

State Water Project Incidental Take Permit Risk Assessment for Delta Smelt and Longfin Smelt

Section 1: Overview

Date: 2/17/2023 (off-cycle meeting)

Life Stages Present:

Delta Smelt (DS): Sub-adults and Adults

Longfin Smelt (LFS): Larvae, Sub-adults, and Adults

Advice to Water Operations Management Team (WOMT):

COA 8.5.1 was triggered by conditions on 2/15/23, and Smelt Monitoring Team (SMT) agreed that a turbidity bridge was formed, and it is not a localized event nor a sensor error. Five-day average OMRI will be restricted to -2,000 cfs for five days starting on 2/18/23. If turbidity drops below 12 FNU on or before the 2/18/23, then this condition will off-ramp and OMRI will not be restricted by COA 8.5.1. If the turbidity increases to 12 FNU or greater thereafter, DWR will have three days to comply to the -2,000 cfs restriction once again.

COA 8.4.2 was triggered when 10 LFS larvae were detected in four (Station 809, 812, 901, and 902) of the 12 Central and South Delta stations. After discussion at SMT, CDFW and DWR did not reach a consensus on a recommendation for OMR flow targets that minimize larval LFS entrainment and/or entrainment risk under COA 8.4.2. CDFW recommends a -2,000 cfs OMRI on a 7-day average to proactively protect larval LFS. DWR recommends a -5,000 cfs OMRI on a 7-day average.

Risk Assessment:

Delta Smelt: The Turbidity Bridge Avoidance Action triggered on 2/15/2023 when the daily average turbidity at OBI reached 12.91 FNU. Turbidity at OBI on 2/16/2023 has remained over 12 FNU (13.09 FNU). Five-day average OMRI will be restricted to the SWP share of -2,000 cfs for five days starting on 2/18/2023. If turbidity drops below 12 FNU on or before 2/18/2023, then this condition will off-ramp and OMRI will not be restricted by COA 8.5.1. If the turbidity increases to 12 FNU or greater thereafter, DWR will have three days to comply to the -2,000 cfs restriction once again. The turbidity event starting on 2/15/2023 may have, in part, been triggered by wind, and was not caused by turbid waters entering via the tributaries. A rise in turbidity occurred on 2/15/2023 and was not isolated to one location. A decline in turbidity was observed on 2/16/2023 at many central and south Delta sites after strong winds have receded, yet turbidity at OBI and stations in the Lower San Joaquin River remain stable and above 12 NTU. Continued widespread turbidity from the Lower Sacramento River and Lower San Joaquin River reaching the OBI station (the region where entrainment into the South Delta may occur)

has increased connectivity from the Lower San Joaquin River to the OMR Corridor over the past few days, increasing risk. This turbidity may cause localized movements of Delta Smelt in these regions related to spawning aggregations and fish seem to move towards higher turbidity and lower salinity. There is uncertainty regarding these movements and how this turbidity pattern may result in entraining additional adults into the South Delta or increasing entrainment of progeny, but more positive OMRI will be more protective. Turbidity conditions will continue to be monitored in the next few days. In the last two weeks, there have not been any detections of Delta Smelt in the lower San Joaquin River or the south Delta, aside from marked Delta Smelt that were detected at SWP on 2/8/2023 and CVP on 2/12/2023, 2/13/2023, and 2/14/2023, for a cumulative season total of 24. Overall risk for entrainment is low for Delta Smelt outside of the OMR corridor and risk is moderate for fish within the OMR corridor. However, the recent turbidity event on 2/15/2023 has strengthened the connectivity between the northern OMR corridor and the lower San Joaquin River and may increase risk of movement into the OMR corridor.

Longfin Smelt: Ten LFS larvae were detected in four (Station 809, 812, 901, and 902) of the 12 Central and South Delta stations by Smelt Larva Survey (SLS) 4, triggering COA 8.4.2. SMT convened an off-cycle meeting and discussed a Particle Tracking Model (PTM) run. The results of the run showed a 5% difference in entrainment of larvae already in the OMR corridor at 902 between -2,000 cfs scenario and baseline scenario. The results also showed a 7% difference from 815 to the projects after three weeks, and a 5% difference in larvae pushed past Chipps between -2,000 cfs scenario and baseline scenario. There is a 11% increase from 812 at the -2,000 cfs scenario in larvae pushed past Chipps between -2,000 cfs scenario and baseline scenario. since mid-January, three sub-adult and one adult LFS were salvaged at the SWP and CVP fish salvage facilities, and the cumulative salvage is 20. One adult LFS was detected in the Lower San Joaquin River by Enhanced Delta Smelt Monitoring Program (EDSM) on 1/26/23 and 1/19/23. Four larvae have been detected in the Lower San Joaquin River (Station 809, 812) by SLS 3. Many fish were detected by SLS and EDSM in and westward of Suisun Bay, suggesting that LFS are dispersing widely, and distribution has shifted more downstream with the increased outflow from the storm in January. LFS adults are moving into spawning habitat, and spawning is on-going. Adult and sub-adult LFS were detected by EDSM in San Pablo, Suisun Bay, Suisun Marsh, Lower Sacramento River, and Lower San Joaquin River, and at the Confluence by Chipps Island Trawl. X2 has shifted upstream to just above 65 km (Port Chicago). Fish are likely distributing widely, which will help decrease risk. Risk remains low outside of the South Delta, and risk remains moderate within the South Delta.

