fish salvage facilities. Loss of Central Valley steelhead at the Central Valley Project (CVP) and State Water Project (SWP) fish collection facilities is unlikely to occur over the next week. 0% of CCV steelhead were estimated in the Delta.

DCC gates recommendation

The DCC gates were closed for the OMR Season on 11/27/2023.

Delta Smelt

Based on distribution patterns over the past decade and low detections in this water year, Delta Smelt are unlikely to be prevalent in the Central and South Delta. Limited detection data from the past month supports Delta Smelt presence in the lower Sacramento River. The last Delta Smelt observations were on 10/24/2023 and 11/15/2023 in the lower Sacramento River. The likelihood of Delta Smelt entrainment is low due to seasonal timing. The Integrated Early Winter Pulse Protection (IEWPP) period begins on 12/1/2023. "First Flush" conditions that would trigger IEWPP regulations are not anticipated this week.

Monitoring Teams summary

There were no non-consensus issues to report from the Salmon Monitoring Team or Smelt Monitoring Team.

Operational and Regulatory Conditions

See current Weekly Fish and Water Operation Outlook document.

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
- Supporting Information regarding Exposure
    - Catch at Red Bluff Diversion Dam continues to increase, which suggests that juvenile winter-run Chinook Salmon have started their migration towards the middle reaches of the Sacramento River. Knights Landing, Tisdale, and Lower Sacramento rotary screw traps have observed winter-run Chinook salmon which further **confirms** that winter-run Chinook salmon have begun migrating downstream.
- Supporting Information regarding DCC Management Effects
    - DCC gates will be closed for the season beginning November 27.

Spring-run Chinook Salmon

- Delta Life Stages:

    - Young-of-year (YOY) and Yearlings
- Supporting Information regarding Exposure
    - See additional supporting information found in winter-run Chinook Salmon section.
    - Mill Creek and Deer Creek daily flows were recorded more than 95 cfs over the past week.
    - One LAD spring-run Chinook Salmon were observed at the Lower Sacramento RSTs.
- Supporting Information regarding DCC Management Effects
    - See additional supporting information in winter-run Chinook Salmon section.

Central Valley Steelhead

- Delta Life Stages:
    - Spawning Adults, Kelts, Juveniles
- Supporting Information regarding Exposure of CCV Steelhead
    - See Additional supporting information found in winter-run Chinook Salmon.
- Supporting Information regarding DCC Management Effects on Central Valley steelhead
    - See additional supporting information found in winter-run Chinook Salmon.

Distribution

Table 1. Salmonid distribution estimates

Location	Yet to Enter Delta (%)	In the Delta (%)	Exited Delta past Chipps Island (%)
Young-of-year (YOY) winter-run Chinook salmon	Current: 97-99 % Last Week: 97-99%	Current: 1-3% Last Week: 1-3%	Current: 0% Last Week: 0%
YOY spring-run Chinook salmon	Current: 100% Last Week: 100 %	Current: 0% Last Week: 0%	Current: 0% Last Week: 0%
YOY hatchery winter-run Chinook salmon	Current: NA Last Week: NA	Current: NA Last Week: NA	Current: NA Last Week: NA
Natural origin steelhead	Current: 100% Last Week: 100 %	Current: 0% Last Week: 0%	Current: 0% Last Week: 0%

Table 2. Historic migration and salvage patterns. Last updated 11/27/2023.

Species	Red Bluff Diversion Dam	Tisdale Rst	Knights Landing Rst	Sac Trawl Sherwood Catch Index	Chipps Island Trawl Catch Index	Salvage
Chinook, Winter-run, Unclipped	88.1%(82.3%, 94.0%) BY: 2013 - 2022	28.4%(7.7%,49.0%) BY: 2013 - 2022	29.3%(6.2%,52.5%) BY: 2013 - 2022	9.9%(-9.4%,29.1%) BY: 2013 - 2022	1.4%(-1.8%,4.7%) BY: 2013 - 2022	0.0%(0.0%,0.0%) WY: 2014 - 2023
Chinook, Spring-run, Unclipped	3.7%(1.3%,6.0%) BY: 2013 - 2022	0.7%(-0.1%,1.6%) BY: 2013 - 2022	2.7%(-2.5%,7.9%) BY: 2013 - 2022	0.0%(-0.0%,0.0%) BY: 2013 - 2022	0.0%(0.0%,0.0%) BY: 2013 - 2022	0.0%(0.0%,0.0%) WY: 2014 - 2023
Steelhead, Unclipped (January-December)	N/A	N/A	N/A	N/A	N/A	N/A
Steelhead, Unclipped (December-March)	N/A	N/A	N/A	N/A	N/A	N/A
Steelhead, Unclipped (April-June)	N/A	N/A	N/A	N/A	N/A	N/A

Table 3. Knight's Landing (KLCI) and Sacramento Seine and Trawl (SCI). No catch indices for juvenile salmonid migration were triggered during the past week.

