

Smelt Monitoring Team – Tuesday, January 31st, 2023

PARTICIPANTS

- California Department of Fish and Wildlife (CDFW)
- California Department of Water Resources (DWR)
- State Water Resources Control Board (SWRCB)
- U.S. Bureau of Reclamation (USBR)
- U.S. Fish and Wildlife Service (USFWS)
- Kearns & West (K&W)

ACTION ITEMS

- CDFW will update the SMT if there are further detections of LFS larvae at the 12 Central and South Delta stations by SLS 3 that may trigger COA 8.4.2.

MEETING SUMMARY

PART 1: Updates on Water Operations and Biological Updates

Relevant Actions & Triggers

Elevated turbidity at Bacon Island triggered the federal Turbidity Bridge Avoidance action and Incidental Take Permit (ITP) Condition of Approval (COA) 8.5.1 (Turbidity Bridge Avoidance) on January 17th. The descriptions below are intended as summaries and do not provide all the details related to each action or trigger. For full descriptions, please see the Old and Middle River (OMR) Guidance Document or ITP as needed.

Proposed Action

OMR Management Measures	Requirement	Time Frame	Trigger	Triggered?
Integrated Early Winter Pulse Protection (“First Flush” Turbidity Event)	Reduce exports for 14 consecutive days so that the 14-day averaged OMR index for the period shall not be more negative than -2,000 cubic feet per second (cfs).	Dec 1 to Jan 31	(1) Running 3-day average of daily flows at Freeport >25,000 cfs; and (2) Running 3-day average of daily turbidity at Freeport ≥50 Nephelometric Turbidity Units (NTU ¹); or (3) Real-time monitoring indicates a high risk of migration and dispersal into areas at high risk of future entrainment or a spent Delta Smelt (DS) has been collected in monitoring surveys.	Off-ramped, triggered 12/31/22 (starting January 3 rd through 16 th EOD)

¹ The current instrumentation measures turbidity in Formazin Nephelometric Units (FNU).

OMR Management Measures	Requirement	Time Frame	Trigger	Triggered?
OMR Management	Manage to a more positive OMR than -5,000 cfs.	From the onset of OMR management to the end.		Active as of 1/17/23
Turbidity Bridge Avoidance (“South Delta Turbidity”)	If the daily average turbidity at Bacon Island cannot be maintained less than 12 NTU, manage exports to achieve an OMR no more negative than -2,000 cfs until the daily average turbidity at Bacon Island drops below 12 NTU.	After the first flush or Feb 1 (whichever comes first) and until a ripe or spent female DS is detected or April 1 (whichever is first).	Average daily turbidity in Old River at Bacon Island (OBI) at a level of more than 12 NTU.	Triggered 1/17/23, but not controlling
Larval and Juvenile Delta Smelt	Run hydrodynamic models and forecasts of entrainment, informed by the Enhanced Delta Smelt Monitoring (EDSM) or other relevant survey data to estimate the percentage of larval and juvenile DS that could be entrained. If necessary, manage exports to limit entrainment to be protective based on the modeled recruitment levels.	On or after March 15 of each year until off-ramp criteria are met.	If QWEST is negative AND larval or juvenile DS are within the entrainment zone of the pumps based on real-time sampling of spawning adults or young of year life stages.	Not active
End of OMR Management	OMR criteria may control operations until June 30 (for DS and Chinook salmon), until June 15 (for steelhead/rainbow trout), or when the species-specific off-ramps have occurred, whichever is earlier.	During OMR management to June 30, or when the DS temperature off-ramp has been reached.	DS: when the daily mean water temperature at Clifton Court Forebay (CCF) reaches 77°F for 3 consecutive days	Not active