Section 1-A: Sacramento River and Confluence

Table 1: Risk of entrainment into the Central Delta and export facilities for Delta Smelt in the Sacramento River and Confluence:

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
DS larvae and juveniles	Exposure Risk (Hydrology)	NA	Spawning hasn't started, no larvae present. Water temperatures are now suitable for spawning (Damon et al. 2016).
DS subadults and adults	Routing Risk (Behavior and life history)	Low	While localized movement in preparation for spawning is underway, the extent of migration under the current flow and turbidity conditions is highly uncertain. Distribution has shifted upstream into fresh water. Two marked DS were detected in the Lower Sacramento River and the Confluence by EDSM on 2/14/23 and 2/15/23. Two marked ripe female DS were detected by SKT 2 in the Lower Sacramento River (Station 704) and Sacramento Deepwater Shipping Channel (Station 719) on 2/8/23. One unmarked adult DS was detected by EDSM on 1/31/23 in the Lower San Joaquin River just north of Antioch and one was detected by EDSM on 2/9/23 in Suisun Marsh. Eleven marked DS were detected in the Lower Sacramento River, Confluence, Sacramento Deep Water Ship Channel, and Cache Slough from 2/01/23 to 2/16/23. Chipps Island trawl detected a marked DS on 1/19/23.
DS	Overall Entrainment Risk	Low	Same as above.

Table 2: Risk of entrainment into the Central Delta and export facilities for Longfin Smelt in the Sacramento River and Confluence:

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
LFS larvae and juveniles	Exposure Risk (Hydrology)	Low	25 larvae were detected in the Confluence and the Lower Sacramento River by SLS 2 and SLS 3.
LFS sub-adults and adults	Routing Risk (Behavior and life history)	Low	Spawning is ongoing. Staging downstream of X2 is continuing and with the recent dry weather, X2 has shifted upstream to just above 65 km (Port Chicago). Fish are likely distributing widely, which will help decrease risk. Five sub-adult and adult LFS

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
			have been detected in the Lower Sacramento River and the Confluence by EDSM this month.
LFS	Overall Entrainment Risk	Low	Same as above.

Section 1-B: Central Delta

Table 3: Risk of entrainment into the export facilities for Delta Smelt in the Central Delta:

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
DS subadults and adults	Exposure Risk (Hydrology)	Moderate	Five marked DS were salvaged from 2/8/23 to 2/14/23. One unmarked DS was detected in the South Delta in EDSM on 1/17/23, and one marked adult was detected in salvage on 1/7/23. Risk is moderate within the South Delta and low in the Central Delta. The recent turbidity spike on 2/15/2023 has again strengthened the connectivity between the northern OMR corridor and the Lower San Joaquin River and may increase risk of movement into the OMR corridor.

Table 4: Risk of entrainment into the export facilities for Longfin Smelt in the Central Delta:

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
LFS larvae	Exposure Risk (Hydrology)	Moderate	Ten larvae were detected in the Lower San Joaquin River and the Central Delta (Stations 809, 812, 901, 902) by SLS 4. Risk is elevated to moderate for LFS larvae outside of the OMR corridor, and high for LFS larvae within the OMR corridor.
LFS sub-adults and adults	Exposure Risk (Hydrology)	Moderate	One adult was detected in the Lower San Joaquin River by EDSM on 1/19/23 and 1/26/23, and one adult was detected in salvage on 1/25/23. Overall risk of entrainment remains low outside of the OMR corridor. However, within the OMR corridor the risk continues to be moderate.

- Change in exposure from previous week: *(Note: The change in risk compared to previous weeks is not required by the Incidental Take Permit [ITP]).*
 - DS: Risk in South Delta remains moderate. Two marked DS were detected in the Lower Sacramento River and the Confluence by EDSM on 2/14/23 and 2/15/23. Five marked adult DS were detected in salvage between 2/8/23 and 2/14/23. All five salvaged fish were from the Rio Vista release on 1/18-1/19/23, and expanded seasonal salvage for DS is currently 24. One marked adult DS was detected in salvage on 1/7/23, the marked fish came from the DS Experimental Release that occurred in the Sacramento River near Rio Vista on 11/30/22. One unmarked adult was detected by EDSM on 2/09/23 in Suisun Marsh, and on 1/17/23 in the South Delta. One marked DS was detected by Chipps Island Trawl on 1/19/23 from the Experimental Release that occurred in Rio Vista on 1/18/23. One unmarked adult DS and one marked DS were detected by EDSM in Lower San Joaquin River and Lower Sacramento River respectively on 1/31/23. The recent turbidity spike on 2/15/2023 has strengthened the connectivity between the northern OMR corridor and the Lower San Joaquin River again, and may increase risk of movement into the OMR corridor. Risk of entrainment for fish outside of the South Delta remains low.
 - LFS: Risk is elevated to moderate for LFS larvae outside of the OMR corridor, and high for LFS larvae within the OMR corridor. 688 larvae were detected so far this season by SLS, but some stations are still being processed. Ten larvae have been detected in the Lower San Joaquin River and Central Delta (Station 809, 812, 901, and 902) by SLS 4. One sub-adult was detected in salvage on 1/25/23, and cumulative expanded salvage is 20. Spawning is on-going. For adult and sub-adult LFS risk remains low outside of the OMR corridor, and moderate for LFS within the OMR corridor.

