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

Section 1: Overview

Date: 12/26/2023

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):

No Advice.

Risk Assessment:

Delta Smelt: Based on distribution patterns over the past decade and low detections in this water year, Delta Smelt are unlikely to be prevalent in the Central and South Delta. Limited detection data from the past month supports Delta Smelt presence in the lower Sacramento River. The last Delta Smelt observation was on 12/07/23 in the lower Sacramento River. The likelihood of Delta Smelt entrainment is low due to seasonal timing. The Integrated Early Winter Pulse Protection (IEWPP) period began on 12/01/23. “First Flush” conditions that would trigger IEWPP regulations are not anticipated but will be monitored this week.

Longfin Smelt: LFS population scale migration is on-going and spawning has started. Larval LFS have been detected in the Lower Sacramento River by Smelt Larva Survey (SLS) 12. Fall Midwater Trawl (FMWT) December survey, San Francisco Bay Study (SFBS) December survey, and Enhanced Delta Smelt Monitoring (EDSM) have detected several sub-adult and adult LFS in the Lower Sacramento River and the Confluence. X2 is estimated to be around 90.9 km, QWEST is anticipated to be as negative as -5,000 cfs, and OMRI is expected to be as negative as -9,000 cfs. Based on distribution data and life history, LFS are unlikely to be present in the Central or South Delta and therefore at low risk of entrainment in that region, but based on the increased detections and unfavorable hydrological conditions, the risk of entrainment from the Lower Sacramento River and Confluence region is moderate.

Section 1-A: Sacramento River and Confluence

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 subadults and adults	Exposure Risk (Hydrology)	Low	Water temperature is not conducive for spawning. Turbidity and flow are not conducive of population scale migration.
DS subadults and adults	Routing Risk (Behavior and life history)	Low	One marked adult DS was detected in the Lower Sacramento River by EDSM on 12/07/23. One sub-adult DS was detected in the Lower Sacramento River by EDSM on 11/15/23.
DS	**Overall Entrainment Risk**	**Low**	As above

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 sub-adults and adults	Routing Risk (Behavior and life history)	Moderate*	Migration is on-going and spawning has been detected in the Lower Sacramento River. Over 70 sub-adults and adults have been detected near or east of Chipps Island. X2 is estimated to be around 90.9 km and OMRI is expected to be as negative as -9,000 cfs this week. Due to the increased detections and unfavorable hydrological conditions, entrainment risk is moderate.
LFS larvae	Exposure Risk (Hydrology)	Moderate*	Two yolk-sac larvae were detected by SLS 12 in the Lower Sacramento River. QWEST is anticipated to be as negative as -5,000 cfs.
LFS	**Overall Entrainment Risk**	**Moderate***	As above

* SMT has a non-consensus on the risk level for LFS under these conditions. See notes section for more detail.

Section 1-B: **Central Delta**

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)	Low	No survey detections and unlikely to be present in this region.

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 sub-adults and adults	Exposure Risk (Hydrology)	Low	No survey detections and unlikely to be present in this region.

- 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: No changes
    - LFS: Due to the increased detections and unfavorable hydrological conditions, entrainment risk is increased from low to moderate.
- Reporting Old and Middle River Index (OMRI) *(Number and range of OMRI bins will vary based on anticipated hydrology and operations)*
    - Condition of Approval (COA) 8.3.2 will initiate OMR management season on 01/01/24 and limit OMRI to no more negative than -5,000 cfs on a 14-day average.
    - Expected daily OMRI range this week: -5,000 to -9,000 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 Formazin Nephelometric Unit (FNU), OR
- The SMT determines that real-time monitoring of abiotic and biotic factors indicates

a high risk of DS migration and dispersal into areas at high risk of future entrainment.

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

[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.

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, 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.

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: Conditions are not likely to exceed the thresholds described in this COA in the next seven days.

8.3.2: This COA for salmonids will initiate the OMR management season on 01/01/24.

8.3.3: No adult LFS have been salvaged this WY. The FMWT LFS index for September through December is 464, therefore the salvage (post-expansion) threshold to trigger this COA is 46 LFS. This COA will be off-ramped on 01/01/24 when COA 8.3.2 initiates OMR management season.

