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

Section 1: Overview

Date: 3/28/2023

Life Stages Present:

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

Advice to Water Operations Management Team (WOMT):

No recommendation to WOMT this week.

Condition of Approval (COA) 8.5.1 was triggered by the conditions on 3/17/23 with the daily turbidity at OBI exceeding 12 FNU, and will off-ramp on 4/1/23. COA 8.5.2 became active by the conditions on 3/18/23 with the water temperature exceeding 12°C at Jersey Point, and triggered due to SLS 6/20mm Survey 1 Secchi readings being < 1m. However, neither of these COAs are controlling because OMRI is highly positive and is predicted to remain highly positive throughout the week.

Risk Assessment:

Delta Smelt: Based on recent detection data and distribution patterns over the past decade, the Delta Smelt population has completed spawning migration and is widely distributed throughout the Delta. Continued movement at a smaller spatial scale is expected. Water temperatures are suitable for spawning (Damon et al. 2016) and for the presence of larval Delta Smelt. Starting 3/13/23, one marked adult Delta Smelt was detected by surveys in the Sacramento Deepwater Ship Channel. The most recent detections of Delta Smelt in salvage were two marked Delta Smelt detected at the CVP and SWP on 3/2/23. Under the PA, the Turbidity Bridge Avoidance Action off-ramped starting 2/9/23 due to detections of ripe Delta Smelt. A turbidity bridge formed on 3/17/23. Three-day average water temperature at Jersey Point exceeded 12˚ C on 3/18/23, and the most recent Secchi depths in the South Delta were below 1m, triggering COA 8.5.2. However, these actions are not controlling OMRI. Due to highly positive QWEST and OMRI, overall risk for entrainment is low for all life stages of Delta Smelt throughout the Delta.

Longfin Smelt: Risk remains low for all lifestages as a result of favorable hydrology. COA 8.4.3 was triggered on 3/3/23 and remains triggered with San Joaquin River flow at Vernalis continuing to exceed 5,000 cfs. No salvage was detected in the past two weeks, and the cumulative adult and sub-adult seasonal salvage is 26. X2 remains downstream west of Martinez (<56 km) and QWEST remains highly positive (~41,000 cfs). Many fish were detected

by SKT, SLS and EDSM in and westward of Suisun Bay, suggesting that LFS are distributed widely, and spawning is on-going but reaching the end. Adult and sub-adult LFS were detected in San Pablo Bay, Suisun Bay, and the Lower Sacramento River by EDSM and at the Confluence by Chipps Island Trawl (3/19/23 – 3/24/23). Fish distribution continues to shift downstream with high outflow.

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)	Low	Spawning has started, but no larvae have been detected. Water temperatures are above 12°C at Jersey Point and 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. One marked DS was detected by EDSM in the SDWSC on 3/21/23.
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	46 larvae were detected in the Confluence and the Lower Sacramento River by SLS 6 and 20mm Survey 1 (processing is on-going). One juvenile (Fork length (FL): 21mm) was detected in the Confluence by SKT 3.
LFS sub-adults and adults	Routing Risk (Behavior and life history)	Low	Spawning is ongoing. X2 is < 56 km. Fish are widely distributed resulting in low risk. Two adult LFS was detected in the Lower Sacramento River and SDWSC by EDSM in the last two weeks. Nine adult and sub-adult LFS were detected by Chipps Island Trawl from 3/19/23 to 3/24/23.

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
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 larvae and juveniles	Exposure Risk (Hydrology)	Low	Spawning has started, but no larvae have been detected. Water temperatures are above 12°C at Jersey Point and suitable for spawning (Damon et al. 2016).
DS subadults and adults	Exposure Risk (Hydrology)	Low	No DS were detected in salvage or in field surveys in this region in the last two weeks (3/13/23 - 3/27/23).

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)	Low	Twelve larvae were detected in the Central and South Delta (Stations 812, 815, 901) by SLS 6. One larva was detected (Station 901) by 20-mm Survey 1.
LFS sub-adults and adults	Exposure Risk (Hydrology)	Low	No sub-adult and adult LFS were detected in salvage or in field surveys in this region in the last two weeks (3/13/23 - 3/27/23) although there were reduced counts at SWP for one day (3/14/23-3/15/23). Overall risk of entrainment remains low.

- 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: Overall risk of entrainment remains low for all lifestages of DS.
    - LFS: Overall risk of entrainment remains low for all lifestages of LFS.
- 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: +5,000 to +17,000 cfs

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 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 index[1] 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 Chipps 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.

8.5.2 Larval and Juvenile Delta Smelt Protection. If the five-day cumulative salvage of juvenile DS at the CVP and SWP facilities is greater than or equal to one plus the average prior three years' FMWT index (rounded down), 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.

