

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

## Section 1: Overview

**Date: 2/07/2023**

### **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):**

SMT is not making a recommendation for the protection of sub-adult and adult DS as turbidity has begun to decline. The SMT agrees that risk of entrainment to sub-adult and adult DS is moderate in the OMR corridor (low outside) due to turbidity.

### **Risk Assessment:**

#### *Delta Smelt:*

Based on recent detection data, distribution patterns over the past decade, and widespread turbidity in the Delta, Delta Smelt are likely completing migration and recently released fish are widely distributed throughout the Delta. Eight marked Delta Smelt were detected by EDSM in the Sacramento Deepwater Ship Channel, Lower Sacramento River, and Liberty Island between 2/1/23 and 2/6/2023. One unmarked Delta Smelt was detected by EDSM in the lower San Joaquin River near Antioch on 1/31/2023. Earlier detections include one marked Delta Smelt at Chipps on 1/19/2023, one unmarked Delta Smelt on 1/17/2023 in the South Delta near Franks Tract, and one marked Delta Smelt on 1/7/2023 at the CVP (salvage). The Turbidity Bridge Avoidance Action began on 1/17/2023 and continues to be triggered; however, it is not controlling OMRI. Turbidities continue to decrease and are close to or below 12 FNU/NTU in the South Delta. Overall risk for entrainment is low for Delta Smelt outside of the OMR corridor and risk is moderate for fish within the OMR corridor.

*Longfin Smelt:* One sub-adult LFS was detected at the federal fish salvage facility on 1/25/23: the cumulative salvage is now 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, but no additional larvae were detected in the rest of the 12 Central and South Delta stations. 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. 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 about 65 km. Fish are likely distributing widely, which will help decrease risk. Condition of Approval (COA) 8.5.1 Turbidity Bridge Avoidance continues to be triggered but is not controlling OMRI. Turbidity continues to decline. 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:

<b>Species and life stage</b>	<b>Risk type</b>	<b>Risk level</b>	<b>Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)</b>
DS larvae and juveniles	Exposure Risk (Hydrology)	NA	Spawning hasn't started, no larvae present.
DS subadults and adults	Routing Risk (Behavior and life history)	Low	A turbidity bridge is present, which increases the possibility that DS could migrate into the Central and South Delta. Turbidity Bridge Avoidance continues to be triggered but is not controlling OMRI. Turbidity has begun to decline. While migration in preparation for spawning is underway, the extent of migration under the current flow and turbidity conditions is highly uncertain. Distribution is shifting upstream into fresh water. One unmarked adult DS was detected by EDSM on 1/31/23 in the Lower San Joaquin River just north of Antioch and eight marked DS were detected in the Lower Sacramento River, Shipping Channel, and Cache Slough from 2/01/23 to 2/03/23. Chipps Island trawl had detected a marked DS on 1/19/23.
<b>DS</b>	<b>Overall Entrainment Risk</b>	<b>Low</b>	Same as above.

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

<b>Species and life stage</b>	<b>Risk type</b>	<b>Risk level</b>	<b>Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)</b>
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.

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
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 around 65 km. Fish are likely distributing widely, which will help decrease risk. 31 sub-adult and adult LFS have been detected in the Lower Sacramento River and the Confluence by EDSM in the last two weeks.
LFS	Overall Entrainment Risk	Low	Turbidity Bridge Avoidance continues to be triggered but is not controlling OMRI. Turbidity continues to decline.

### 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	Turbidity Bridge Avoidance continues to be triggered but is not controlling OMRI. Turbidity continues to decline. One unmarked individual was detected in the South Delta in EDSM on 1/17/23, and one marked adult was detected in salvage on 1/7/23. A turbidity bridge is present, which increases the possibility that DS could migrate into the Central and South Delta. Risk is moderate within the South Delta and low in the Central Delta.