IIP Conditions of Approval

Condition of Approval	Requirement	Time Frame	Trigger	Triggered?
8.1.5.2 (Smelt Monitoring Team Risk Assessment)	Outlines contents for weekly risk assessments of DS and Longfin Smelt (LFS) required under 8.1.5 and 8.1.1.	Nov 1 st through June 30 th or until off-ramped by 8.8		Active
8.3.1 (Integrated Early Winter Pulse Protection)	Reduce south Delta exports for 14 consecutive days to maintain a 14-day average OMR index no more negative than -2,000 cfs, and convene the Smelt Monitoring Team (SMT) within one day of triggering. After maintaining a 14-day average OMR index no more negative than -2,000 cfs for 14 days, Permittee shall maintain a 14-day average OMR index no more negative than -5,000 cfs, initiating the OMR Management season.	Dec 1 to Jan 31	3-day running average daily flows at Freeport greater than, or equal to, 25,000 cfs, AND Three-day running average of daily turbidity at Freeport is greater than, or equal to, 50 FNU OR The SMT determines that real-time monitoring of abiotic and biotic factors indicates a high risk of DS migration and dispersal into areas at high risk of future entrainment.	Off-ramped, triggered 12/31/22 (starting January 3 rd through 16 th EOD)
8.3.3 (Adult Longfin Smelt Entrainment Protection)	After December 1, if an Integrated Early Winter Pulse Protection (COA 8.3.1) has not yet initiated, Permittee shall reduce south Delta exports to maintain a 14-day average OMR index no more negative than -5,000 cfs and initiate OMR Management if: Cumulative expanded salvage, Dec 1 st through Feb 28 th , exceeds most recent Fall Midwater Trawl (FMWT) Index divided by 10, or SMT determines that there is a high risk of entrainment.	Dec 1 through Feb 28 th	Salvage threshold for water year (WY) 2023 is 40.	Off-ramped with COA 8.3.1 triggering on 12/31/22

Condition of Approval	Requirement	Time Frame	Trigger	Triggered?
8.4.1 (OMR Management for Adult Longfin Smelt)	<p>The SMT shall conduct weekly risk assessments and decide whether to recommend an OMR flow requirement to minimize entrainment of adult LFS. The SMT may provide advice to restrict south Delta exports for seven consecutive days to achieve a seven-day average OMR index within three risk categories:</p> <p>Low risk: OMR between -4,000 cfs to -5,000 cfs Medium risk: OMR between -2,500 cfs to -4,000 cfs High risk: OMR between -1,250 cfs to -2,500 cfs</p>	Onset of OMR management through Feb 28 th	SMT recommendation based on weekly risk assessment.	Off-ramped with detection of LFS larvae in Smelt Larval Survey (SLS) 12
8.4.2 (Larval and Juvenile Longfin Smelt Entrainment Protection)	If triggered, it will restrict south Delta exports for seven consecutive days in order to maintain a seven-day average OMR index no more negative than -5,000 cfs and convene the SMT to recommend an OMR flow limit between -1,250 and -5,000 cfs.	January 1st through June 30th or until the temperature off-ramp occurs	(1) LFS larvae or juveniles are found in four or more of the 12 SLS or 20 mm stations in the central or south Delta, or (2) LFS catch per tow exceeds five larvae or juveniles in two or more of the 12 stations in the central or south Delta. The relevant stations are: 809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918 and 919.	Active, not triggered
8.4.3 High flow offramp for Longfin Smelt	If triggered, COA 8.4.1 and 8.4.2 are not required or would cease if previously required.	Throughout OMR management	When river flows are (a) greater than 55,000 cfs in the Sacramento River at Rio Vista or (b) greater than 8,000 cfs in the San Joaquin River at Vernalis. If flows subsequently drop below 40,000 cfs in the Sacramento River at Rio Vista or below 5,000 cfs in the San Joaquin River at Vernalis, the OMR limit previously required as a part of Conditions of Approval 8.4.1 and 8.4.2 shall resume.	Triggered but not controlling