Additionally, if the five-day cumulative salvage threshold is met or exceeded, Permittee shall immediately convene the Smelt Monitoring Team to conduct a risk assessment (Condition of Approval 8.1.5.2) and determine the future risk of entrainment and take of larval and juvenile DS. The Smelt Monitoring Team may provide advice to further restrict south Delta exports to maintain a more positive OMR than -5,000 cfs. The Smelt Monitoring Team may provide advice for further restrictions within three risk categories:

- Low risk: Limit OMR between -4,000 cfs to -5,000 cfs
- Medium risk: Limit OMR between -2,500 cfs to -4,000 cfs
- High risk: Limit OMR between -1,250 cfs to -2,500 cfs

The duration and magnitude of operational advice shall be provided to the WOMT (Condition of Approval 8.1.3) and decisions shall be made following the process described in Condition of Approval 8.1.4 (Collaborative Real Time Risk Assessment). When conducting risk assessments to evaluate the risk of entrainment and take of juvenile DS the Smelt Monitoring Team shall evaluate the following information sources, in addition to any other models or surveys they deem appropriate and those listed in Condition of Approval 8.1.5.2:

- Results from a CDFW approved DS life cycle model.
- DS recruitment levels identified by the Smelt Monitoring Team using the CDFW approved life cycle model that links environmental conditions to recruitment, including factors related to loss as a result of entrainment such as OMR flows. In this context, recruitment is defined as the estimated number of post-larval DS in June per number of spawning adults in the prior February-March period.
- Hydrodynamic models and forecasts of entrainment informed by the EDSM or other relevant survey data to estimate the percentage of larval and juvenile DS that could be entrained.

When a larval or juvenile DS is detected in the SLS or 20 mm, or the 3-day average water temperature at Jersey Point is greater than or equal to 12°C, and Secchi depth from the most recent SLS or 20 mm survey is less than or equal to 1 meter, averaged across the 12 south Delta survey stations (809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, and 919). Permittee shall 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 20mm 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 (see Condition of Approval 8.1.3) and follow the decision-making process described in Condition of Approval 8.1.4.

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 for the first time this season 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 were 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 non-consensus between CDFW and DWR, and the decision was elevated to WOMT. WOMT convened for an off-cycle meeting on 2/17/23 and decided that OMRI would be limited to -3,500 cfs on a seven-day average. On 2/21/23 SMT agreed to continue to recommend OMRI be limited to -3,500 cfs, however there was non-consensus on the duration of this protection between CDFW and DWR in SMT and WOMT on 2/21/23 and 2/22/23 respectively. This was elevated to the Directors, and they decided that DWR would manage exports to -3,500 cfs OMRI until SMT can reassess with further LFS data by SLS 5.

This COA was triggered for the second time this season on 2/28/23 with the detection of 14 LFS larvae in the Central and South Delta (Station 809, 812, 901, 902, and 915) by SLS 5. SMT did not come to consensus on a recommendation on 2/28/23. CDFW recommended OMRI be limited to -2,000 cfs on a 7-day average for the protection of larval LFS based on the PTM results and recent detections by SLS 5. DWR recommended limiting OMRI to -5,000 cfs due to a positive QWEST and improvement in hydrodynamic conditions relative to last week. The decision was elevated to WOMT. It was decided to keep the -3,500 cfs OMRI restrictions until COA 8.4.3 off-ramps COA 8.4.2 later in the week. COA 8.4.3 off-ramped this COA on 3/2/23.

This COA was not triggered by SLS 6. Twelve larvae were detected in three of the 12 Central and South Delta stations (Station 812, 815, and 901) by SLS 6 and one larvae (Station 901) was preliminarily detected by 20mm Survey 1. Neither SLS 6 nor 20mm Survey met the threshold for this COA, and thus this COA is no longer triggered as of 3/21/23.

8.4.3: This COA was triggered for the first time this season by the conditions measured on 1/3/23 when the flow of the San Joaquin River at Vernalis exceeded 8,000 cfs, but no longer triggered as of 2/11/23 due to flow in the San Joaquin River at Vernalis decreasing to under 5,000 cfs.

This COA was triggered for the second time this season by the conditions measured on 3/2/23 when the flow of San Joaquin River at Vernalis exceeded 8,000 cfs, and temporarily off-ramped COA 8.4.2. It is expected for this condition to remain triggered through the week of 3/27/23.

8.5.1: This condition was triggered for the first time this season on 1/18/23 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 for the second time this season by the conditions on 2/15/23. SMT agreed that a turbidity bridge had formed, and it was not a localized event nor a sensor error. Five-day average OMRI would have been restricted to -2,000 cfs for five days starting on 2/18/23, if turbidity didn't drop below 12 FNU on or before 2/18/23. On 2/17/23, the daily turbidity at OBI decreased to less than 12 FNU, therefore this COA was no longer triggered.

SMT met on 2/21/23 and agreed that turbidity will likely spike again in the afternoon, and DWR will have three days to comply to -2,000 cfs OMRI restriction if the daily average turbidity at OBI exceeds 12 FNU. The daily average turbidity at OBI was above 12 FNU on 2/21/23, triggering this COA for the third time this season. DWR exports were restricted to the SWP share of -2,000 OMRI from 2/24/23 through 2/26/23. On 2/26/23, the daily turbidity at OBI decreased to less than 12 FNU, therefore this COA was no longer triggered.

This COA was triggered for the fourth time this season by the conditions on 3/17/23. However, it has not been controlling and is unlikely to be controlling by 4/1/23 due to OMRI being highly positive. This condition will off-ramp on 4/1/23.

8.5.2: This COA became active on 3/18/23 with Jersey Point exceeding 12°C and triggered due to SLS 6 and 20mm Survey 1 recording Secchi depth < 1m. However, it has not been controlling and is unlikely to be controlling within the next seven days due to OMRI being highly positive.