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	Four larvae were detected in the Lower San Joaquin River (Stations 809, 812) by SLS 3. Turbidity Bridge Avoidance continues to be triggered but is not controlling OMRI. Turbidity continues to decline
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. Turbidity Bridge Avoidance continues to be triggered but is not controlling OMRI,

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
			therefore overall risk of entrainment remains low outside of the OMR corridor. Turbidity continues to decline. 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. 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 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. Turbidity Bridge Avoidance continues to be triggered but is not controlling OMRI. Turbidity continues to decline. Risk of entrainment for fish outside of the South Delta remains low.
  - LFS: Risk remains low for LFS outside of OMR corridor. 448 larvae were detected so far this season by SLS, but some stations are still being processed. Four larvae have been detected in the Lower San Joaquin River (Station 809, 812) by SLS 3, and processing is ongoing, but no additional larvae were detected in the rest of the Central and South Delta stations. One adult was detected in salvage on 1/25/23, and cumulative expanded salvage is 20. Spawning is on-going. Turbidity Bridge Avoidance continues to be triggered but is not controlling OMRI. Turbidity continues to decline. However, risk remains 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)*
  - Relevant COA 8.5.1 was triggered on 1/17/23 and ongoing, but not controlling.
  - Expected daily OMRI range this week: -5,000 cfs.
  - High turbidity is still present but has started decreasing therefore risk of entrainment for DS in the South Delta is moderate and low outside the South Delta.

## 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 index<sup>1</sup> 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  $\geq 60$  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,

---

<sup>1</sup> 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 1<sup>st</sup>. 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 are being 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 expands to a salvage of four LFS. This is 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 became active on 1/1/23. SLS 3 detected four larvae in station 809 and 812. Processing is ongoing, but no additional larvae have been detected in the rest of the Central and South Delta stations.

8.4.3: Conditions currently exceed the thresholds described in this COA, temporarily off-ramping COA 8.4.2. If flows subsequently drop below 5,000 cfs in the San Joaquin River at Vernalis, COA 8.4.2 shall come into effect. Flow conditions may drop below these thresholds this week.

8.5.1: 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 are warranted at this time, because turbidity is starting to decrease. This condition will likely be no longer in effect later in the week of 2/6/23.

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

8.13: The Sacramento Valley Water Year Type Index (SVI) January forecast corresponding to the 50% probability of exceedance is 6.6 which is in the range for a Below Normal water year classification. The forecast was reported on the California Data Exchange Center (CDEC) [Water Supply Index Webpage](#), accessed on 01/11/2023.

### 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.
  - COA 8.5.1 was triggered by conditions on 1/17/23, but no longer controlling.
- Controlling Factors: OMR
- Water Temperature:
  - Clifton Court Forebay (CCF) Daily Average Water Temperature = NA
  - 3 Station Average = 9.26°C
- Tidal Cycle: Spring tide peaked on 2/5, and neap cycle will peak this weekend
- Turbidity:
  - 8.3.1 Freeport 3-day average = 23.29 formazin nephelometric units (FNU)
  - 8.5.1 Old River at Bacon Island (OBI) Turbidity = 12.72 FNU
- Salinity: X2 ~ 65 km
- Hydrologic Footprint: No Particle Tracking Models were requested.

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

- Outages
  - State Water Project (SWP): None.
  - Central Valley Project (CVP): None
- Exports:
  - CCF: 3,500 to 5,700 cfs
  - Jones: 3,500 to 4,200 cfs

- Combined: 7,000 to 9,900 cfs
- Meteorological Forecast: Dry weather through the week, with cool nights and daytime high temperatures at or above normal levels.
- 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: 20,937 cfs as of 2/6/2023. Anticipated range: 15,000 to 22,000 cfs
- San Joaquin River flow at Vernalis: 6,208 cfs as of 2/6/2023. Anticipated range: 5,000 to 6,500 cfs
- Qwest: +4,020 cfs as of 2/5/2023. Anticipated range: continue to be significantly positive, but may drop to +3,000 by next week.
- OBI Turbidity: 12.72 FNU
- NDOI: 21,126 cfs as of 2/5/2023. Anticipated range: 15,000-22,000 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 07 February 2023.