8.4.1: This COA has been off-ramped as of 12/18/23 due to detection of larval LFS by SLS 12.

8.4.2: This COA will be in effect starting 01/01/24 and may be triggered by SLS 13 which is on the water this week.

8.4.3: Conditions are not likely to exceed the thresholds described in this COA in the next seven days.

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: Closed on 11/27/23. Expected to remain closed for the season.
    - OMR management has not been initiated.
- Controlling Factors: Salinity management
- Water Temperature:
    - Clifton Court Forebay (CCF) Daily Average Water Temperature = NA
    - 3 Station Average = 11.45°C
- Tidal Cycle: Transitioning from Spring to Neap tide.
- Turbidity:
    - 8.3.1 Freeport 3-day average = 38.38 formazin nephelometric units (FNU)
    - 8.5.1 Old River at Bacon Island (OBI) Turbidity = 2.6 FNU
- Salinity: X2 = ~90.9 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: 5,500 cfs. Anticipated range: 2,000 to 7,200 cfs
    - Jones: 3,600 cfs. Anticipated range: 3,600 to 4,200 cfs
- Meteorological Forecast: Dry with morning fog at start of week. Increasing chances for rain and snow in the mountains into this weekend.
- Six-day Storm Event Projection: NA

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

- DCC Gates position: Expected to remain closed for the season.
- Sacramento River flow at Freeport: 17,300 cfs as of 12/25/23.

    - Anticipated range: 12,000 to 20,000 cfs
- San Joaquin River flow at Vernalis: 1,300 cfs as of 12/25/23.
    - Anticipated range: 1,000 to 1,750 cfs
- Qwest: -600 cfs as of 12/21/23. Anticipated range: highly variable with expected precipitation but as negative as -5,000 cfs.
- OBI Turbidity: No anticipated changes.
- NDOI: 12,500 cfs as of 12/21/23. Anticipated range: 5,000 to 10,000 cfs.
- Upstream releases:
    - Keswick = 5,000 cfs. No anticipated changes.
    - Nimbus = 2,000 cfs. No anticipated changes.
    - Goodwin = 200 cfs. No anticipated changes.
    - Oroville = 1,750 cfs. No anticipated changes.

Table 1: Comparison of OMR and OMR Index (5-day and 14-day averages for OMR Index and USGS gauge were reported on SacPAS website, accessed 26 December 2023.

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
12/22/23	Daily	-6,780	-6,480
12/22/23	5-day	-6,130	-5,970
12/22/23	14-day	-5,560	-5,390

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 (Fork Length (FL): 63mm) DS was detected in the Lower Sacramento River on 12/07/23 (origin: 11/15/23 release). One subadult (FL: 57mm) DS was detected in the Lower Sacramento River on 11/15/23. One adult (FL: 60mm) and one sub-adult (FL: 53mm) DS were detected in Lower Sacramento River in October.
- FMWT September to December Index for Delta Smelt: 0
- Delta Smelt life cycle model (LCM) discussion: NA
- Biological Conditions: NA
- % of population in Delta zones: NA
- Smelt Larva Survey (SLS): Survey 12 detected no DS. The 12 Central and South Delta station average Secchi depth is 166cm.

- 20mm Survey: NA
- Experimental release:
  - 14,104 cultured DS marked with green VIE on the left anterior dorsal side were released at Sacramento River near Rio Vista on 11/15/23.
  - 6,508 cultured DS marked with blue VIE on the left posterior dorsal side were released at Sacramento River near Rio Vista on 12/12/23.
  - 6,581 cultured DS marked with blue VIE on the right anterior dorsal side were released at Sacramento River near Rio Vista on 12/14/23.
  - 6,430 cultured DS marked with green VIE on the right anterior dorsal side were released at Sacramento River near Rio Vista on 12/19/23.
  - 6,261 cultured DS marked with green VIE on the left posterior dorsal side were released at Sacramento River near Rio Vista on 12/20/23.
- Salvage: No DS have been salvaged at either facility this water year.