Date	Knights Landing RST: Winter Chinook: Catch Index	Knights Landing RST: Older Chinook: Catch Index	Sacramento Trawls: Older Chinook: Catch Index	Sacramento Beach Seines: Older Chinook: Catch Index	Alert: Catch Index > 5	Alert: Catch Index 3 < X ≤ 5
2023-11-27	N/A	N/A	N/A	N/A	N/A	N/A
2023-11-26	1.07	1.07	N/A	N/A	N/A	N/A
2023-11-25	NA	NA	N/A	N/A	N/A	N/A
2023-11-24	0	0	N/A	N/A	N/A	N/A
2023-11-23	0	0	N/A	N/A	N/A	N/A
2023-11-22	0	0	0	0	N/A	N/A

Date	Knights Landing RST: Winter Chinook: Catch Index	Knights Landing RST: Older Chinook: Catch Index	Sacramento Trawls: Older Chinook: Catch Index	Sacramento Beach Seines: Older Chinook: Catch Index	Alert: Catch Index > 5	Alert: Catch Index 3 < X ≤ 5
2023-11-21	0	0	0	0	N/A	N/A

Table 4. Mean daily flow and percent change (Wilkins Slough, Deer Creek, Mill Creek; cfs from CDEC) and temperature and percent change (Knights Landing; °F from RST).

Date	Mill Creek (MLM): mean daily flow (cfs)	Mill Creek (MLM): flow percent change	Mill Creek (MLM): Alert	Deer Creek (DCV): mean daily flow (cfs)	Deer Creek (DCV): flow percent change	Deer Creek (DCV): Alert	Wilkins Slough (WLK): mean daily flow (cfs)	Knights Landing RST: water temperature (f)	Alert Triggered
11/26/2023	111.1	-1.2%	Flow>95cfs	107.7	-1.4%	Flow>95cfs	4,099.8	N/A	N/A
11/25/2023	112.5	-1.3%	Flow>95cfs	109.2	-2.4%	Flow>95cfs	4,105.5	N/A	N/A
11/24/2023	113.9	-2.8%	Flow>95cfs	111.8	-2.0%	Flow>95cfs	4,274.8	N/A	N/A
11/23/2023	117.2	-1.3%	Flow>95cfs	114.1	-2.1%	Flow>95cfs	4,331.2	N/A	N/A
11/22/2023	118.8	-3.1%	Flow>95cfs	116.5	-4.9%	Flow>95cfs	4,449.2	N/A	N/A
11/21/2023	122.5	-10.2%	Flow>95cfs	122.5	-17.7%	Flow>95cfs	4,728.8	N/A	N/A
11/20/2023	136.5	-37.4%	Flow>95cfs	149.0	-29.4%	Flow>95cfs	4,249.0	N/A	N/A

Table 5. STARS model simulations for route-specific entrainment, travel times, and survival.

Stock	Date	Route	Median Travel Time	Survival	Routing Probability
Winter Chinook	2023-11-25	Overall	6.76	0.26	N/A
Winter Chinook	2023-11-25	Sacramento River	6.32	0.27	0.58
Winter Chinook	2023-11-25	Yolo Bypass	9.75	0.56	0.00
Winter Chinook	2023-11-25	Sutter Slough	6.45	0.31	0.14
Winter Chinook	2023-11-25	Steamboat Slough	6.11	0.35	0.15
Winter Chinook	2023-11-25	Interior Delta	9.70	0.07	0.13
Late-fall Chinook	2023-11-25	Overall	13.12	0.37	N/A
Late-fall Chinook	2023-11-25	Delta Cross Channel	N/A	N/A	0.00
Late-fall Chinook	2023-11-25	Georgiana Slough	18.04	0.17	0.30
Late-fall Chinook	2023-11-25	Sacramento River	11.16	0.50	0.45
Late-fall Chinook	2023-11-25	Sutter and Steamboat Slough	11.49	0.37	0.25

Evaluation

1. How much salmonid loss has occurred in the past week?

   No loss of juvenile winter-run Chinook Salmon or spring-run Chinook Salmon occurred in the past week at the CVP and SWP fish salvage facilities.

