BUREAU OF RECLAMATION

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

November 8, 2022

Executive Summary

Operational Conditions

See Weekly Fish and Water Operation Outlook document for November 8 – November 14.

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 is unlikely to occur over the next week. 0% of juvenile natural winter-run Chinook Salmon from brood year (BY) 2022 are estimated to be present in the Delta. The Delta Cross Channel (DCC) gates closure reduces far-field effects on winter-run Chinook Salmon juveniles that are potentially present in the Sacramento River near the DCC gates into the interior 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 from brood year (BY) 2022 are estimated to be present in the Delta. No juvenile natural spring-run Chinook Salmon from BY 2022 have been observed near the DCC gates; CV spring-run Chinook Salmon adults have 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

No loss of natural California CV (CCV) steelhead has occurred in the past week at the State and Federal 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 juvenile natural CCV Steelhead from brood year (BY) 2022 are estimated to be present in the Delta. DCC closure reduces exposure to Central Valley steelhead juveniles that are potentially present in the Sacramento River near the DCC gates.

Green Sturgeon

Loss of green sturgeon has not occurred in the past week at the State and Federal fish salvage facilities (WY 2023 total loss = 0 fish, as of 11/06/2022). Loss of green sturgeon is unlikely to occur over the next week due to their rare presence in the South Delta.

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 3 months support Delta Smelt presence in the Sacramento Deepwater Shipping Channel, Suisun Marsh, and the lower Sacramento River. The last Delta Smelt observations were on November 3 & 7, 2022, in the lower Sacramento River. These detections may be an indication that DS are starting to stage downstream of X2 in preparation for seasonal migration into freshwater. The likelihood of Delta Smelt subadult entrainment is low due to seasonal timing. First flush conditions are not anticipated to occur within the next seven days. The regulations for Integrated Early Winter Pulse Protection do not go into effect until 12/1/2022.

DCC gates recommendation

The DCC gates were closed on 11/7/2022 to meet Rio Vista flows criteria. Closing the DCC gate may also reduce straying of Mokelumne River fall-run Chinook Salmon attracted by Mokelumne flows. The DCC gate is currently scheduled to re-open on 11/11/2022 for salinity/seasonal weekend operation, and to allow boaters passage to the interior Delta. The gates will then be closed again on 11/14/2022.

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.

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 have declined since late September, which suggests that juvenile winter-run Chinook Salmon have mostly migrated towards the middle reaches of the Sacramento River. GCID rotary screw trap observed 3 winter-run Chinook Salmon on 11/1/22.
- Supporting Information regarding DCC Management Effects

- DCC gate operations will continue with a weekday closed/weekend open pattern. There are no modeling alternatives for water quality due to the Rio Vista flow requirement and a case where the DCC gates left open would likely cause a violation to D-1641.

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 less than 95 cfs over the past week. GCID rotary screw trap observed 3 spring-run Chinook Salmon on 11/1/22 and 1 yearling at Butte Creek on 11/04/22.
- 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: 100 % Last Week: 100 %	Current: 0% Last Week: 0 %	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: N/A Last Week: N/A	Current: N/A Last Week: N/A	Current: N/A Last Week: N/A

Location	Yet to Enter Delta (%)	In the Delta (%)	Exited Delta past Chipps Island (%)
Natural origin steelhead	Current: 100% Last Week: N/A	Current: 0% Last Week: N/A	Current: 0% Last Week: N/A

Table 2. Historic migration and salvage patterns. Last updated 11/7/2022.

Date (10/03)	Red Bluff Diversion Dam	Tisdale RST	Knights Landing RST	Sac Trawl (Sherwood) Catch Index	Chipps Island Trawl Catch Index	Salvage
Chinook, Winter-run, Unclipped	77.9% (68.7%,87.1%) BY: 2012 - 2021	20.1% (6.1%,34.0%) BY: 2012 - 2021	21.5% (4.7%,38.4%) BY: 2013 - 2021	8.2% (-7.3%,23.8%) BY: 2012 - 2021	1.4% (-1.8%,4.7%) BY: 2012 - 2021	0.0% (0.0%,0.0%) WY: 2013 - 2022
Chinook, Spring-run, Unclipped	3.6% (-1.4%,8.6%) BY: 2012 - 2021	0.2% (0.1%,0.3%) BY: 2012 - 2021	0.6% (-0.2%,1.4%) BY: 2013 - 2021	0.0% (0.0%,0.0%) BY: 2012 - 2021	0.0% (0.0%,0.0%) BY: 2012 - 2021	0.0% (0.0%,0.0%) WY: 2013 - 2022
Steelhead, Unclipped (– December-March)	N/A	N/A	N/A	N/A	N/A	0.0% (0.0%,0.0%) WY: 2013 - 2022