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
2/3/2023	Daily	-5,660	-5,020
2/3/2023	5-day	-5,840	-4,970
2/3/2023	14-day	-4,930	-3,740

**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 unmarked adult (Fork Length (FL): 73mm) DS was detected in the Lower San Joaquin River on 1/31/23. 15 marked DS were detected in Suisun Bay, Cache Slough, Sacramento Deepwater Shipping Channel, and Lower Sacramento from 1/24/23 to 2/3/23. One unmarked adult (FL: 71mm) DS was detected in the South Delta near Franks Tract on 1/17. 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: X2 has shifted upstream to about 65 km. A turbidity bridge formed on 1/1/2023 and extends from the Lower San Joaquin River into the South Delta and export facilities, increasing the risk of DS migration into the Central and South Delta. Turbidity has continued to decline this past week. While migration in preparation for spawning is still underway, it is likely ending soon. However, 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.
- % 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.
- Salvage: One marked adult (FL: 74mm) DS was salvaged at CVP on 1/7/2023. The expanded seasonal salvage is four. This is the first detection of WY 2023. This is the first adult salvage detected since 1/16/2022.
- 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: 32 sub-adult (FL: 70-82mm) and 16 adult LFS (FL: 85-107mm) were detected in Suisun Bay, Suisun Marsh, Lower Sacramento River, and Sacramento Deepwater Shipping Channel during the week of January 31<sup>st</sup> – February 3<sup>rd</sup> (Table 1).
  - Chipps Island Trawl: 53 sub-adult (FL: 62-84mm) and 64 adult LFS (FL: 85-110mm) were detected during the week of January 31<sup>st</sup> – February 3<sup>rd</sup> (Table 2).
  - SLS: Since the last meeting, SLS 2 detected 48 additional LFS larvae, and SLS 3 detected 74 additional LFS larvae, four in which were detected in the Lower San Joaquin River (Station 809 and 812). Many stations are still being processed for SLS 2 and 3, but no additional larvae were detected in the rest of the 12 Central and South Delta stations.
  - 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 (Table 4). 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:**

- SKT 2 is on the water this week.
- SMT agreed on requesting CVP and SWP to start qualitative larval sampling by March 1<sup>st</sup> or as soon as possible thereafter. The date was agreed upon with consideration of preparation and training of each salvage facilities staff.

**Attachments:** Table 1: EDSM Catch Table, Table 2: Chipps Island Trawl Catch Table, Table 3: SLS 2 Catch Table, Table 4: SLS 3 Catch Table, and Figure 1: Map of SLS.

Table 1: DS and LFS catch for EDSM 2022 Phase 1 Kodiak trawls of January 31<sup>st</sup> – February 3<sup>rd</sup>. Only stations with catch of these species 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
01/30/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR02	DSM	VIE-RGP	75	1	UC Davis
01/30/2023	Suisun Bay	Confluence	23-27-SB04	LFS	None	79	1	Released
01/30/2023	Suisun Bay	Mid Suisun Bay	23-27-SB03	DSM	VIE	76	1	UC Davis