Condition of Approval	Requirement	Time Frame	Trigger	Triggered?
8.5.1 Turbidity Bridge Avoidance	Maintain daily average turbidity at OBI at a level of less than 12 NTU. If the daily average turbidity at OBI is greater than 12 NTU, Permittee shall restrict south Delta exports to achieve an OMR flow that is no more negative than -2,000 cfs until the daily average turbidity at OBI is less than 12 NTU.	After the first flush or Feb 1 until end of OMR management or until CDFW agrees that the action may be ended or modified.	Turbidity at OBI > 12 FNU	Triggered 1/17/23, but not controlling
8.5.2 (Larval and Juvenile Delta Smelt Protection)	If triggered, this Condition of Approval will restrict south Delta exports for seven consecutive days in order to maintain a seven-day average OMR index no more negative than -5,000 cfs and SMT members will meet to assess the risk of entrainment. The SMT may provide further advice to restrict exports in order to maintain an OMR index more positive than -5,000 cfs. In their assessment, SMT members will determine if risk of entrainment is low, medium, or high; subsequent OMR restrictions will be based on level of risk. Furthermore, if trigger (2) or (3) are met, this Condition of Approval will restrict south Delta exports to maintain a seven-day average OMR index no more negative than -3,500 cfs until the average Secchi depth is greater than 1 meter in the south Delta stations in a subsequent SLS or 20 mm survey. If average south Delta Secchi depth continues to be less than or equal to 1 meter in a subsequent SLS or 20mm survey then Permittee shall continue restrictions and request a risk assessment by the Smelt Monitoring Team to determine if additional advice and subsequent restrictions are warranted and provide advice to WOMT.	Nov 1 st through June 30 th or until off-ramped by 8.8	(1) When the five-day salvage of juvenile Delta Smelt is greater than or equal to one plus the average prior three years' FMWT index (rounded down). The 2022 FMWT index for DS was zero. Or (2) when a larval/juvenile DS is detected in SLS/20 mm Or (3) the 3-day average water temperature at Jersey Point is $\geq 12^{\circ}\text{C}$ and Secchi from the most recent SLS/20 mm survey is $\leq 1\text{m}$ averaged across the 12 stations (809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, and 919)	Active, not triggered

Condition of Approval	Requirement	Time Frame	Trigger	Triggered?
8.8 (End of OMR Management)	If triggered, OMR Management would be off-ramped for LFS and DS.	From the onset of OMR management through June 30 th	Daily mean water temperature at CCF is >25° C for three consecutive days.	Not active
8.12 (Barker Slough Pumping Plant Longfin and Delta Smelt Protection)	Barker Slough Pumping Plant will reduce exports so the maximum 7-day average is <60 cfs.	From January 15 through March 31 in dry and critical water years for LFS, and from March 1 st through June 30 th for DS	Larval Smelt are detected at SLS Station 716 during the period identified for each species, and/or when recommended by the SMT.	Not active; water year type is below normal as of 01/01/23

Current Operations & Outlook

USBR and DWR shared operations updates from the Outlook. Their observations included:

- USBR reported on weather conditions noting precipitation favoring the north coast along the Shasta Basin, and along the spine of Sierra waning south of the I80 corridor, with average temperatures remaining below normal.
- Releases from Whiskeytown Dam on Clear Creek are currently 200 cfs.
- Releases from Keswick Dam on the Sacramento River are 3,250 cfs.
- Releases from Nimbus Dam on the American River are 4,000 cfs and may decrease as the week progresses.
- Releases from Goodwin Dam on the Stanislaus River are 200 cfs.
- Delta Cross Channel (DCC) gates remain closed. No changes expected for the next seven-day period.
- The Delta is emerging from a first quarter neap cycle, and a full moon on the 5th of February will bring a spring tide.
- The federal facility is exporting 4,200 cfs.
- DWR reported that state facility exports have been at 9,500 cfs and will decrease over the week.
- Feather River releases are holding at 950 cfs.
- As of January 30th, Sacramento River flows at Freeport were approximately 26,000 cfs. The incoming storm system may stabilize flows for the week ahead.
- For the week of January 30th, San Joaquin River flows at Vernalis were 11,800 cfs. Flows will likely decrease over the next week.
- Delta outflows were 35,000 cfs as of January 30th and will likely decrease through the week.
- As of January 30th, QWEST was approximately +11,000 cfs with a decrease expected for the week ahead, though flows will remain above +5,000 cfs.
- Rio Vista flows were 24,000 cfs as of January 30th.
- X2 is between Martinez and Port Chicago (<65 km).