- Reporting Old and Middle River Index (OMRI) *(Number and range of OMRI bins will vary based on anticipated hydrology and operations)*
 - Expected daily OMRI range this week: -2,000 cfs starting 2/18/23 through 2/22/23 if turbidity at OBI remains above 12 FNU.

Section 2: Basis for Advice

The 2020 ITP ([Incidental Take Permit for Long-Term Operation of the State Water Project in the Sacramento-San Joaquin Delta 2081-2019-066-00](#)) states that advice to WOMT shall be based on the following Conditions of Approval:

List relevant Condition of Approval number and title based on species/life stage, time of year, etc.

8.3.1 Integrated Early Winter Pulse Protection. Between December 1 and January 31 each year Permittee shall reduce south Delta exports for 14 consecutive days to maintain a 14-day average OMRI no more negative than -2,000 cfs, and convene the SMT within one day of triggering the following criteria:

- Three-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 greater than, or equal to, 50 Nephelometric Turbidity Units (NTU), 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.

After maintaining a 14-day average OMRI no more negative than -2,000 cfs for 14 days, Permittee shall maintain a 14-day average OMRI no more negative than -5,000 cfs, initiating the OMR Management season, until the OMR Management Season ends (Condition of Approval 8.8).

The Integrated Early Winter Pulse Protection Action may only be initiated once during the December 1 through January 31 time period each year.

8.3.2 Salmonid Presence. After January 1 each year, if Conditions of Approval 8.3.1 or 8.3.3 have not already been triggered, the OMR Management season shall begin when the Salmon Monitoring Team first estimates that 5% of the CHNWR or CHNSR population is in the Delta whichever is sooner. Upon initiation of the OMR Management season, Permittee shall reduce exports to achieve, and shall maintain a 14-day average OMR index no more negative than -5,000 cfs, until the OMR Management season ends (see Condition of Approval 8.8). In the event that a salmon daily or single-year loss threshold is exceeded (Conditions of Approval 8.6.1, 8.6.2, 8.6.3, or 8.6.4) prior to the start of OMR Management season the requirements in those Conditions shall control operations.

8.3.3 Adult Longfin Smelt Entrainment Protection. After December 1, if an Integrated Early Winter Pulse Protection (Condition of Approval 8.3.1) has not yet initiated, Permittee shall reduce south Delta exports to maintain a 14-day average OMRI no more negative than -5,000 cfs and initiate OMR Management (Condition of Approval 8.3) if:

- Cumulative combined LFS salvage (total estimated LFS counts at the CVP and SWP salvage facilities beginning December 1 through February 28 exceeds the most recent Fall Midwater Trawl (FMWT) LFS index¹ divided by 10, OR
- Real-time monitoring of abiotic and biotic factors indicates a high risk of LFS movement into areas at high risk of future entrainment, as determined by DWR and CDFW SMT staff.

When evaluating the possibility of LFS movement into areas that may be subject to an elevated risk of entrainment, the SMT shall evaluate catch of LFS with fork length ≥ 60 mm by the Chippis Island Trawl (conducted by USFWS) as an early warning indicator for LFS migration movement into the Delta, in addition to other available survey and abiotic data. The SMT shall communicate the results of these risk assessments and advice to the WOMT (Condition of Approval 8.1.3), and operational decisions shall be made as described in Condition of Approval 8.1.4 (Collaborative Approach to Real-time Risk Assessment).

8.4.1 OMR Management for Adult Longfin Smelt. From the onset of OMR Management (Condition of Approval 8.3) through February 28, the SMT shall conduct weekly, or more often as needed, risk assessments (see Condition of Approval 8.1.5.2) and decide whether to recommend an OMR flow requirement between -5,000 cfs and -1,250 cfs to minimize entrainment and take of adult LFS. The SMT may provide advice to restrict south Delta exports for seven consecutive days to achieve a seven-day average OMRI within three risk categories:

- 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

If a risk assessment conducted by the SMT determines that a more restrictive OMR flow requirement is needed to minimize take of adult LFS, the SMT shall provide its advice to WOMT (Condition of Approval 8.1.3) and operational decisions shall be made following the process described in Condition of Approval 8.1.4 (Collaborative Approach to Real-time Risk Assessment).

This Condition will terminate when a high-flow off-ramp occurs (Condition of Approval 8.4.3), or when LFS spawning has been detected in the system, as determined by the SMT, or, if there is disagreement and resolution is not reached within WOMT, as determined by CDFW. The SMT shall consider results from Additional LFS Larval Sampling (Condition of Approval 7.6.1) to inform its assessment of the start of LFS spawning. After LFS spawning has been observed,

¹ The Fall Midwater Trawl (FMWT) Survey annual abundance index for LFS is calculated as the sum of September through December monthly abundance indices and is typically reported at about the same date as adult salvage begins in December. The FMWT Index available beginning on December 1 each year shall be used to establish this threshold.

Permittee shall implement Condition of Approval 8.4.2 to minimize take of larval and juvenile LFS.