As of 2/21/23, the federal agencies are following COA 8.5.2 per order 6(i) of the Interim Operations Plan (IOP).

8.12: This COA is not currently active due to water year type. The March 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 April.

8.13: The Sacramento Valley Water Year Type Index (SVI) March forecast corresponding to the 50% probability of exceedance is 8.02 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 03/13/23.

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: Limited real time demand
- Water Temperature:
    - Clifton Court Forebay (CCF) Daily Average Water Temperature = NA
    - 3 Station Average = 12.03°C
- Tidal Cycle: in the heart of neap cycle and will be in spring tide with a full moon on 4/5/23
- Turbidity:
    - 8.3.1 Freeport 3-day average = 40.73 formazin nephelometric units (FNU)
    - 8.5.1 Old River at Bacon Island (OBI) Turbidity = 20.85 FNU
- Salinity: X2 = < 56 km
- Hydrologic Footprint: Particle Tracking Model will be run when projections show San Joaquin River flow at Vernalis will drop below 5,000 cfs and off-ramp COA 8.4.3.

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

- Outages
    - State Water Project (SWP):
        - 3/22/23 (0900): reduced one count due to high fish number
    - Central Valley Project (CVP): None

- Exports:
    - CCF: 2,600 cfs. Anticipated range: 2,500 to 6,680 cfs
    - Jones: 3,500 cfs. Anticipated range: 800 to 4,200 cfs
    - Combined: 3,300 to 10,880 cfs
- Meteorological Forecast: Storm system arrives Monday night bringing moderate rains, gusty winds, and heavy mountain snow through Wednesday. Showery by mid-Wednesday, then tapering off. Unsettled weather with chances of showers and below normal temperatures continuing into the weekend.
- Six-day Storm Event Projection: Expecting another series of precipitation over the weekend favoring the north coast with about one to two inches of precipitation in the San Joaquin River Basin and Sacramento Basin.

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: 63,697 cfs as of 3/27/23. Anticipated range: 40,000 to 70,000 cfs
- San Joaquin River flow at Vernalis: 35,741 cfs as of 3/27/23. Anticipated range: 25,000 to 36,000 cfs
- Qwest: +44,326 cfs as of 3/27/23. Anticipated range: +30,000 to +40,000 cfs
- OBI Turbidity: 20.85 FNU
- NDOI: 107,264 cfs as of 3/27/23. Anticipated range: 60,000 to 100,000 cfs
- Upstream releases:
    - Keswick = 3,250 cfs. No anticipated changes.
    - Nimbus = 7,000 cfs. Anticipated range: 7,000 to 10,000 cfs
    - Goodwin = 1,500 cfs. Anticipated range: 300 to 1,500 cfs
    - Oroville = 15,000 cfs. Anticipated range: 5,000 to 15,000 cfs

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 28 March 2023.

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
3/25/2023	Daily	+10,990	+10,950
3/25/2023	5-day	+10,310	+10,570
3/25/2023	14-day	+5,680	+6,180

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: One marked adult (FL: 83mm) was detected in SDWSC on 3/21/23 (Table 1). Two marked adult (FL: 65-72mm) DS were detected in Suisun Marsh and Sacramento Deep Water Ship Channel on 3/6/23 and 3/7/23 respectively. One marked adult (FL: 70mm) DS was detected in the Lower Sacramento River on 2/24/23. Three marked adult (FL: 76-79mm) DS were detected in the Confluence, Lower Sacramento River, and the SDWSC on 2/14/23, 2/15/23, and 2/17/23 respectively. One unmarked (FL: not measured) DS was detected in Suisun Marsh on 2/9/23. One unmarked adult (FL: 73mm) DS was detected in the Lower San Joaquin River on 1/31/23. Sixteen marked (FL: 47-80mm) DS were detected in Suisun Bay, Cache Slough, SDWSC, 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 adult (FL: 84mm) DS was detected on 2/19/23. One marked DS (FL: 68mm) was detected on 1/19/23.
- Fall Mid-water Trawl (FMWT) Index for Delta Smelt: 0
- Delta Smelt life cycle model (LCM) discussion: NA
- Biological Conditions: Turbidity is elevated above 12 FNU across the system and the average Secchi reading in 12 Central and South Delta stations from the last SLS and 20mm Survey is < 1m. X2 remains downstream, west of Martinez (< 56km). 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. Water temperature at Jersey Point is above 12°C and temperatures are conducive to spawning (Damon et al. 2016). Although no larvae have been detected yet, larvae are likely present. 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 freshwater, though some fish are present downstream due to high outflow from the storms in January and March.
- % 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 larvae so far this season.
- SKT: Survey 3 detected two marked DS (one ripe female, one unidentified sex) in SDWSC (station 719). Survey 2 detected two marked, ripe female DS in the Lower Sacramento River (station 704) and Sacramento Deep Water Ship Channel (station 719).
- Salvage: One marked adult (FL:64-67mm) was detected in salvage at SWP and CVP each on 3/2/23, two marked adult (FL: 70-72mm) DS were detected in salvage at SWP on 2/22/23, one marked adult (FL: 65mm) DS was detected in salvage at CVP on 2/22/23, one unmarked adult (FL: 76mm) DS was detected in salvage at CVP on 2/18/23, one

marked adult (FL: 70mm) DS was detected in salvage at CVP on 2/17/23, one marked adult (FL: 63mm) DS was detected in salvage at CVP on 2/14/23, two marked adult (FL: 59-69mm) DS were detected in salvage at CVP on 2/13/23, one marked adult (FL: 63mm) was detected in salvage at CVP on 2/12/23, one marked adult (FL: 73mm) was detected in salvage at SWP on 2/8/23, and one marked adult (FL: 74mm) DS was detected in salvage at CVP on 1/7/2023.The cumulative seasonal salvage of adults is 52.