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	KLCI	SCI Trawl	SCI Seine	Trigger Exceeded
11/1/22	0	N/A	N/A	No
11/2/22	0	0	0	No
11/3/22	0	N/A	N/A	No
11/4/22	0	0	0	No
11/5/22	N/A	N/A	N/A	No
11/6/22	N/A	N/A	N/A	No
11/7/22	N/A	0	0	No

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 flow (MLM)	MLM Change	MLM Alert	Deer Creek flow (DCV)	DCV Change	DCV Alert	Wilkins Slough flow (WLK)	Knights Landing temp. (°F)	Alert Triggered
11/6/2022	117.8	13.8%	Flow>95cfs	96.8	19.7%	Flow>95cfs	3446.5	N/A	N/A
11/5/2022	103.5	12.4%	Flow>95cfs	80.9	0.7%	N/A	3408.0	N/A	N/A
11/4/2022	92.1	-6.9%	N/A	80.3	-10.4%	N/A	3401.8	N/A	N/A
11/3/2022	98.9	-11.3%	Flow>95cfs	89.7	-7.6%	N/A	3365.7	45	N/A
11/2/2022	111.5	17.1%	Flow>95cfs	97.1	18.7%	Flow>95cfs	3198.1	45.4	N/A
11/1/2022	95.2	11.6%	Flow>95cfs	81.8	14.3%	N/A	3254.5	46.3	N/A
10/31/2022	85.3	0.2%	N/A	71.6	0.2%	N/A	3308.7	46.4	N/A

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

Date (11/5/2022)	DCC	Georgiana Slough	Sacramento River	Sutter and Steamboat	Interior Delta
Stock: Late Fall Run	N/A	N/A	N/A	N/A	N/A
Proportion of Entrainment	0.22	0.2	0.33	0.24	N/A
Survival	0.1	0.13	0.33	0.3	N/A
Travel Time	22.1d	20.7d	10.3d	10.1d	N/A
Stock: Winter Run	N/A	N/A	N/A	N/A	N/A
Proportion of Entrainment	N/A	N/A	0.57	0.14, 0.15	0.14
Survival	N/A	N/A	0.21	0.3, 0.26	0.05
Travel Time	N/A	N/A	6.5d	6.6d, 6.2d	10.2d

The entrainment tool estimates a median loss of 0 winter-run Chinook Salmon and a maximum loss of 4 winter-run Chinook Salmon, as well as a median loss of 0 juvenile CCV Steelhead and a maximum loss of 17 juvenile CCV Steelhead this week (SacPas last updated on 11/8/2022).

Table 6. a) WY 2023 loss and salvage predictor data: Predicted weekly loss of winter-run Chinook salmon and steelhead at CVP and SWP facilities. b) Environmental details, current and forecast.

Week	14	15
a)	Model	N/A
Steelhead median	0	0

Week	**14**	**15**
Steelhead high	17	17
Winter-run Chinook median	0	0
Winter-run Chinook high	4	4
b)	Data	Forecast
Temperature (Mallard Island, C)	17.5	17.5
Precipitation (5-d running sum, inches)	0	0
Old + Middle river flows (cfs)	-1,951	-1,951
Sacramento River flow (Freeport, cfs)	6,916	6,916
DCC Gates	Closed	Closed
San Joaquin River flow (Vernalis, cfs)	1,438	1,438
Export	1,123	1,123