8.4.2 Larval and Juvenile Longfin Smelt Entrainment Protection. From January 1 through June 30, when a single Smelt Larva Survey (SLS) or 20 mm Survey (20 mm) sampling period exceeds one of the following thresholds:

- LFS larvae or juveniles found in four or more of the 12 SLS or 20 mm stations in the central Delta and south Delta (Stations 809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, 919), or
- LFS catch per tow exceeds five LFS larvae or juveniles in two or more of the 12 stations in the central Delta and south Delta (Stations 809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, 919).

Permittee shall restrict south Delta exports for seven consecutive days to maintain a seven-day average OMR index no more negative than -5,000 cfs. Permittee shall also immediately convene the SMT to conduct a risk assessment (see Condition of Approval 8.5.1.2) to assess the risk of larval and juvenile LFS entrainment into the South Delta Export Facilities, determine if an OMR flow restriction is warranted, and recommend an OMR flow limit between -1,250 and -5,000 cfs. The SMT risk assessment and operational advice shall be reviewed by the WOMT (Condition of Approval 8.1.3) via the Collaborative Real-time Decision-making process (Condition of Approval 8.1.4). Permittee shall operate to the export restriction and OMR flow target approved through Conditions of Approval 8.1.3 and 8.1.4. Each week the SMT shall convene to conduct a new risk assessment and determine whether to maintain, or off ramp from, export restrictions based on the risk to LFS, or until the DS and LFS off-ramp has been met as described in Condition of Approval 8.8 (End of OMR Management).

From January 1 through June 30, DWR and CDFW SMT staff shall conduct weekly, or more often as needed, risk assessments (see Condition of Approval 8.5.1.2) to assess the risk of larval and juvenile LFS entrainment into the South Delta Export Facilities. As a part of the risk assessment the SMT shall provide advice on the appropriate OMR flow targets to minimize LFS entrainment or entrainment risk, or both. The SMT shall provide its advice to WOMT (Condition of Approval 8.1.3) and use the Collaborative Approach to Real-time Risk Assessment process described in Condition of Approval 8.1.4 to determine if an OMR flow restriction is warranted and determine OMR flow limit between -1,250 and -5,000 cfs. The OMR flow limit shall be in place until the next risk assessment conducted by the SMT determines that it is no longer necessary to minimize take or related impacts to LFS, or until the DS and LFS off-ramp has been met as described in Condition of Approval 8.8 (End of OMR Management).

8.4.3 High Flow Off-Ramp from Longfin Smelt OMR Restrictions. OMR management for adult, juvenile, or larval LFS as described in Conditions of Approval 8.4.1 and 8.4.2 are not required, or would cease if previously required, 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.

8.5.1 Turbidity Bridge Avoidance. The purpose of this Condition is to minimize the risk of entrainment of adult DS in the corridors of the Old and Middle rivers into the south Delta export facilities. This Condition is intended to avoid the formation of a turbidity bridge from the San Joaquin River shipping channel to the south Delta export facilities, which historically has been associated with elevated salvage of pre-spawning adult DS.

After the Integrated Early Winter Pulse Protection (Condition of Approval 8.1.3) or February 1 (whichever comes first), until April 1, Permittee shall manage exports to maintain daily average turbidity in Old River at Bacon Island (OBI) at a level of less than 12 FNU. If the daily average turbidity at OBI is greater than 12 FNU, 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 FNU.

If, after five consecutive days of OMR flow that is less negative than -2,000 cfs, the daily average turbidity at OBI is not less than 12 FNU the Smelt Monitoring Team may convene to assess the risk of entrainment of DS (Condition of Approval 8.1.5.2). The Smelt Monitoring Team may provide advice to WOMT regarding changes in operations that could be conducted to minimize the risk of entrainment of DS (Condition of Approval 8.1.3). The Smelt Monitoring Team may also determine that OMR restrictions to manage turbidity are infeasible and may instead provide advice for a different OMR flow target that is between -2,000 and -5,000 cfs and is protective based on turbidity and adult DS distribution and salvage to the WOMT for consideration (Condition of Approval 8.1.3). Operational decisions shall be made following the process described in Condition of Approval 8.1.4 (Collaborative Real Time Risk Assessment).

Turbidity readings at individual sensors can generate spurious results in real time. Spurious results could be incorrectly interpreted as a turbidity bridge, when in fact the cause is a result of local conditions or sensor error. To assess whether turbidity readings at OBI are attributable to a sensor error or a localized turbidity spike, Permittee, in coordination with Reclamation, may consider and review data from other nearby locations and sources. Additional information that will be reviewed include regional visualizations of turbidity, alternative sensors, and boat-based turbidity mapping, particularly if there was evidence of a local sensor error. Permittee may bring data from these additional sources to the Smelt Monitoring Team for consideration during the development of a risk assessment to be provided to the WOMT for evaluation (Condition of Approval 8.1.3).

Permittee shall use the decision-making process described Condition of Approval 8.1.4 (Collaborative Real-time Risk Assessment) to determine if south Delta exports may increase after five-days of OMR no more negative than -2,000 cfs, or to determine that this action is not warranted due to a sensor error or localized turbidity

event. Permittee shall implement this action until CDFW is in agreement that the action may be ended or modified.

8.12 Barker Slough Pumping Plant Longfin and Delta Smelt Protection. Permittee shall operate the BSPP to protect larval LFS from January 15 through March 31 of dry and critical water years. Permittee shall operate to protect larval DS from March 1 through June 30 of dry and critical years. If the water year type changes after January 1 to below normal, above normal or wet, this action will be suspended. If the water year type changes after January to dry or critical, Permittee shall operate according to this Condition of Approval.