- The expected daily OMR index values as of January 30th are -3,500 to -5,000 cfs.
 - January 28th OMR at USGS gauge:
 - Daily: -6,100 cfs
 - Five-Day: -5,200 cfs
 - 14-Day: -2,700 cfs
 - January 28th OMR Index:
 - Daily: -4,800 cfs
 - Five-Day: -4,000 cfs
 - 14-Day: -2,000 cfs
 - January 30th OMR Index:
 - Daily: -5,000 cfs
 - Five-Day: -4,500 cfs
 - 14-Day: -2,500 cfs

No updates to the survey table.

Review of Environmental Conditions and Survey Updates

CDFW delivered catch updates on relevant surveys to the SMT.

- The Bay Study released the January catch report noting the following detections:
 - LFS (58 – 109 mm)
 - Sub-adult: 44
 - Adult: Six
- SLS 2 was on the water from January 17th to the 19th. Since the last update, 139 new LFS larvae have been confirmed in the Suisun Bay and West region with fork lengths from 6 to 10 mm. Processing is ongoing.
- SLS 3 is on the water from January 30 to February 1st.
 - Preliminary LFS larvae detections:
 - Station 812: Two (six and seven mm with yolk sac)
 - Station 809: Two
 - Processing is ongoing and SMT will be notified when the 12 Central and South Delta stations have been processed.
- Spring Kodiak Trawl (SKT) 2 will be on the water from February 6th to the 9th.

USFWS provided catch updates on the Enhanced Delta Smelt Monitoring Program (EDSM) and Chipps Island Trawl.

- EDSM was on the water from January 23rd to the 27th completing 34 of 36 scheduled tows with technical issues complicating operations. At least three sites were sampled in all strata. Detections were as follows:
 - DS
 - Lower Sacramento River: One (VIE-tagged DSM Right, Orange, Posterior, 56 mm)
 - Cache Slough: One (VIE-tagged DSM Left, Orange, Anterior, 80 mm)
 - Suisun Bay: One (ad-clipped, 47 mm)
 - LFS
 - Lower Sacramento River: 20
 - Lower San Joaquin River: One
 - Western Delta: 11

- Suisun Bay: 17
 - Suisun Marsh: Five
- EDSM is scheduled to sample January 30th to February 2nd. Preliminary detections are as follows:
 - January 30th
 - DS
 - Lower Sacramento River: One (From soft release on week of January 23rd)
 - Suisun Bay: Two (One from January 19th direct release, and the other from November 30th, 2022)
 - January 31st
 - DS
 - Lower Sacramento River: One (From experimental release the week of January 23rd)
 - Lower San Joaquin River: One (No visible marks)
 - Did not survive transfer to the Fish Conservation and Culture Laboratory
- Chipps Island Trawl was on the water last week completing 30 of 30 scheduled tows.
 - LFS
 - 37 (55 – 119 mm)
- Chipps Island Trawl will sample Monday, Wednesday, and Friday this week.
- The DS abundance estimate for the week of January 30th was 6,884.

CDFW provided a salvage update (January 23rd to the 29th).

- The federal facility reported a 75 mm LFS salvage at 0600 hours on January 25th.
 - The LFS expanded salvage total for WY23 is 20.
- CVP reported reduced counts (30-minute counts reduced to 15 minutes) at the following times due to increased debris loads:
 - January 23rd from 0400 to 0600 hours
 - January 24th at 0600 hours
 - January 25th at 0800 hours
- On January 30th the SWP salvaged Loach, marking the first detection of this species at the State facility.
 - CVP also salvaged Loach. The fish have been transported to Cramer Fish Sciences for genetic identification.
- USFWS noted that salvage data from CVP may not be as reliable in assessing risk due to the reduced counts.

Experimental Release Update

- January 26th marked the first successful soft release with fish acclimating for 48 hours before release.
 - Fish were released early from two previous soft releases due to wind events.
- Differential mortality was noted across the two cages with a few hundred perished fish in one enclosure and a few dozen in the other out of 3,000 in each cage.
- The paired hard release was on January 25th in the Sacramento Deep Water Ship Channel.
- Releases are concluded for WY23.

Relevant Abiotic Conditions

- USBR noted decreasing turbidity across the system with mild wind events possibly elevating turbidity in the short term.

PART 2: Open Discussion on Species Status (Structured-Unstructured Time)

Delta Smelt

The SMT reviewed the Biological Justifications put forth by USBR and DWR in the Outlook.