- 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 unmarked, and the other fish was tagged with red VIE tag (hard release) from the experimental release on 11/30/22.
- 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: Seven sub-adult (FL: 70-83mm) and eight adult LFS (FL: 85-97mm) LFS were detected in the Lower Sacramento River, Suisun Bay, and East San Pablo Bay during the week of March 20th – 24th (Table 1).
  - Chipps Island Trawl: One sub-adult (FL: 84mm) and eight adult LFS (FL: 85-100mm) were detected during the week of March 19th – 24th (Table 2).
  - SLS: Twelve larval LFS across three of the 12 Central and South Delta stations (station 812, 815, and 901) were detected by SLS 6 (Table 3). Processing is ongoing and since the last meeting SLS 4 detected 18 (Table 4), SLS 5 detected 461 (Table 5), and SLS 6 detected 50 (Table 3) , more larval LFS. The average Secchi reading at the 12 Central and South stations for SLS 6 was 45cm.
  - 20-mm Survey: One larval LFS was detected at station 901 (FL: 14mm) and three larval LFS were detected at the Lower Sacramento River, Confluence, and Suisun Bay (Table 6). The average Secchi reading for the 12 Central and South Delta stations was 51cm.
  - 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: No LFS were salvaged in the past two weeks. The cumulative seasonal salvage of adults and sub-adults is 26.

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

Notes

- 20mm Survey 2 is on the water this week.
- SKT 4 is on the water next week.
- COA 8.17 will be in effect starting 4/1/23. However, NDOI is likely to remain above 44,500 cfs and thus not trigger this COA.

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: EDSM Catch Table, Table 2: Chipps Island Trawl Catch Table, Table 3: SLS 6 Catch Table, Table 4: SLS 4 Catch Table, Table 5: SLS 5 Catch Table, Figure 1: Map of SLS, Table 6: 20mm Survey 1 Catch Table, and Figure 2: Map of 20mm Survey.

Table 1: DS and LFS catch for EDSM 2022 Phase 1 Kodiak trawls of March 20th -24th. Only stations with catch of DS and LFS are reported here. These data are preliminary and subject to change. LFS that were mortalities upon capture were returned to the Lodi Fish and Wildlife Office (LFWO) to be frozen.

Date	Stratum	Subregion	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
03/20/2023	Western Delta	East San Pablo Bay	23-34-WD01	LFS	None	90	1	Released
03/20/2023	Western Delta	East San Pablo Bay	23-34-WD01	LFS	None	91	1	Released
03/20/2023	Western Delta	East San Pablo Bay	23-34-WD02	LFS	None	70	1	Released
03/20/2023	Western Delta	East San Pablo Bay	23-34-WD02	LFS	None	78	1	Released
03/20/2023	Western Delta	East San Pablo Bay	23-34-WD02	LFS	None	80	1	Released
03/20/2023	Western Delta	East San Pablo Bay	23-34-WD02	LFS	None	83	2	Released
03/20/2023	Western Delta	East San Pablo Bay	23-34-WD02	LFS	None	96	1	Released
03/20/2023	Western Delta	East San Pablo Bay	23-34-WD02	LFS	None	97	1	Released
03/21/2023	Sac DW Ship Channel	Lower Sac River Ship Channel	23-34-SSC03	DSM	VIE-RGP	83	1	UC Davis
03/22/2023	Lower Sacramento	Lower Sacramento River	23-34-LSR01	LFS	None	85	1	Released
03/22/2023	Suisun Bay	Honker Bay	23-34-SB04	LFS	None	85	1	Released
03/22/2023	Suisun Bay	Honker Bay	23-34-SB04	LFS	None	91	1	Released
03/22/2023	Suisun Bay	Honker Bay	23-34-SB04	LFS	None	93	1	Released
03/22/2023	Suisun Bay	Mid Suisun Bay	23-34-SB03	LFS	None	78	1	Released
03/22/2023	Suisun Bay	West Suisun Bay	23-34-SB05	LFS	None	74	1	Released

Table 2: DS and LFS catch for Chipps Island Trawls March 19th -24th. These data are preliminary and subject to change.

Date	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
3/19/2023	SB018M	LFS	None	84	1	Released
3/19/2023	SB018M	LFS	None	87	1	Released
3/19/2023	SB018N	LFS	None	85	1	Released
3/19/2023	SB018N	LFS	None	98	1	Released
3/19/2023	SB018N	LFS	None	100	1	Released
3/20/2023	SB018S	LFS	None	93	1	Released
3/20/2023	SB018S	LFS	None	95	2	Released
3/21/2023	SB018N	LFS	None	96	1	Released

Table 3: LFS catch for SLS 6 March 13th – 16th. Only stations with catch of DS and LFS are reported here. These data are preliminary and subject to change.