2. Were salmonids observed near the DCC gate in the last seven days?

   Juvenile salmonids are present near the DCC gates but historical monitoring data indicates that they are not present in the Delta in significant numbers at this time.

3. Given forecasted conditions and observations of salmonids, what are the effects of DCC gate operations on salmonids in the next seven days?

   Juvenile winter-run Chinook Salmon are present near the DCC gates but have not triggered any actions. On the dates the DCC gates are closed the probability of juvenile salmon entrainment into the interior Delta will be reduced.

Biology, Distribution, and Evaluation of Delta Smelt

Population Status

- Delta Smelt Life Stages:
    - Juveniles, Subadults, Adults

- Brood Year 2023:
- Abundance estimate:
    - The most recent non-zero abundance estimate for Delta Smelt is from November 17, 2023, and was 1,293 (95% CI: 179 to 4,674).
- Biological Conditions:
    - Adult, subadult and juvenile Delta Smelt are expected to be present in the Low Salinity Zone and Sacramento Deep Water Shipping Channel and have been most recently detected in the lower Sacramento River. The Smelt Monitoring Team discussed the most recent monitoring data (TABLE 6) and considered published literature and professional judgement on the historical trends in regional distribution.

Distribution

Current Distribution

- Real time detection data are currently limited to EDSM and Chipps Island Trawl. Fall Midwater Trawl Survey and Bay Study provide data as available.
- One adult and two juvenile Delta Smelt have been detected by surveys in the lower Sacramento River between 10/5/2023-11/15/2023.
- No Delta Smelt have been detected in salvage at the SWP and CVP this water year.
- Larval sampling at the Skinner Fish Facility (SFF) and the Tracy Fish Collection Facility (TFCF) has not yet been initiated this year.
- COA 8.5.2: Spawning has not yet begun.

Table 6. Summary of newly reported detections of Delta Smelt by Region and Salvage Facilities since the last assessment. Regions are those defined by EDSM sampling. Delta Smelt >58mm FL are considered adults. Subadult fish are considered by the SMT to be fish from the previous year's cohort based on size and timing of collection. Young of year are considered juveniles and larvae.

Life Stage	North	South	West	Far West	Salvage
Adult	0	0	0	0	0
Subadult	0	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. Total Fish counts do not distinguish between hatchery origin and wild Delta Smelt. Table indicates new detections and previously reported detections that have undergone preliminary ID, QA/QC, and genetic confirmation. Numbers are updated as QA/QC and genetic confirmation become available.

Sampling Method	Frequency	New Detections	Preliminary Detections	QA/QC Detections	Genetically Confirmed to Date	Total WY2024	Notes
EDSM	Weekly	0	N/A	N/A	N/A	3	Phase 3 began 7/3/2023 Phase 1 begins 12/4/2023
SKT	Monthly	0	N/A	N/A	N/A	0	Begins: not occurring this year
SLS	Biweekly	0	N/A	N/A	N/A	0	Begins: 12/11/2023
20-mm	Biweekly	0	N/A	N/A	N/A	0	Begins: 3/18/2024
Summer Townet	Biweekly	0	N/A	N/A	N/A	0	Begins:
Bay Study	Monthly	0	N/A	N/A	N/A	0	Ongoing
FMWT	Monthly	0	N/A	N/A	N/A	0	Ongoing
Chipps Island Trawl	Weekly	0	N/A	N/A	N/A	0	Ongoing
FCCL Brood Stock Collections	Weekly	0	N/A	N/A	N/A	0	Begins: 11/27/2023
LEPS	As available	0	N/A	N/A	N/A	0	Begins: 1/3/2024 (depending on LFS catch)
FRP	Daily	0	N/A	N/A	N/A	0	Ongoing

Sampling Method	Frequency	New Detections	Preliminary Detections	QA/QC Detections	Genetically Confirmed to Date	Total WY2024	Notes
Tracy Fish Collection Facility (CVP)	Daily	0	N/A	N/A	N/A	0	Ongoing
Skinner Fish Facility (SWP)	Daily	0	N/A	N/A	N/A	0	Ongoing
Total	N/A	N/A	N/A	N/A	N/A	3	Sum of all Delta Smelt observed during the water year

Cultured Delta Smelt Experimental Releases

- Experimental releases completed in Water Year 2024 include:
    - Release 1: 14,104 fish released at Sacramento River at Rio Vista (truck release)
- Other experimental releases for Water Year 2024 are planned for:
    - Release 2: 12/13-12/14/2023
    - Release 3: 12/20-12/21/2023
    - Release 4: 1/10/2024
    - Release 5: 1/24-1/25/2024
    - Release 6: 1/31-2/1/2024
- See additional details at: SacPAS: Central Valley Prediction & Assessment of Salmon

Table 8. Weekly summary of the origin of Delta Smelt. These identifications are considered tentative and additional genetic testing will confirm the identity of individuals. Individuals with no tags are provided alive to the FCCL as potential additions to the FCCL Broodstock.