Date	Stratum	Subregion	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
01/30/2023	Suisun Bay	Mid Suisun Bay	23-27-SB03	LFS	None	75	2	Released
01/30/2023	Suisun Bay	Mid Suisun Bay	23-27-SB03	LFS	None	78	3	Released
01/30/2023	Suisun Bay	Mid Suisun Bay	23-27-SB03	LFS	None	86	1	Released
01/30/2023	Suisun Bay	Mid Suisun Bay	23-27-SB03	LFS	None	92	1	Released
01/30/2023	Suisun Bay	Mid Suisun Bay	23-27-SB03	LFS	None	103	1	Released
01/30/2023	Suisun Bay	West Suisun Bay	23-27-SB02	DSM	VIE	65	1	UC Davis
01/30/2023	Suisun Bay	West Suisun Bay	23-27-SB02	LFS	None	76	1	Released
01/30/2023	Suisun Bay	West Suisun Bay	23-27-SB02	LFS	None	107	1	Released
01/31/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR03	LFS	None	87	1	Released
01/31/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR03	LFS	None	93	1	Released
01/31/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR03	LFS	None	96	1	Released
01/31/2023	Lower Sacramento	Sacramento River near Rio Vista	23-27-LSR01	DSM	VIE-RGP	76	1	UC Davis
01/31/2023	Lower Sacramento	Sacramento River near Rio Vista	23-27-LSR01	LFS	None	78	1	Released
01/31/2023	Lower Sacramento	Sacramento River near Rio Vista	23-27-LSR04	LFS	None	79	1	Released
01/31/2023	Lower San Joaquin	Lower San Joaquin	23-27-LSJ06	DSM	None	73	1	FCCL
01/31/2023	Suisun Bay	Mid Suisun Bay	23-27-SB05	LFS	None	76	1	Released
01/31/2023	Suisun Bay	Mid Suisun Bay	23-27-SB05	LFS	None	86	1	Released
01/31/2023	Suisun Bay	Mid Suisun Bay	23-27-SB05	LFS	None	87	1	Released
01/31/2023	Suisun Bay	Mid Suisun Bay	23-27-SB05	LFS	None	95	1	Released
01/31/2023	Suisun Bay	West Suisun Bay	23-27-SB06	LFS	None	70	1	Released
01/31/2023	Suisun Bay	West Suisun Bay	23-27-SB06	LFS	None	74	1	Released
01/31/2023	Suisun Bay	West Suisun Bay	23-27-SB06	LFS	None	75	1	Released
01/31/2023	Suisun Bay	West Suisun Bay	23-27-SB06	LFS	None	77	1	Released
01/31/2023	Suisun Bay	West Suisun Bay	23-27-SB06	LFS	None	79	1	Released
01/31/2023	Suisun Bay	West Suisun Bay	23-27-SB06	LFS	None	81	2	Released
02/01/2023	Sac DW Ship Channel	Lower Sac River Ship Channel	23-27-SSC01	DSM	VIE-LOA	72	1	UC Davis
02/01/2023	Sac DW Ship Channel	Lower Sac River Ship Channel	23-27-SSC02	LFS	None	85	1	Released
02/01/2023	Sac DW Ship Channel	Lower Sac River Ship Channel	23-27-SSC03	DSM	VIE-LOA	67	2	UC Davis
02/01/2023	Sac DW Ship Channel	Lower Sac River Ship Channel	23-27-SSC03	DSM	VIE-LOA	70	1	UC Davis
02/02/2023	Cache Slough LI	Cache Slough and Liberty Island	23-27-CS03	DSM	VIE-LOA	60	1	UC Davis
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM01	LFS	None	73	1	Released

Date	Stratum	Subregion	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM01	LFS	None	76	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM01	LFS	None	79	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM01	LFS	None	80	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM03	LFS	None	75	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM03	LFS	None	76	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM03	LFS	None	89	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM03	LFS	None	90	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM03	LFS	None	91	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM04	LFS	None	76	1	LFWO
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM04	LFS	None	72	2	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM04	LFS	None	80	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM04	LFS	None	81	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM04	LFS	None	82	1	Released
02/02/2023	Suisun Marsh	Suisun Marsh	23-27-SM04	LFS	None	107	1	Released
02/03/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR05	DSM	VIE-RGP	61	1	UC Davis
02/03/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR05	DSM	VIE-RGP	65	1	UC Davis
02/03/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR05	DSM	VIE-RGP	73	1	UC Davis
02/03/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR05	LFS	None	75	1	LFWO
02/03/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR05	LFS	None	80	1	Released
02/03/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR05	LFS	None	100	1	Released
02/03/2023	Lower Sacramento	Lower Sacramento River	23-27-LSR06	LFS	None	76	1	Released

Table 2: LFS catch for Chipps Island Trawls January 31<sup>st</sup> – February 3<sup>rd</sup>. These data are preliminary and subject to change.

Date	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
01/30/2023	SB018M	LFS	None	80	1	Released
01/30/2023	SB018M	LFS	None	82	1	Released
01/30/2023	SB018M	LFS	None	86	1	Released
01/30/2023	SB018M	LFS	None	90	1	Released
01/30/2023	SB018M	LFS	None	100	1	Released
01/30/2023	SB018M	LFS	None	110	2	Released
01/30/2023	SB018N	LFS	None	74	1	Released