Year	Survey #	SLS Station	Date	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Yolk Sac (# of Individuals)
2023	6	501	3/15/2023	21.1	38	Processed	Longfin Smelt	4	Preliminary	5	7	6.0	0
2023	6	504	3/15/2023	31.8	34	Processed	Longfin Smelt	31	Preliminary	6	7	6.2	16
2023	6	508	3/13/2023	36.0	38	Processed	Longfin Smelt	12	Complete	6	8	6.9	5
2023	6	513	3/13/2023	36.0	49	Processed	Longfin Smelt	5	Preliminary	6	7	6.4	2
2023	6	519	3/15/2023	43.9	33	Processed	Longfin Smelt	3	Preliminary	5	8	6.7	2
2023	6	520	3/13/2023	18.0	57	Processed	Longfin Smelt	5	Preliminary	6	7	6.2	2
2023	6	610	3/15/2023	17.7	50	Processed	Longfin Smelt	3	Preliminary	6	7	6.7	3
2023	6	704	3/13/2023	15.7	44	Processed	Longfin Smelt	7	Preliminary	6	8	6.1	1
2023	6	705	3/13/2023	19.4	44	Processed	Longfin Smelt	2	Complete	7	8	7.5	0
2023	6	706	3/13/2023	19.8	42	Processed	Longfin Smelt	4	Preliminary	6	7	6.3	2
2023	6	707	3/13/2023	18.6	35	Processed	Longfin Smelt	4	Preliminary	6	7	6.3	4
2023	6	711	3/13/2023	19.9	25	Processed	Longfin Smelt	1	Preliminary	8	8	8.0	0
2023	6	723	3/13/2023	32.7	37	Processed	Longfin Smelt	1	Complete	8	8	8.0	0
2023	6	801	3/13/2023	15.8	53	Processed	Longfin Smelt	2	Preliminary	6	8	7.0	2
2023	6	804	3/13/2023	N/A	46	Processed	Longfin Smelt	1	Preliminary	5	5	5.0	1

Year	Survey #	SLS Station	Date	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Yolk Sac (# of Individuals)
2023	6	812	3/13/2023	26.6	42	Processed	Longfin Smelt	2	Complete	8	10	9.0	0
2023	6	815	3/13/2023	29.3	37	Processed	Longfin Smelt	7	Complete	6	8	7.1	3
2023	6	901	3/13/2023	18.5	54	Processed	Longfin Smelt	3	Complete	5	7	5.7	2

Table 4: 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.

Year	Survey #	SLS Station	Date	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Yolk Sac (# of Individuals)
2023	4	306	2/13/2023	9.4	76	Processed	Longfin Smelt	1	Complete	8	8	8	1
2023	4	308	2/13/2023	10.8	64	Processed	Longfin Smelt	1	Complete	10	10	10	0
2023	4	327	2/13/2023	62.7	22	Processed	Longfin Smelt	2	Complete	7	11	9	1
2023	4	328	2/13/2023	82.9	38	Processed	Longfin Smelt	4	Preliminary	8	13	10.5	0
2023	4	329	2/13/2023	9.3	67	Processed	Longfin Smelt	1	Complete	65	65	65	0
2023	4	335	2/13/2023	16.9	51	Processed	Longfin Smelt	4	Preliminary	9	11	10.3	0
2023	4	338	2/13/2023	11.1	75	Processed	Longfin Smelt	1	Complete	9	9	9	0
2023	4	340	2/14/2023	16.4	57	Processed	Longfin Smelt	5	Complete	9	11	10	0

Year	Survey #	SLS Station	Date	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Yolk Sac (# of Individuals)
2023	4	342	2/14/2023	12.3	65	Processed	Longfin Smelt	6	Complete	7	11	8.8	2
2023	4	343	2/14/2023	21.5	47	Processed	Longfin Smelt	5	Complete	8	11	9.6	0
2023	4	344	2/14/2023	16.0	49	Processed	Longfin Smelt	101	Complete	8	16	11.9	7
2023	4	345	2/14/2023	17.9	54	Processed	Longfin Smelt	76	Complete	8	15	10.8	10
2023	4	346	2/14/2023	16.0	51	Processed	Longfin Smelt	221	Preliminary	8	15	N/A	0
2023	4	347	2/14/2023	11.5	54	Processed	Longfin Smelt	34	Complete	8	15	11.9	0
2023	4	401	2/13/2023	13.5	64	Processed	Longfin Smelt	1	Preliminary	7	7	7.0	0
2023	4	404	2/13/2023	24.7	39	Processed	Longfin Smelt	10	Complete	N/A	N/A	N/A	N/A
2023	4	405	2/15/2023	10.1	52	Processed	Longfin Smelt	3	Complete	8	9	8.3	1
2023	4	411	2/15/2023	14.2	46	Processed	Longfin Smelt	11	Complete	7	11	9.3	3
2023	4	418	2/15/2023	15.1	63	Processed	Longfin Smelt	11	Complete	7	11	9.3	3
2023	4	501	2/15/2023	33.4	31	Processed	Longfin Smelt	21	Complete	3	14	9.4	11
2023	4	504	2/15/2023	25.2	34	Processed	Longfin Smelt	359	Complete	6	13	8.4	227
2023	4	508	2/15/2023	36.4	27	Processed	Longfin Smelt	64	Complete	6	15	8.8	26
2023	4	513	2/15/2023	29.3	26	Processed	Longfin Smelt	25	Complete	6	8	6.8	21
2023	4	519	2/15/2023	74.4	21	Processed	Longfin Smelt	7	Complete	7	12	9.1	3