Date	Survey	Stratum/Station	Total Caught	Ad. Clipped	VIE	No Tag
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Historical Trends

- Upstream migration for Delta Smelt occurs between September and December and in response to "first flush" conditions (Sommer et al. 2011, Grimaldo et al. 2009). Migration typically ranges one to four weeks after flow and turbidity increases, based on salvage data (Sommer et al. 2011).
- Historically, detections of ripe Delta Smelt began in January and peaked in February and March and the majority of Delta Smelt spawning occurs within a temperature range of 9-18˚C (Damon et al. 2016).
- Based on historical monitoring data from the past few years (https://github.com/Delta-Stewardship-Council/deltafish), first detection of larvae in the Central and South Delta has typically occurred by mid to late March. (https://www.cbr.washington.edu/sacramento/tmp/hrtsalvage_1676407207_694.html).
- Salvage data as presented on SacPas indicates that adult Delta Smelt salvage in recent years has reached the 50th percentile at the end of February – beginning of March.
- Historically, the highest peak in salvage is in May and the second highest is in June (Grimaldo et al 2009).

Forecasted Distribution within Central Valley and Delta regions

- Predicting the distribution of Delta Smelt is currently difficult because detection data is limited to a few wild individuals and historic patterns may not be representative of the low population levels.
- The SMT uses turbidity as a surrogate for Delta Smelt presence and in making assessments of the likelihood of entrainment for larval Delta Smelt after spawning begins.
- The potential of experimentally released Delta Smelt to distribute from their release site is unknown at this time and SMT cannot predict their distribution beyond the original release site and subsequent recaptures. There is a high degree of uncertainty regarding the response of cultured fish to environmental cues typically applied to wild Delta Smelt.

Abiotic Conditions

Turbidity

- Cooling temperatures and slight chance of light precipitation Tuesday evening through Saturday. Light winds at Stockton and Antioch.
- Turbidity is below 12 FNU at OBI and at other stations in the central and south Delta. Turbidity is likely to remain stable this week.

Table 9. Relevant Environmental Factors to the current management actions for Delta Smelt.

Date Reported	FPT 3-day Running Average Flow (cfs)	FPT 3-day Running Average Turbidity (FNU)
11/27/2023	8377.3	3.17

X2 Conditions

- As of 11/27/2023, X2 is estimated to be >81 km.

Other Environmental Conditions

- The Fish and Water Operation Outlook OMR Index values are expected to range between -3,000 to -5,000 cfs this week.
- QWEST was +1000 cfs on 11/27 and will become negative this week as DCC gates closed on 11/27.
- 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

USBR and DWR Proposed Operations:

- Monthly Delta Outflow and Rio Vista flow for November greater than 4,500 cfs; E/I ratio not to exceed 0.65.

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

   This question is not applicable until Dec. 1.

   The predicted amount of precipitation for this week is unlikely to create "First Flush" conditions and trigger IEWPP regulations this week. However, conditions will be monitored throughout the rest of the week.

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

   This question is not applicable until Dec. 1.

   Based on distribution patterns over the past decade and recent detection data, Delta Smelt are unlikely to be prevalent in the South Delta. No Delta Smelt have been detected in the South Delta and none have been detected since 11/15/2023. Experimental release of hatchery Delta Smelt occurred recently at Rio Vista, which

is outside of the South Delta. Information regarding their behavior post-release is limited and catch will be monitored.

3. Has a spent female been collected?

   This question is not applicable until Turbidity Bridge Avoidance begins.

4. If OMR of -2000 cfs does not reduce OBI turbidity below 12NTU/FNU, what OMR target is deemed protective between -2000 and -5000 cfs?

   This question is not applicable until Turbidity Bridge Avoidance begins.

5. If OBI is 12 NTU/FNU, what do other station locations show?

   This question is not applicable until Turbidity Bridge Avoidance begins.

6. If OBI is 12 NTU/FNU, 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 after March 15.

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?

   This question is not applicable until March 15.

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 15.

Delta Smelt References

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