From January 15 through March 31 of dry and critical water years, Permittee shall reduce the maximum seven-day average diversion rate at BSPP to less than 60 cfs when larval LFS are detected at Station 716. In addition, in its weekly meetings from January 15 through March 31, the Smelt Monitoring Team shall review LFS abundance and distribution survey data and other pertinent abiotic and biotic factors that influence the entrainment risk of larval LFS at the BSPP. When recommended by the Smelt Monitoring Team, and as approved through the decision making processes described in Conditions of Approval 8.1.3 and 8.1.4, Permittee shall reduce the maximum seven-day average diversion rate at BSPP according to the advice provided by the Smelt Monitoring Team.

From March 1 through June 30 of dry and critical water years, Permittee shall reduce the maximum seven-day average diversion rate at BSPP to less than 60 cfs when larval DS are detected at Station 716. In addition, in its weekly meetings from March 1 through June 30, the Smelt Monitoring Team shall review DS abundance and distribution survey data and other pertinent abiotic and biotic factors that influence the entrainment risk of larval DS at the BSPP (including temperature and turbidity). When recommended by the Smelt Monitoring Team, and as approved through the decision-making processes described in Conditions of Approval 8.1.3 and 8.1.4, Permittee shall reduce the maximum seven-day average diversion rate at BSPP to less than 60 cfs.

The DS requirements described in this condition may be adjusted to align with USFWS requirements to minimize take of DS through an amendment to this ITP.

8.13 Water Year Type Definition. All references to water year type in this ITP shall be defined based on the Sacramento Valley Index unless otherwise noted.

Discussion of Conditions of Approval

Provide discussion addressing criteria for each Condition of Approval listed in "Basis for Advice" section. Refer to data below where appropriate.

COAs relevant to OMR management went into effect December 1st. The Smelt Monitoring Team (SMT) conducted a Risk Assessment based on COA 8.1.5.2.

8.3.1: This COA was triggered by conditions measured on 12/31/22 when the three-day average of daily flow and turbidity was 26,552 cfs and 77 FNU and respectively. Operations were reduced on 1/3/23, targeting a 14-day average OMRI no more negative than -2,000 cfs for 14 consecutive days through 1/16/23. After 1/16/23, the 14-day average OMRI shall be no more negative than -5,000 cfs, initiating the OMR Management Season until the OMR Management Season ends (COA 8.8). This condition has been off-ramped as of 1/16/23.

8.3.2: This COA is no longer active due to the initiation of an Integrated Early Winter Pulse Protection (IEWPP- COA 8.3.1).

8.3.3: This COA is no longer active due to the initiation of an IEWPP (COA 8.3.1). One adult LFS was detected in salvage on 1/1/23, this was the first LFS salvage of WY 2023. The FMWT LFS index for September through December is 403, therefore the salvage threshold to trigger this COA is 40 LFS.

8.4.1: This COA is no longer active due to the detection of larval LFS by SLS.

8.4.2: This COA was triggered on 2/16/23 with the detection of LFS larvae at four (stations 809, 812, 901, and 902) of the 12 Central and South Delta stations by SLS 4. Exports will be managed for seven consecutive days to maintain a seven-day average OMR index no more negative than -5,000 cfs. SMT convened for an off-cycle meeting on 2/17/23 and discussed the risk of larval LFS entrainment in the Central and South Delta while looking at the PTM run provided by DWR. There was a non-consensus between CDFW and DWR, and the decision has been elevated to WOMT. WOMT is convening for an off-cycle meeting on 2/17/23 shortly after the SMT meeting.

8.4.3: This COA is no longer triggered as of 2/11/23 due to flow in the San Joaquin River at Vernalis decreasing to under 5,000 cfs.

8.5.1: Previously this condition was triggered on 1/17/23 by the conditions measured on 1/17/23 when the turbidity at OBI was 17 FNU. OMRI was limited to no more negative than -2,000 cfs. After the first five days (1/17/23 through 1/21/23), turbidity was still above 12 FNU at OBI, therefore the SMT reconvened to assess risk. The SMT reassessed risk for DS but was unable to reach consensus on a recommendation between -2,000 cfs and -5,000 cfs on 1/19/23. On 1/20/23 WOMT reached consensus to allow operational flexibility to maintain maximum exports until 1/24/23 when the SMT met again, which may have resulted in an OMRI as negative as -3,500 cfs. On 1/24/23 the OMRI had not reached -3,500 cfs (was -2,100 cfs as of 1/23/23) and proposed operations were to maintain maximum exports as long as possible and

operate to an OMRI of -5,000 cfs for the week. The SMT reassessed risk for DS and determined that risk for DS in the South Delta was high and moderate outside the South Delta because of ongoing high turbidity. Additionally, the SMT agreed that risk of entrainment would increase if OMRI were to become more negative, however the SMT was unable to reach consensus on an OMRI recommendation. WOMT met on 1/25/23 and came to a consensus for -5,000 cfs OMRI for one week starting on 1/26/23. The SMT reassessed risk for DS on 1/31/23 and came to a consensus that no further restrictions were warranted, because turbidity was decreasing. On 2/9/23 daily turbidity at Old River at Bacon Island decreased to less than 12 FNU, therefore this COA was no longer triggered.