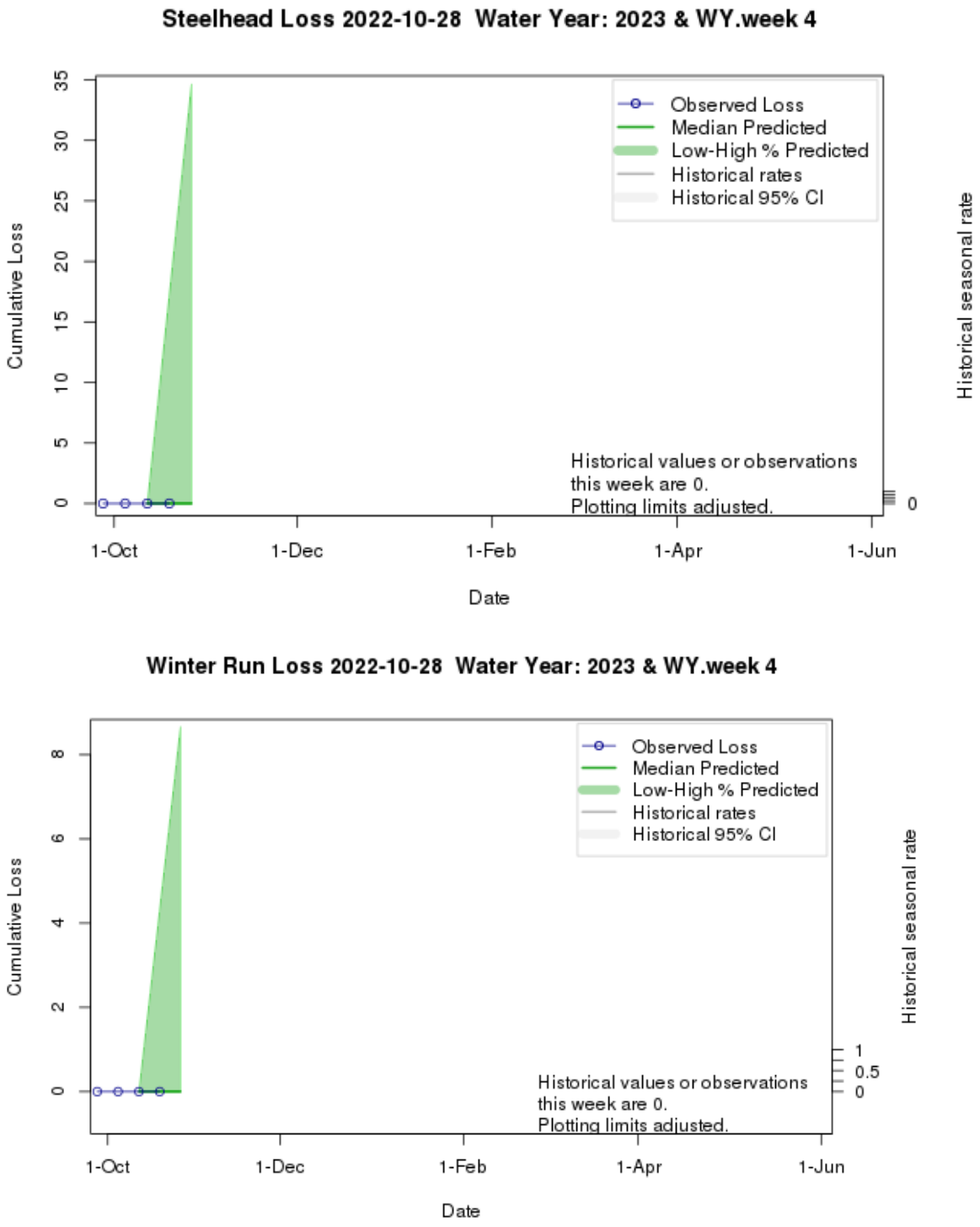

Figure 1. Predicted weekly loss of steelhead and winter-run Chinook salmon at the CVP and SWP facilities

Evaluation

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

   No loss of juvenile winter-run Chinook Salmon, spring-run Chinook Salmon, or Steelhead has 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 have not been observed this year near the DCC gates and historical monitoring data indicates that they are not present in the Delta in significant numbers at this time. Closure of the DCC gates would reduce likelihood of entraining juvenile salmonids into the Interior Delta.

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

   It is unlikely juvenile winter-run Chinook Salmon are present near the DCC gates. Closure of the gates would positively impact any present juvenile salmonids by preventing entrainment into the interior Delta. Closure of the DCC gates, also reduces straying of Mokelumne River adult fall-run Chinook salmon during the fall attraction flow releases.