Year	Survey #	SLS Station	Date	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Yolk Sac (# of Individuals)
2023	4	520	2/14/2023	28.5	35	Processed	Longfin Smelt	18	Complete	6	12	8.5	5
2023	4	602	2/15/2023	23.1	34	Processed	Longfin Smelt	11	Complete	7	8	7.7	8
2023	4	606	2/15/2023	39.9	22	Processed	Longfin Smelt	20	Complete	6	14	9.9	7
2023	4	609	2/15/2023	57.1	38	Processed	Longfin Smelt	10	Complete	9	13	10.3	1
2023	4	703	2/14/2023	20.5	52	Processed	Longfin Smelt	5	Complete	7	8	7.2	5
2023	4	704	2/14/2023	21.9	39	Processed	Longfin Smelt	3	Complete	6	7	6.7	3
2023	4	706	2/14/2023	22.8	39	Processed	Longfin Smelt	11	Complete	6	7	6.8	7
2023	4	707	2/14/2023	18.1	48	Processed	Longfin Smelt	7	Complete	6	7	6.4	4
2023	4	801	2/14/2023	23.3	48	Processed	Longfin Smelt	6	Complete	6	7	6.7	4
2023	4	804	2/14/2023	21.9	51	Processed	Longfin Smelt	11	Complete	7	14	9.5	6
2023	4	809	2/13/2023	18.6	44	Processed	Longfin Smelt	6	Complete	6	7	6.3	5
2023	4	812	2/13/2023	15.0	52	Processed	Longfin Smelt	2	Complete	7	7	7.0	1
2023	4	901	2/13/2023	12.3	64	Processed	Longfin Smelt	1	Complete	6	6	6.0	1
2023	4	902	2/13/2023	12.5	64	Processed	Longfin Smelt	1	Complete	8	8	8.0	0

Table 5: LFS catch for SLS 5 February 27th – March 1st. Only stations with catch of DS and LFS are reported here. These data are preliminary and subject to change.

Year	Survey #	SLS Station	Date	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Yolk Sac (# of Individuals)
2023	5	328	3/1/2023	27.5	38	Processed	Longfin Smelt	1	Complete	8	8	8	0
2023	5	338	2/28/2023	15.2	61	Processed	Longfin Smelt	2	Complete	7	8	7.5	1
2023	5	340	2/27/2023	39.4	39	Processed	Longfin Smelt	8	Complete	7	14	9.9	2
2023	5	342	2/27/2023	47.1	31	Processed	Longfin Smelt	19	Complete	7	16	8.8	9
2023	5	343	2/27/2023	43.3	37	Processed	Longfin Smelt	16	Preliminary	8	17	12.8	1
2023	5	344	2/27/2023	27.8	44	Processed	Longfin Smelt	136	Complete	N/A	N/A	N/A	N/A
2023	5	345	2/27/2023	30.1	46	Processed	Longfin Smelt	184	Complete	N/A	N/A	N/A	N/A
2023	5	346	2/27/2023	20.8	56	Processed	Longfin Smelt	48	Complete	N/A	N/A	N/A	N/A
2023	5	347	2/27/2023	33.9	39	Processed	Longfin Smelt	2	Complete	16	17	16.5	0
2023	5	348	2/27/2023	21.9	54	Processed	Longfin Smelt	2	Complete	6	6	6.0	1
2023	5	401	2/27/2023	16.6	57	Processed	Longfin Smelt	1	Complete	8	8	8.0	0
2023	5	404	2/27/2023	21.2	58	Processed	Longfin Smelt	2	Complete	8	13	10.5	0
2023	5	405	3/2/2023	20.4	40	Processed	Longfin Smelt	95	Complete	7	10	7.6	71
2023	5	411	3/2/2023	25.5	35	Processed	Longfin Smelt	194	Complete	7	11	7.7	67

Year	Survey #	SLS Station	Date	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Yolk Sac (# of Individuals)
2023	5	418	3/2/2023	28.6	27	Processed	Longfin Smelt	134	Complete	6	12	8.2	44
2023	5	501	3/2/2023	25.8	26	Processed	Longfin Smelt	91	Complete	6	17	9.1	49
2023	5	504	3/2/2023	28.5	32	Processed	Longfin Smelt	61	Preliminary	6	19	10.8	14
2023	5	508	3/2/2023	23.4	40	Processed	Longfin Smelt	26	Complete	6	15	6.8	6
2023	5	513	2/28/2023	21.8	27	Processed	Longfin Smelt	57	Complete	6	8	7.3	40
2023	5	519	3/2/2023	32.4	27	Processed	Longfin Smelt	58	Complete	6	17	8.2	30
2023	5	520	3/2/2023	17.6	42	Processed	Longfin Smelt	18	Complete	6	7	6.8	11
2023	5	602	3/2/3023	56.0	21	Processed	Longfin Smelt	213	Complete	6	15	7.9	43
2023	5	606	3/2/2023	56.4	20	Processed	Longfin Smelt	9	Complete	7	16	9.9	4
2023	5	610	3/2/2023	29.5	27	Processed	Longfin Smelt	2	Complete	7	8	7.5	2
2023	5	703	2/28/2023	17.9	39	Processed	Longfin Smelt	18	Complete	7	13	8.1	12
2023	5	704	2/28/2023	14.6	60	Processed	Longfin Smelt	3	Complete	7	8	7.7	3
2023	5	705	2/28/2023	8.7	97	Processed	Longfin Smelt	14	Complete	6	8	6.9	7
2023	5	707	2/28/2023	15.5	78	Processed	Longfin Smelt	8	Complete	6	7	6.6	5
2023	5	716	2/28/2023	15.5	48	Processed	Longfin Smelt	8	Complete	6	8	6.6	5
2023	5	723	2/28/2023	14.6	62	Processed	Longfin Smelt	9	Complete	6	7	6.3	6