Date	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
01/30/2023	SB018N	LFS	None	79	1	Released
01/30/2023	SB018N	LFS	None	84	1	Released
01/30/2023	SB018N	LFS	None	86	1	Released
01/30/2023	SB018N	LFS	None	90	1	Released
01/30/2023	SB018N	LFS	None	103	1	Released
01/30/2023	SB018N	LFS	None	105	1	Released
01/30/2023	SB018N	LFS	None	110	1	Released
01/30/2023	SB018S	LFS	None	76	1	Released
01/30/2023	SB018S	LFS	None	83	1	Released
01/30/2023	SB018S	LFS	None	84	1	Released
01/30/2023	SB018S	LFS	None	88	1	Released
01/30/2023	SB018S	LFS	None	98	1	Released
02/01/2023	SB018M	LFS	None	62	1	Released
02/01/2023	SB018M	LFS	None	76	1	Released
02/01/2023	SB018M	LFS	None	77	1	Released
02/01/2023	SB018M	LFS	None	78	2	Released
02/01/2023	SB018M	LFS	None	79	1	Released
02/01/2023	SB018M	LFS	None	80	4	Released
02/01/2023	SB018M	LFS	None	81	4	Released
02/01/2023	SB018M	LFS	None	82	3	Released
02/01/2023	SB018M	LFS	None	83	2	Released
02/01/2023	SB018M	LFS	None	84	3	Released
02/01/2023	SB018M	LFS	None	85	2	Released
02/01/2023	SB018M	LFS	None	87	3	Released
02/01/2023	SB018M	LFS	None	90	4	Released
02/01/2023	SB018M	LFS	None	91	2	Released
02/01/2023	SB018M	LFS	None	94	1	Released
02/01/2023	SB018M	LFS	None	95	2	Released
02/01/2023	SB018M	LFS	None	96	1	Released
02/01/2023	SB018M	LFS	None	98	1	Released
02/01/2023	SB018M	LFS	None	99	1	Released
02/01/2023	SB018M	LFS	None	100	2	Released
02/01/2023	SB018M	LFS	None	105	1	Released
02/01/2023	SB018N	LFS	None	80	4	Released
02/01/2023	SB018N	LFS	None	82	1	Released
02/01/2023	SB018N	LFS	None	85	2	Released
02/01/2023	SB018N	LFS	None	86	1	Released
02/01/2023	SB018N	LFS	None	88	1	Released
02/01/2023	SB018N	LFS	None	93	1	Released
02/01/2023	SB018N	LFS	None	91	1	Released
02/01/2023	SB018N	LFS	None	96	1	Released
02/01/2023	SB018N	LFS	None	100	1	Released
02/01/2023	SB018S	LFS	None	76	2	Released
02/01/2023	SB018S	LFS	None	79	1	Released
02/01/2023	SB018S	LFS	None	80	2	Released
02/01/2023	SB018S	LFS	None	82	1	Released

Date	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
02/01/2023	SB018S	LFS	None	85	4	Released
02/01/2023	SB018S	LFS	None	88	1	Released
02/01/2023	SB018S	LFS	None	90	1	Released
02/03/2023	SB018M	LFS	None	76	1	Released
02/03/2023	SB018M	LFS	None	78	1	Released
02/03/2023	SB018M	LFS	None	79	1	Released
02/03/2023	SB018M	LFS	None	81	1	Released
02/03/2023	SB018M	LFS	None	82	2	Released
02/03/2023	SB018M	LFS	None	83	1	Released
02/03/2023	SB018M	LFS	None	85	1	Released
02/03/2023	SB018M	LFS	None	90	1	Released
02/03/2023	SB018M	LFS	None	96	1	Released
02/03/2023	SB018N	LFS	None	80	2	Released
02/03/2023	SB018N	LFS	None	85	1	Released
02/03/2023	SB018N	LFS	None	86	2	Released
02/03/2023	SB018N	LFS	None	87	1	Released
02/03/2023	SB018N	LFS	None	89	1	Released
02/03/2023	SB018N	LFS	None	91	1	Released
02/03/2023	SB018N	LFS	None	92	1	Released
02/03/2023	SB018N	LFS	None	93	1	Released
02/03/2023	SB018N	LFS	None	102	1	Released
02/03/2023	SB018S	LFS	None	80	1	Released
02/03/2023	SB018S	LFS	None	81	1	Released
02/03/2023	SB018S	LFS	None	83	1	Released
02/03/2023	SB018S	LFS	None	86	1	Released
02/03/2023	SB018S	LFS	None	87	1	Released
02/03/2023	SB018S	LFS	None	96	1	Released
02/03/2023	SB018S	LFS	None	100	1	Released
02/03/2023	SB018S	LFS	None	102	1	Released
02/03/2023	SB018S	LFS	None	105	1	Released