Biology, Distribution, and Evaluation of Delta Smelt

Population Status

- Delta Smelt Life Stages:
    - Adults and subadults
- Brood Year 2022:
- Abundance estimate:
    - The abundance estimate as of November 3, 2022 was 1,288 (95% CI: 178-4,658). The most recent detections of Delta Smelt were on 11/3/2022 and on 11/7/2022 in the lower Sacramento River.
- Biological Conditions:
    - Adult and subadult Delta Smelt are expected to be present in the Sacramento Deepwater Shipping Channel, Suisun Marsh, and in the lower Sacramento River. The Smelt Monitoring Team discussed the most recent monitoring data (Table 4) and considered professional judgement on the historical trends in regional distribution.

Distribution

Current Distribution

- Real time detection data is currently limited to EDSM sampling and Chipps Island; Bay Study and FMWT provide data as available.
- Since there are few recent detections of Delta Smelt, the Smelt Monitoring Team's capacity to estimate where they are within the Delta is limited.
- The most recent Delta Smelt detections were on 11/3/2022 and 11/7/2022 in the lower Sacramento River.
- Delta Smelt may be beginning to stage downstream of X2 in preparation for seasonal migration into freshwater.
- Larval sampling at the Skinner Fish Facility (SFF) and the Tracy Fish Collection Facility (TFCF) will be initiated by the SMT in February.
- COA 8.5.2: No larval or juvenile Delta Smelt have been salvaged at the SFF or TFCF as of 11/08/2022 (Table 7).

Table 6. Summary of newly reported detections of Delta Smelt by Region and Salvage Facilities between 11/2/2022 and 11/8/2022. 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	1	0	0
Subadult	0	0	1	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 may include preliminary data that may not have received full QA/QC, but any corrections will be made the following week.

Sampling Method	Frequency	New Detections	WY2023	Notes
EDSM	Weekly	2	2	Phase 3 began 7/5/22
SKT	Monthly	0	0	Begins: 1/9/23

Sampling Method	Frequency	New Detections	WY2023	Notes
SLS	Biweekly	0	0	Begins: 12/5/2022
20-mm	Biweekly	0	0	Begins: 3/13/23
Summer Townet	Biweekly	0	0	Begins:
Bay Study	Monthly	0	0	Ongoing
FMWT	Monthly	0	0	Ongoing
Chipps Island Trawl	Weekly	0	0	Ongoing
FCCL Brood Stock Collections	Weekly	0	0	N/A
LEPS	As available	0	0	Begins:
TFCF	Daily	0	0	Ongoing
FRP	Daily	0	0	Ongoing
Total	N/A	N/A	2	Sum of all Delta Smelt observed during the OMR Management Season

Cultured Delta Smelt Experimental Releases

Experimental releases are planned for the week of November 28, January 9, and January 23. A total of approximately 42,000 fish are expected to be released this water year.

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
11/3/2022	EDSM	Lower Sacramento/23-14-LSR06	1	N/A	N/A	X
11/7/2022	EDSM	Lower Sacramento	1	N/A	N/A	X

Historical Trends

- In November historical patterns observed the centroid of the population close to the X2 position (Sommer et al 2011).
- Upstream migration for Delta Smelt occurs between September and December (Sommer et al. 2011).

- 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).
- 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 subadult 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. No detections have been in the central or south delta.
- 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.

Abiotic Conditions

Turbidity

- First Flush Conditions can be triggered between Dec. 1st and January 31st. Precipitation up to a half an inch is expected on 11/8. SE winds 13-16 mph becoming WSW in the afternoon, gusting up to 21 mph. Slight chance of precipitation the rest of the week.
- As of 11/8/2022 turbidity continues to be less than 12 FNU at OBI and is stable at other central and south Delta stations. However, the expected precipitation this week will likely increase turbidity in the Delta over the next seven days.
- South Delta Turbidity is expected to increase, but due to seasonal timing the turbidity change is not expected to influence the distribution of Delta Smelt and the likelihood of entraining Delta Smelt in the next seven days.

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)
11/7/2022	7012	1.55

X2 Conditions

- X2 is estimated to be at 95.1 km as of 11/7/2022.

- 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 -1000 to -4500 cfs from 11/8/2022 to 11/15/2022.
- 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 question is not applicable until Dec. 1st

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

   The question is not applicable until Dec. 1st

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?

   OBI turbidity is currently below 12 FNU. The daily average turbidities on 11/7/2022 at Prisoners Point (3.20 NTU), Holland Cut (2.78 FNU) and Victoria Canal (1.92 NTU) are expected to remain stable over the next seven days.

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 March 15th.

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 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

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