Some SMT members expressed needing to focus the entrainment risk assessment on fish going into the OMR corridor from the lower San Joaquin River. However, CDFW noted that the ITP requires assessing risk from the Sacramento River and Confluence into the central Delta and export facilities and from the central Delta to the export facilities.

The Biological Justifications and discussion are captured below (Biological Justifications are in *italics*):

- *The Projects operated at -2000 cfs for 19 consecutive days (starting 1/3/2023, first flush for 14 days, then turbidity bridge avoidance for 5 days), at OMR no more negative than -3500 cfs for an additional 5 days, ending 1/27/2023, and at OMR no more negative than -5000 cfs thereafter. The cumulative effects of these actions reduced the entrainment footprint of the Projects for a period that extends through average upstream movement period of Delta Smelt (23.6 days see Sommer et al 2011; also see Grimaldo et al. 2009).*
 - CDFW asked where specifically the 23.6 days came from in Sommer et al 2011, as the paper has several analyses and presents multiple results.
 - DWR stated that they believed the 23.6 days came from an average of the number of days to the SWP after the first flush in table 2.
 - CDFW noted that migratory behavior of DS is highly variable and not necessarily predictable based on timing of salvage highlighted in peer reviewed literature. Using the average value is undermining the relatively high range given by Sommer et al 2011 which signifies the variation of migratory duration.
 - DWR agreed with CDFW's statements regarding migratory variability and noted the importance of including language in the assessments addressing the potential for behavioral differences between cultured and wild DS.
 - CDFW agrees that cultured DS may not behave in the same manner as wild DS. However, the detections in the last week in the lower Sacramento River and preliminary detection of an unmarked adult DS in the Lower San Joaquin River today by EDSM provides further evidence that migratory period is variable and migration this season is still likely ongoing.
 - USFWS noted that previous studies show when the peak of migratory period may be but does not indicate how to minimize entrainment risk during this period. Regression tree from Grimaldo et al. 2021 indicated that salvage was highly variable and unpredictable. From a regulatory standpoint, there is no difference between salvage of released and wild DS.
 - USFWS noted that even if the duration of DS upstream migration were constant, fish may be at higher risk of entrainment following upstream migration, particularly at high turbidities, so other metrics to evaluate exposure to entrainment should be considered.

- *The last detection of Delta Smelt in the South Delta occurred on 1/17/2023 near Franks Tract. Once Delta Smelt move upstream, they have limited movements (Polansky et al. 2017). Therefore, the risk of additional Delta Smelt moving into the interior Delta or getting entrained at the Projects is likely low.*
 - DWR noted that based on the DSM2 hydro model, the unmarked DS detected in the Lower San Joaquin River today is at low risk.
 - USFWS pointed out the need to consider water temperatures and the duration of the spawning window of DS to ensure the next generation is not compromised. and more negative OMR and high turbidities expose the parental population to mortality due to predation in the south Delta and increases potential losses to water projects before the fish are able to successfully reproduce.