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

- FMWT September to December Index: 464
  - In December, two LFS were detected in the Lower Sacramento River, and 86 LFS were detected in San Pablo Bay, Carquinez Strait, Suisun Bay, and Montezuma Slough.
- Other Surveys:
  - EDSM: 13 sub-adult (FL: 60-76mm) LFS were detected in the Lower Sacramento River and the Confluence, and 16 adult (FL: > 84-90mm) and 113 sub-adult (FL: 52-84mm) LFS were detected in Suisun Bay and Suisun Marsh during the week of 12/18/23 (Table 1). Some of the adult-sized LFS were not measured in order to reduce handling stress for the broodstock collection (indicated as FL: > 84mm).
  - Chipps Island Trawl: 16 adult (FL: >84-105mm) LFS were detected during the week of 12/18/23 (Table 2).
  - Bay Study: The December survey detected four adult (FL: 93-98mm) and 47 sub-adult (FL: 53-77mm) LFS in the Lower Sacramento River and the Confluence region, and ten adult (FL: 85-112mm) and 36 sub-adult (FL: 50-72mm) LFS in the South Bay, Central Bay, San Pablo Bay, and the Suisun region (Table 3).
  - SLS: Survey 12 detected two yolk-sac larvae (FL: 5-6mm) in the Lower Sacramento River.
- Salvage: No LFS have been salvaged at either facility this water year.

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

Notes:

- SMT discussed the risk level of LFS in the Lower Sacramento River and the Confluence

for all life stages.
    - CDFW recommended increasing the risk level to moderate due to increased detections of adult and sub-adult LFS in that region, detection of yolk sac larvae from SLS12, and unfavorable hydrologic conditions (90.9 km X2, -9,000 cfs OMRI, and -5,000 cfs QWEST).
    - USFWS agreed and highlighted articles suggesting LFS distribution being significantly correlated with X2 location.
    - DWR recommended keeping the risk level low in all regions due to adult and sub-adult LFS being less susceptible than larvae to hydrologic influences on their movement and distribution and all detections so far this year being outside the zone of entrainment for predicted operations. DWR also shared past PTM runs during dry and below normal years, where X2 was also high and OMRI was more negative than -5,000 cfs, which showed most particles released in the lower Sacramento River moving past Chipps Island and entrainment into the south Delta was <1%.
    - CDFW reiterated the need to err on the side of caution for endangered fish, and the results of PTM runs were difficult to draw a parallel given the difference in hydrological conditions.
- In this document, salvage will be noted in three ways:
    - Salvage (pre-expansion) represents the number of fish detected in subsamples at the fish salvage facilities.
    - Salvage (post-expansion) represents the estimated total number of fish detected at the fish salvage facilities using appropriate expansion factors for the subsampled time. This may be reported as either daily or weekly value.
    - Cumulative seasonal salvage represents the year-to-date sum of salvage (post-expansion) for the current water year.

Attachments: Table 1: EDSM catch table, Table 2: Chipps Island Trawl catch table, Table 3: San Francisco Bay Study (SFBS) catch table, and Figure 1: Map of SFBS sampling stations.

Table 1. Delta Smelt (DSM) and Longfin Smelt (LFS) catch for EDSM 2023 Phase 1 Kodiak trawls on the week of 12/18/23. Only stations with DSM or LFS catch are reported here. Some adult-sized LFS were not measured in order to reduce handling stress for the broodstock collection (indicated as FL: > 84mm). These data are preliminary and subject to change.

Date	Stratum	Subregion	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
12/18/2023	Lower Sacramento	Sacramento River near Rio Vista	24-21-LSR03	LFS	None	60	1	UC Davis/DOP
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	>84	1	Broodstock
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	53	1	Released
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	56	1	Released
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	58	1	UC Davis/DOP
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	69	1	Released