This COA was triggered again by conditions on 2/15/23. SMT agreed that a turbidity bridge was formed, and it is not a localized event nor a sensor error. Five-day average OMRI will be restricted to -2,000 cfs for five days starting on 2/18/23. If turbidity drops below 12 FNU on or before the 2/18/23, then this condition will off-ramp and OMRI will not be restricted by COA 8.5.1. If the turbidity increases to 12 FNU or greater thereafter, DWR will have three days to comply to the -2,000 cfs restriction once again.

8.12: This COA is not currently active due to water year type. The February water year type forecast is Above Normal. This COA may become active if the Water Year Type forecast is updated to dry or critical in March.

8.13: The Sacramento Valley Water Year Type Index (SVI) February forecast corresponding to the 50% probability of exceedance is 7.86 which is in the range for a Above Normal water year classification. The forecast was reported on the California Data Exchange Center (CDEC) [Water Supply Index Webpage](#), accessed on 02/13/2023.

Section 3: Hydrology and Operations

Assessment of hydrologic, operational, and meteorological information. 8.1.5.2 A.

Section 3-A: Water operations conditions. 8.1.5.2.A. i

- Antecedent Actions: (*e.g. Delta Cross Channel [DCC] gate closure and actions such as integrated early winter pulse protection, etc.*)
 - DCC is closed as of 11/28/22.
- Controlling Factors: OMR
- Water Temperature:
 - Clifton Court Forebay (CCF) Daily Average Water Temperature = NA
 - 3 Station Average = 9.91°C
- Tidal Cycle: Neap tide. Spring tide with new moon will peak on the 19th.
- Turbidity:
 - 8.3.1 Freeport 3-day average = 15.30 formazin nephelometric units (FNU)
 - 8.5.1 Old River at Bacon Island (OBI) Turbidity = 13.08 FNU
- Salinity: X2 = 66 km

- Hydrologic Footprint: No Particle Tracking Models were requested for next meeting, but a PTM run was requested on Thursday and was used in assessing larval LFS risk today.

Section 3-B: Water operations outlook. 8.1.5.2.A. ii

- Outages
 - State Water Project (SWP): None.
 - Central Valley Project (CVP): Reduced count from 1600-1800 on 2/8/23 for vegetation management. No counts occurred on 2/12/23 at 0800, 1000, 1200, or 1400 due to staffing issues.
- Exports:
 - CCF: 2,800 to 3,500 cfs. Anticipated range: 1,500 cfs (30% share of SWP at -2,000 cfs OMRI) from 2/18/23 through 2/22/23
 - Jones: 3,500 to 4,200 cfs
 - Combined: 6,300 to 7,700 cfs
- Meteorological Forecast: A very weak system at start of next week brings breezy northern winds and very light mountain precipitation through Tuesday. Dry and cooler weather from mid to late week, with a slow warming trend.
- Storm Event Projection: n/a

Section 3-C: Projected conditions. 8.1.5.2.A. iii

- DCC Gates position: Scheduled to remain closed for season.
- Sacramento River flow at Freeport: 17,908 cfs as of 2/16/2023. Anticipated range: 15,000 to 22,000 cfs
- San Joaquin River flow at Vernalis: 3,725 cfs as of 2/17/2023. Anticipated range: 3,500 to 4,500 cfs
- Qwest: +1,605 cfs as of 2/16/2023. Anticipated range: likely around +1,400 cfs today but may be increased to +3,000 if turbidity at OBI continues to be greater than 12 FNU.
- OBI Turbidity: 13.08 FNU
- NDOI: 16,806 cfs as of 2/12/2023. Anticipated range: 15,000-20,000 cfs
- Upstream releases:
 - Keswick = 3,250 cfs. No anticipated changes.
 - Nimbus = 4,000 cfs. Anticipated range: 3,000 to 4,000 cfs
 - Goodwin = 200 cfs. No anticipated changes.
 - Oroville = 950 cfs. No anticipated changes.

Table 5: Comparison of OMR and OMR Index (5-day and 14-day averages for OMR Index and USGS gauge were reported on [SacPAS website](#), accessed 17 February 2023.

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
2/14/2023	Daily	-4,380	-4,990
2/14/2023	5-day	-5,530	-4,990
2/14/2023	14-day	-5,370	-4,870

Section 4: Distribution and Biology.

8.1.5.2.B. Assessment of biological information for Delta Smelt and Longfin Smelt