Year	Survey #	SLS Station	Date	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Yolk Sac (# of Individuals)
2023	5	801	2/28/2023	29.2	38	Processed	Longfin Smelt	43	Complete	8	17	8.0	23
2023	5	804	2/28/2023	20.0	42	Processed	Longfin Smelt	13	Complete	6	15	7.4	10
2023	5	809	2/27/2023	22.1	55	Processed	Longfin Smelt	7	Complete	6	8	6.9	1
2023	5	812	2/27/2023	16.4	61	Processed	Longfin Smelt	1	Complete	7	7	7.0	1
2023	5	901	2/27/2023	24.6	40	Processed	Longfin Smelt	2	Complete	7	7	7.0	2
2023	5	902	2/27/2023	13.7	58	Processed	Longfin Smelt	3	Complete	7	7	7.0	3
2023	5	915	2/27/2023	9.8	91	Processed	Longfin Smelt	1	Complete	8	8	8	1

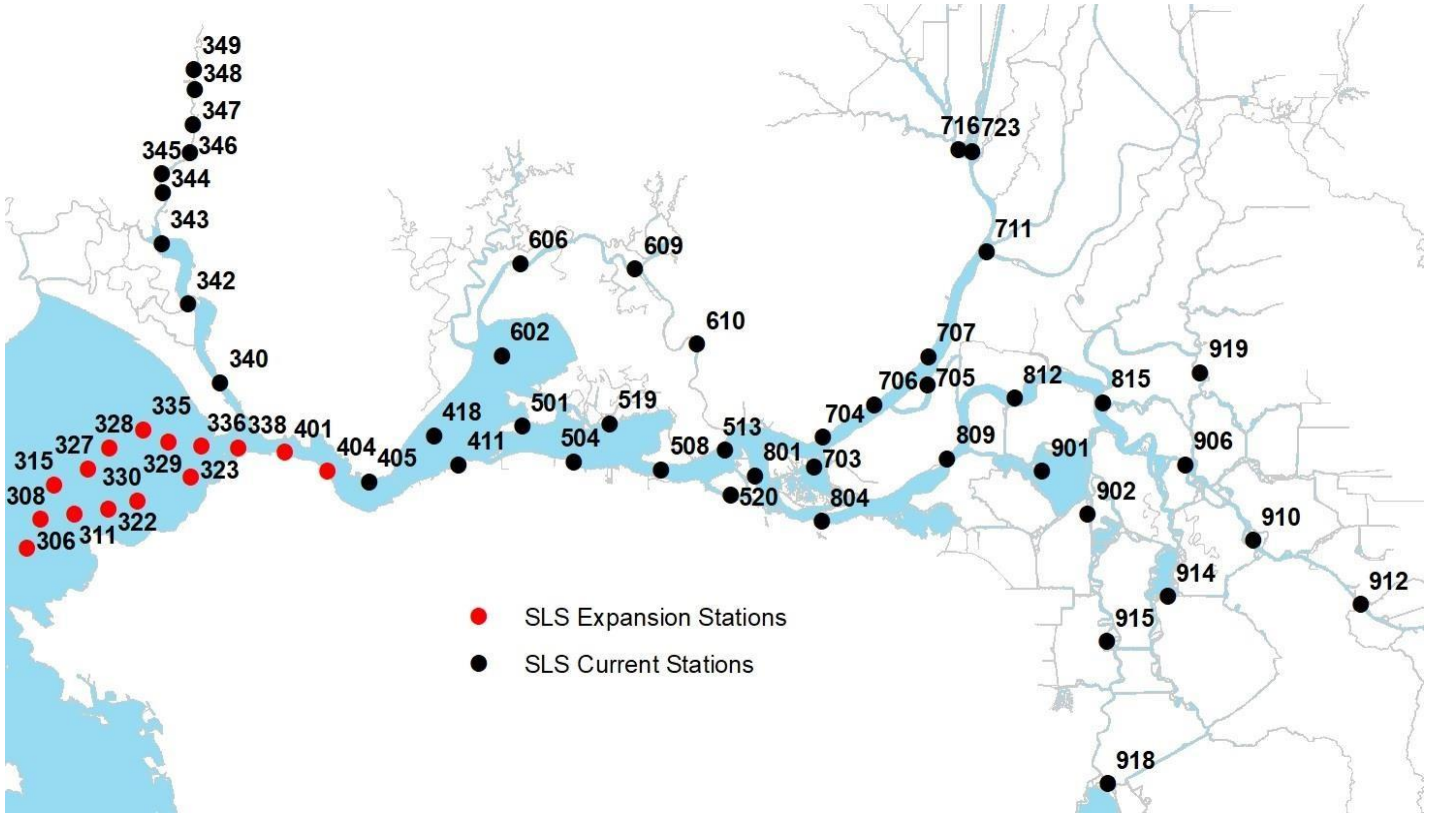

Figure 1: Map of SLS station

Table 6: LFS catch for 20mm Survey 1 March 13th – 16th. Only stations with catch of DS and LFS are reported here. These data are preliminary and subject to change.