Table 3: LFS catch for SLS 2 January 17<sup>th</sup>-19<sup>th</sup>. 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	2	306	1/18/2023	42.9	38	Processed	LFS	2	Complete	7	8	7.5	1
2023	2	311	1/18/2023	63.9	20	Processed	LFS	2	Complete	7	8	7.5	0
2023	2	322	1/18/2023	58.5	23	Processed	LFS	3	Complete	7	9	8	2
2023	2	323	1/18/2023	66.2	19	Processed	LFS	33	Complete	7	10	8	22
2023	2	327	1/18/2023	80.8	18	Processed	LFS	46	Complete	7	9	7.7	37
2023	2	329	1/18/2023	96	18	Processed	LFS	6	Complete	6	8	7.2	6
2023	2	330	1/18/2023	83.4	15	Processed	LFS	11	Complete	8	9	8.2	6
2023	2	336	1/18/2023	131	17	Processed	LFS	3	Complete	8	8	8	3
2023	2	338	1/18/2023	114	14	Processed	LFS	30	Complete	7	9	7.8	18
2023	2	340	1/17/2023	160	12	Processed	LFS	5	Complete	8	8	8	3
2023	2	401	1/18/2023	142	17	Processed	LFS	11	Complete	7	8	7.4	6
2023	2	404	1/18/2023	143	11	Processed	LFS	43	Complete	7	9	7.8	7
2023	2	405	1/19/2023	186	14	Processed	LFS	2	Complete	6	7	6.5	2
2023	2	411	1/19/2023	159	16	Processed	LFS	2	Complete	6	6	6.0	1
2023	2	418	1/19/2023	173	17	Processed	LFS	1	Complete	6	6	6.0	1
2023	2	501	1/19/2023	134	16	Processed	LFS	4	Complete	5	6	5.8	4
2023	2	504	1/19/2023	104	14	Processed	LFS	5	Complete	6	8	6.8	4
2023	2	508	1/19/2023	134	16	Processed	LFS	2	Complete	6	6	6.0	0
2023	2	519	1/19/2023	160	13	Processed	LFS	1	Complete	5	5	5.0	0
2023	2	520	1/19/2023	139	15	Processed	LFS	2	Complete	6	7	6.5	1
2023	2	606	1/19/2023	141	13	Processed	LFS	2	Complete	6	6	6.0	1
2023	2	609	1/19/2023	138	17	Processed	LFS	2	Complete	6	7	6.5	2
2023	2	801	1/18/2023	122	18	Processed	LFS	1	Complete	7	7	7.0	1
2023	2	804	1/18/2023	63.1	16	Processed	LFS	2	Complete	6	6	6.0	1

Table 4: LFS catch for SLS 3 January 30<sup>th</sup> – February 1<sup>st</sup>. 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	3	602	2/1/2023	41.5	36	Processed	LFS	34	Complete	7	11	8.3	25
2023	3	606	2/1/2023	80.5	25	Processed	LFS	8	Complete	6	9	n/a	7
2023	3	610	2/1/2023	48.2	31	Processed	LFS	6	Complete	6	7	6.8	6
2023	3	704	1/31/2023	43.1	25	Processed	LFS	11	Complete	6	8	6.5	9
2023	3	706	1/31/2023	47.6	26	Processed	LFS	4	Complete	6	7	6.5	4
2023	3	707	1/31/2023	39.7	34	Processed	LFS	4	Complete	6	6	6.0	4
2023	3	801	2/1/2023	36.4	29	Processed	LFS	1	Complete	7	7	7.0	0
2023	3	804	1/31/2023	30.1	31	Processed	LFS	2	Complete	6	6	6.0	2
2023	3	809	1/30/2023	26.0	35	Processed	LFS	2	Complete	7	7	7.0	2
2023	3	812	1/30/2023	23.0	38	Processed	LFS	2	Complete	6	7	6.5	2