Section 4-A: Delta Smelt population status 8.1.5.2.B. i

- EDSM: Two marked DS were detected in the Lower Sacramento River and the Confluence by EDSM on 2/14/23 and 2/15/23. One unmarked individual was detected in Suisun Marsh on 2/9/23. One unmarked adult (Fork Length (FL): 73mm) DS was detected in the Lower San Joaquin River on 1/31/23. Sixteen marked DS were detected in Suisun Bay, Cache Slough, Sacramento Deepwater Shipping Channel, and Lower Sacramento from 1/24/23 to 2/7/23. One unmarked adult (FL: 71mm) DS was detected in the South Delta near Franks Tract on 1/17/23. One subadult DS (FL: 55mm) and one adult DS (FL: 62mm) were detected in Lower Sacramento River on 11/3/22 and 11/7/22 respectively.
- Chipps Island Trawl: One marked DS (FL: 68mm) detected on 1/19/23. This fish was from the experimental release at Rio Vista on 1/18/23.
- Fall Mid-water Trawl (FMWT) Index for Delta Smelt: 0
- Delta Smelt life cycle model (LCM) discussion: NA
- Biological Conditions: The recent turbidity spike on 2/15/2023 has strengthened the connectivity between the northern OMR corridor and the Lower San Joaquin River and may increase risk of movement into the OMR corridor. X2 has shifted upstream to just above 65 km (Port Chicago) and will continue to increase in the coming week. While localized movements in preparation for spawning are still underway, the extent of migration both spatially and temporally under the current flow and turbidity conditions is highly uncertain. There is also a high degree of uncertainty regarding the response of cultured fish to environmental cues typically applied to wild DS. Distribution has shifted upstream into fresh water, though some fish are present downstream due to high outflow from the storm in January.
- % of population in Delta zones: NA
- Smelt Larva Survey (SLS) or 20mm Survey: Many stations are still being processed, but SLS has not detected any DS so far this season.
- SKT: Survey 2 detected two marked, ripe DS in the Lower Sacramento River (station 704) and Sacramento Deep Water Ship Channel (station 719) .

- Salvage: One marked adult (FL: 63mm) DS was salvaged at CVP on 2/14/23, two marked adult (FL: 59-69mm) DS were salvaged at CVP on 2/13/23, one marked adult (FL: 63mm) was salvaged at CVP on 2/12/23, one marked adult (FL: 73mm) was salvaged at SWP on 2/8/23, and one marked adult (FL: 74mm) DS was salvaged at CVP on 1/7/2023. All four DS salvaged in the last week were from the Rio Vista release on 1/18-1/19/23 The expanded seasonal salvage is 24.
- FCCL lampara net sampling detected two adult DS (FL: ~60mm [estimated since fish were not directly handled]) in the Lower Sacramento River on 12/14/22. One fish was untagged, and the other fish was tagged with red VIE tag (hard release) from the experimental release.
- Experimental release: Approximately 13,000 cultured DS were released in the Sacramento Deepwater Shipping Channel on 1/25/23 and 1/26/23, 17,570 cultured DS were released in the Sacramento River near Rio Vista on 1/18/23 and 1/19/23, and 13,140 fish were released in the Sacramento River near Rio Vista on 11/30/22. No further experimental releases are scheduled for this water year.

Section 4-B: Longfin Smelt population status 8.1.5.2.B. ii.

- FMWT Index: 403
- Other Surveys:
 - EDSM: 15 sub-adult (FL: 67-83mm) and six adult LFS (FL: 85-96mm) were detected in Suisun Bay, Suisun Marsh, Western Delta, and the Confluence during the week of February 3rd – 10th.
 - Chipps Island Trawl: 20 sub-adult (FL: 75-84mm) and 15 adult LFS (FL: 85-114mm) were detected during the week of February 3rd – 10th.
 - SLS: Ten larvae were detected in the Lower San Joaquin River and the Central Delta (Stations 809, 812, 901, 902) by SLS 4 (Table 1).
 - SKT: Survey 2 detected ten sub-adult (FL:65-77mm) and eight adult (FL: 85-104mm) LFS in Lower Sacramento River, Confluence, and Suisun region.
 - Bay Study: In January, Bay Study detected six adults (FL: 87-109mm) and 44 sub-adult (FL: 58-84mm) LFS in stations ranging from the Lower Sacramento River to the South Bay. Distribution was widespread but overall, more downstream than in December.
- Salvage: One sub-adult (FL: 75mm) LFS was salvaged at CVP on 1/25/2023. The expanded seasonal salvage is 20.

Section 4-C: Additional data sources to assess sensitivity to entrainment Delta.8.1.5.2.C & D. i

Notes:

- DWR confirmed that the back-up sonde at OBI also shows daily turbidity being above 12 FNU, thus confirming that it is not a sensor error.
- SMT agrees a turbidity bridge is present and is not a localized event.
- CDFW and DWR agree that COA 8.5.1 is a hard trigger, regardless of whether DS behave differently between small changes in turbidity around 12 FNU. If daily average turbidity

at OBI drops below 12 FNU during the 3-day period that SWP has to comply, then the SWP does not need to comply with the -2,000 OMRI required by COA 8.5.1 for five days. Furthermore, if daily average turbidity at OBI drops below 12 FNU, then subsequently increases above 12 FNU again, then the 3-day period to comply restarts.

- Federal agencies abstained from this ITP COA 8.5.1 discussion.
- The DSM2 model USBR provided assumed both CVP and SWP would operate exports to maintain OMRI in the scenarios modeled (-2,000 cfs, -3,500 cfs, and -5,000 cfs).
- The PTM run DWR provided assumed only SWP will reduce exports in the different OMRI scenarios because LFS are not federally protected in the PA.
 - SWP share of -2,000 cfs OMRI results in an OMRI of about -3,000 cfs.
 - SWP share of -3,500 cfs OMRI results in an OMRI of about -3,500 cfs.
- CDFW and DWR did not reach a consensus on what OMR recommendation is protective enough for larval LFS under COA 8.4.2.
 - CDFW recommends a -2,000 cfs OMRI to proactively protect larval LFS given the recent detections of larval LFS in the Central and South Delta by SLS 4.
 - DWR recommends a -5,000 cfs OMRI given the relatively small (2-7%) difference between particles entrained by the export facilities after three weeks.
 - Federal agencies abstained from this discussion as it is only relevant in the ITP.