Year	Survey	Station	Date	Secchi (cm)	# Tows Processed	Species	Total Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)
2023	1	504	3/16/23	25	3	Longfin Smelt	1	Preliminary	22	22	22.0
2023	1	801	3/15/23	20	1	Longfin Smelt	1	Preliminary	19	19	19.0

Year	Survey	Station	Date	Secchi (cm)	# Tows Processed	Species	Total Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)
2023	1	706	3/17/23	21	3	Longfin Smelt	1	Preliminary	6	6	6.0
2023	1	901	3/13/23	50	3	Longfin Smelt	1	Complete	7	7	7.0

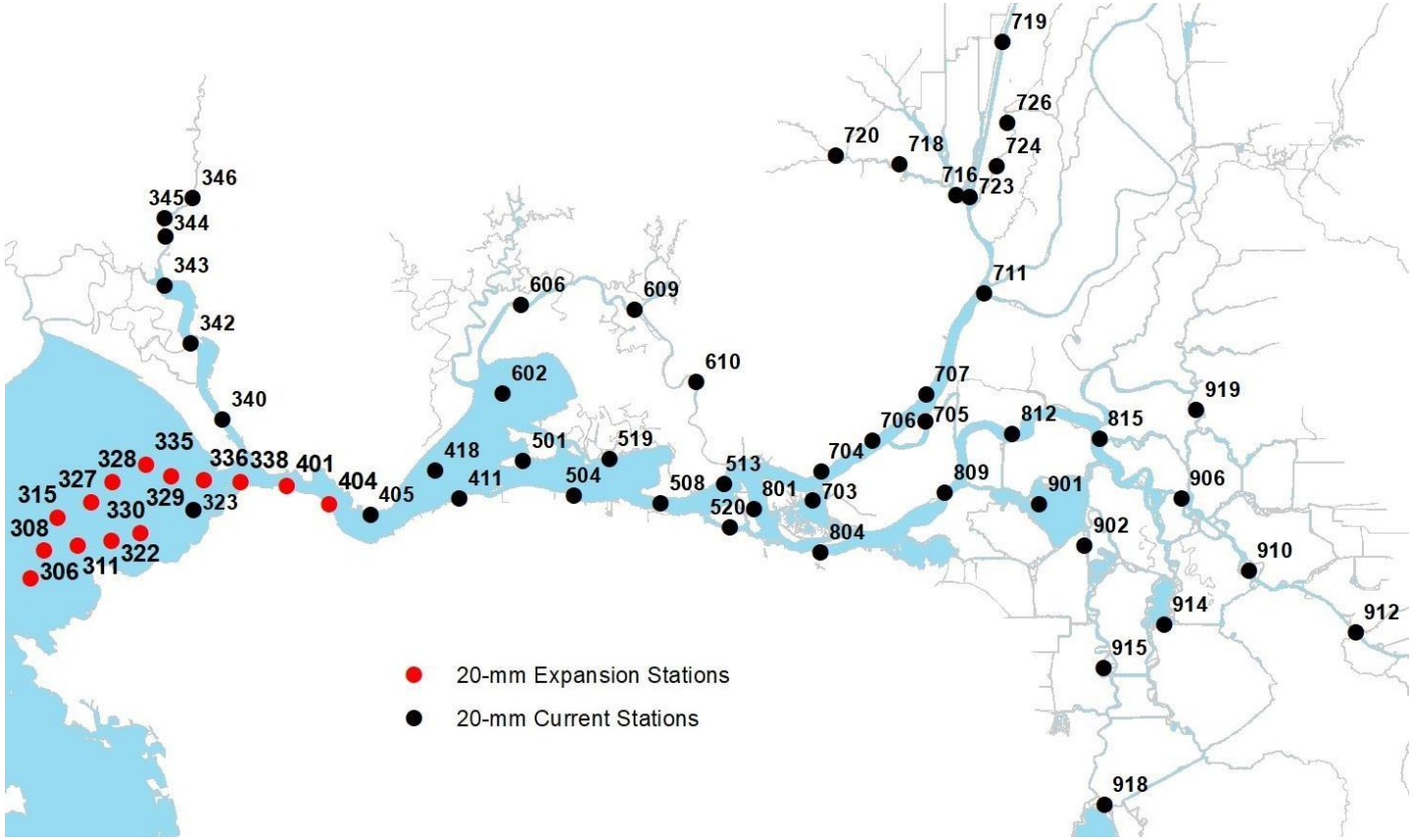

Figure 2: Map of 20mm Survey stations