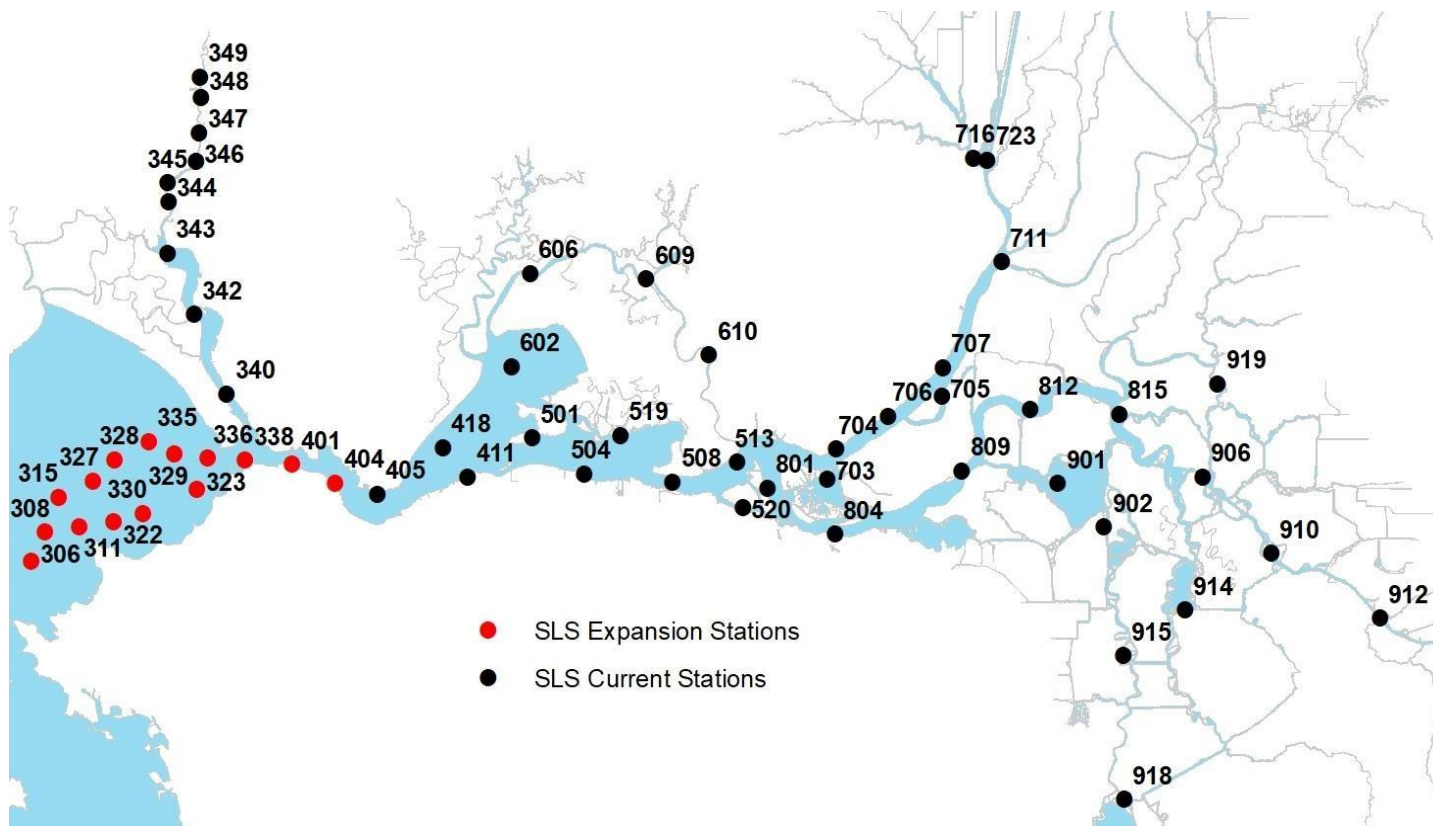


Figure 1: Map of SLS stations