Literature Cited:

Damon, L. J., S. B. Slater, R. D. Baxter, and R. W. Fujimura. 2016. Fecundity and reproductive potential of wild female Delta smelt in the upper San Francisco Estuary, California. *California Fish and Game* 102(4):188–210.

Attachments: Table 1: SLS 4 Catch Table, and Figure 1: Map of SLS.

Table 1: LFS catch for SLS 4 February 13th – 15th. Only stations with catch of DS and LFS are reported here. These data are preliminary and subject to change.

Survey #	SLS Station	Date	Turbidity (NTU)	Secchi (cm)	Species	Smelt Catch	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Yolk Sac (# of Individuals)
4	809	2/13/2023	18.6	44	Longfin Smelt	6	6	7	6.3	5
4	812	2/13/2023	15.0	52	Longfin Smelt	2	7	7	7.0	1
4	901	2/13/2023	12.3	64	Longfin Smelt	1	6	6	6.0	1
4	902	2/13/2023	12.5	64	Longfin Smelt	1	8	8	8.0	0

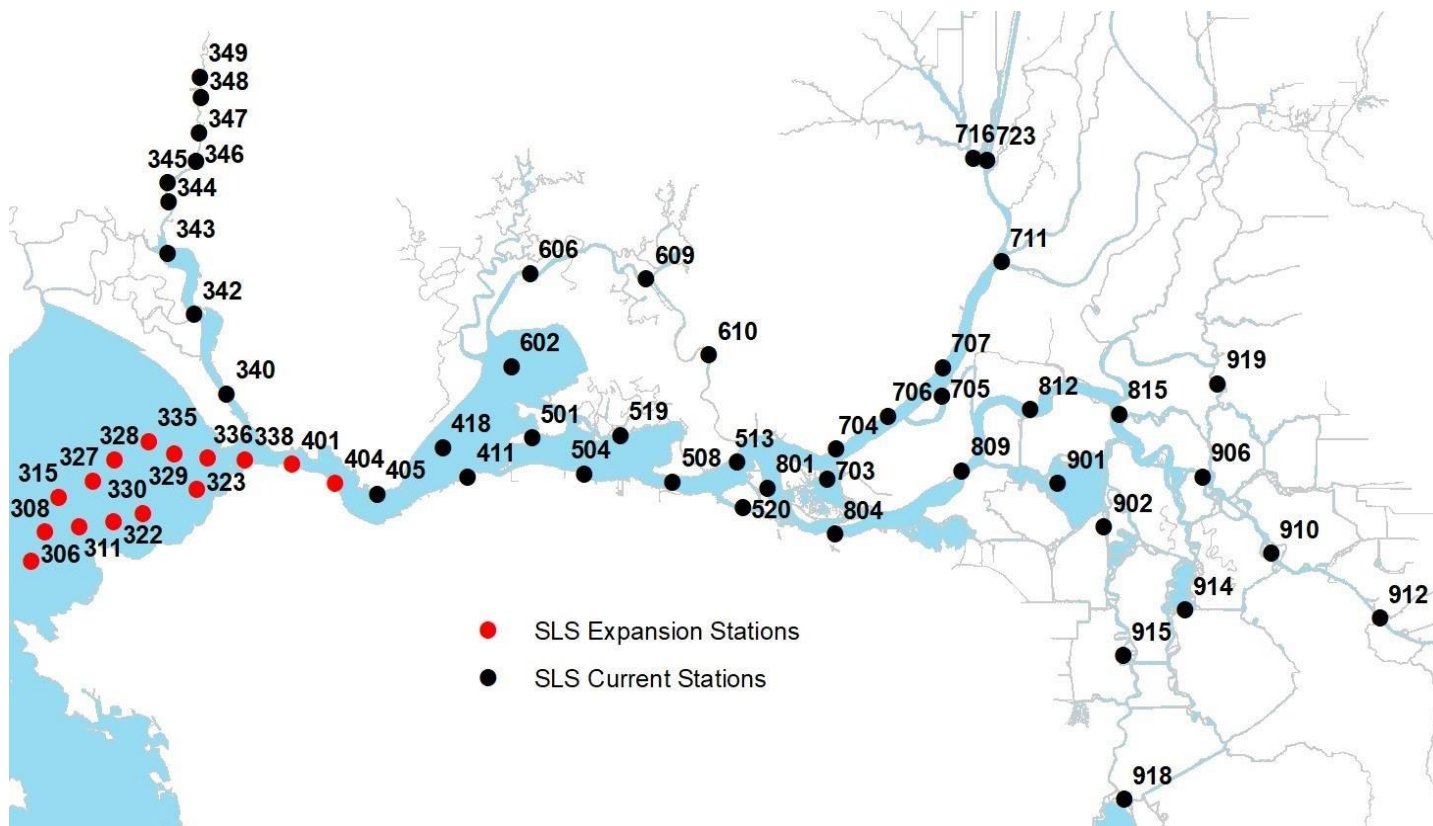


Figure 1: Map of SLS stations