- CDFW reminded the SMT that the First Flush Action targets migrating fish, but the Turbidity Bridge Action is targeting fish during localized movements. Clifton Court temporarily reached 12C and cultured fish may have been cued to release eggs due to the temperature or stress of being released. There is concern that if DS moved into the South Delta, they too may have been cued to start spawning, causing larvae and juveniles to be in areas at high risk of entrainment in the future. CDFW suggested that considering an OMR index of -5,000 cfs to be protective needs to be presented with the caveat that spawning may begin soon depending on water temperature.
- *The 2008 FWS BiOp had an offramp for OMR triggers once SJR flows elevated above 10,000 cfs. As of 1/29, SJR flow (@ Vernalis) was 13,155 cfs. Data pre-2008 shows that when SJR flows reach high levels, adult entrainment and calculated proportional losses are relatively small (Kimmerer 2008; Smith et al. 2021) because Delta Smelt distribution shifts seaward away from the influence of the Projects. Turbidity values at OBI are decreasing and are anticipated to continue decreasing this week. Daily turbidity at OBI was 14.5 FNU on 1/29/2023.*
 - USFWS felt that an offramp from a previous biological opinion based on proportional entrainment is not appropriate evidence that an OMR recommendation is not warranted, since it is not currently in the proposed action and effects were not analyzed. Furthermore, proportional losses are not applicable to a fish with a nominal population. When a population is small enough any loss is unacceptable because each individual fish is too valuable.
 - USFWS mentioned that any more protective measures in previous opinions would not have been suggested as they are outside of the current proposed action as well, and we should confine our suggestions to those analyzed in the current PA.
 - USFWS reiterated the critical need to improve entrainment monitoring as salvage is not a consistent index of entrainment. Salvage of entrained fish is far less likely to be observed at current population sizes.
 - CDFW contrasted this bullet point with the first by pointing out that the majority of the DS population cannot be simultaneously upstream and holding for spawning and downstream due to displacement from high storm flows. If DS are aggregating around X2 (Suisun Bay), as some of the field detections in the last week suggest, then they are likely to migrate soon.
 - DWR noted that San Joaquin River flows will likely drop below 10,000 cfs in the coming week, and historically, DS have been observed to spawn in Suisun Marsh and the Napa River in high outflow years.
 - USBR and CDFW noted that their review of the cited and other peer reviewed literature did not seem to directly evaluate the relationship between SJR flows and adult entrainment or proportional losses.
 - CDFW stated that the ITP and CESA does not consider proportional losses but rather that take must be minimized and fully mitigated for.
- *DWR and Reclamation propose that the Projects operating to -5000 cfs OMR will not create conditions that result in any additional movement of Delta Smelt into the interior Delta. The intent of first flush and turbidity bridge was never to expect zero salvage or zero fish movement into the interior Delta as Delta Smelt are capable of swimming to upstream locations under high outflows (Gross et al. 2021). The intent was to severely reduce a large proportion of the Delta Smelt from moving into the entrainment zone which historically (pre-2009 FWS BiOP) led to relatively high proportional population losses (Kimmerer 2008).*
 - The SMT agreed an OMRI recommendation is not warranted this week. Given decreasing turbidity throughout the Delta contrasted with the continued high turbidity in the Sacramento River/confluence, the risk of entraining additional DS has decreased from high to moderate in the OMR corridor and moderate to low elsewhere in the system.

- USFWS emphasized that the rationale for no recommendation was based on turbidity for this week, and not the justification provided for last week.
- CDFW requested that if any information arises in the coming week that could indicate operating to an OMR index of -5,000 cfs is not sufficiently protective (e.g., new detections in salvage or the South Delta), the SMT convene for an off-cycle meeting to reassess risk.

Longfin Smelt

CDFW noted the LFS detections at stations 809 and 812 approaches the requirements needed to trigger COA 8.4.2 (Larval and Juvenile Longfin Smelt Entrainment Protection). If 8.4.2 is triggered between January 31st and February 7th an off-cycle SMT meeting must be convened. CDFW will keep participants updated on LFS detections. COA 8.4.3 (High flow offramp for Longfin Smelt) may be off-ramped in the coming week.

The SMT agreed overall risk for LFS has not changed in since last week.

PART 3: Live-edit Assessments

Proposed Action Weekly Evaluation of Delta Smelt, including Distribution, Abiotic Conditions, Risk Assessment Questions, and Executive Summary

USBR reviewed proposed changes to the PA Assessment, which include the latest dates, detections, conditions, data, and reflects the discussion documented in Part 2 above.

- Evaluation question two suggests current distribution of cultured fish could be the result of disorientation and stress from the experimental release, and migration is likely coming to a conclusion.

ITP Longfin Smelt and Delta Smelt Risk Assessment

The SMT reviewed and discussed updates to the ITP Risk Assessment for DS and LFS, which include the latest dates, detections, conditions, data, and reflects the discussion documented in Part 2 above.

- Section 1-B
 - DS Sub-Adult and Adult Exposure Risk (Hydrology): Decreased to moderate noting reduced turbidity in the system.
 - LFS Exposure Risk (Hydrology): Remains moderate for adults and sub-adults in the Central Delta, and increased to moderate for larvae in the Central Delta.

Part 4: Additional Considerations/Discussion

Agencies reported no items for elevation to WOMT.