Date	Stratum	Subregion	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	72	1	Released
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	74	1	UC Davis/DOP
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	74	1	Released
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	78	1	UC Davis/DOP
12/19/2023	Suisun Marsh	Grizzly Bay	24-21-SM01	LFS	None	79	1	UC Davis/DOP
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	>84	13	Broodstock
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	55	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	56	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	58	1	UC Davis/DOP
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	58	6	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	60	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	61	2	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	62	2	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	63	8	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	64	3	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	65	1	UC Davis/DOP
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	65	7	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	66	1	UC Davis/DOP
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	66	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	67	2	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	68	2	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	69	2	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	70	3	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	70	1	UC Davis/DOP
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	71	3	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	72	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	73	8	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	74	3	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	75	4	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	76	6	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	77	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	78	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	79	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	80	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	81	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	82	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	84	1	Released
12/19/2023	Suisun Marsh	Suisun Marsh	24-21-SM04	LFS	None	90	1	Broodstock
12/20/2023	Suisun Bay	Mid Suisun Bay	24-21-SB01	LFS	None	63	1	UC Davis/DOP
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	60	1	UC Davis/DOP
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	60	1	Released
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	67	1	UC Davis/DOP
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	67	1	Released
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	69	1	Released
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	71	1	Released
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	72	1	UC Davis/DOP
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	72	1	Released
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	74	1	Released

Date	Stratum	Subregion	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	75	1	UC Davis/DOP
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	75	1	Released
12/20/2023	Suisun Bay	Confluence	24-21-SB02	LFS	None	76	1	Released
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	>84	1	Broodstock
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	55	1	Released
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	56	1	Released
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	62	1	Released
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	63	1	Released
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	64	1	Released
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	65	1	UC Davis/DOP
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	67	1	UC Davis/DOP
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	68	1	UC Davis/DOP
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	68	1	Released
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	69	1	UC Davis/DOP
12/21/2023	Suisun Marsh	Grizzly Bay	24-21-SM02	LFS	None	75	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	52	1	UC Davis/DOP
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	58	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	61	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	61	1	UC Davis/DOP
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	62	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	63	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	64	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	65	1	UC Davis/DOP
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	66	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	69	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	72	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	73	1	UC Davis/DOP
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM05	LFS	None	75	1	Released
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM06	LFS	None	73	1	UC Davis/DOP
12/21/2023	Suisun Marsh	Suisun Marsh	24-21-SM06	LFS	None	80	1	USFWS Lab

Table 2: Delta Smelt (DSM) and Longfin Smelt (LFS) catch for Chipps Island Trawl on the week of 12/18/23. Only stations with DSM or LFS catch are reported here. Some adult-sized LFS were not measured in order to reduce handling stress for the broodstock collection (indicated as FL: > 84mm). These data are preliminary and subject to change.

Date	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
12/20/2023	SB018M	LFS	None	105	1	USFWS Lab
12/20/2023	SB018M	LFS	None	>84	1	Broodstock
12/20/2023	SB018S	LFS	None	>84	2	Broodstock
12/22/2023	SB018M	LFS	None	>84	4	Broodstock
12/22/2023	SB018N	LFS	None	>84	4	Broodstock
12/22/2023	SB018S	LFS	None	>84	4	Broodstock

Table 3: San Francisco Bay Study December survey catch table. These data are preliminary and subject to change.

Year	Survey	Station	Net	Tow	Species	Fork Length (mm)	Frequency	Plus Count
2023	12	101	1	1	LFS	60	1	NA
2023	12	107	2	1	LFS	64	1	NA
2023	12	107	2	1	LFS	69	1	NA
2023	12	108	2	1	LFS	58	1	NA
2023	12	108	2	1	LFS	54	1	NA
2023	12	108	2	1	LFS	57	1	NA
2023	12	110	2	1	LFS	112	1	NA
2023	12	110	2	1	LFS	104	1	NA
2023	12	110	2	1	LFS	111	1	NA
2023	12	215	2	57	LFS	72	1	NA
2023	12	216	1	1	LFS	52	1	NA
2023	12	216	2	1	LFS	NA	NA	1
2023	12	243	1	1	LFS	57	1	NA
2023	12	244	2	1	LFS	93	1	NA
2023	12	244	2	1	LFS	111	1	NA
2023	12	320	1	1	LFS	60	1	NA
2023	12	320	2	1	LFS	71	1	NA
2023	12	321	2	1	LFS	62	1	NA
2023	12	321	2	1	LFS	55	1	NA
2023	12	322	2	1	LFS	100	1	NA
2023	12	322	2	1	LFS	69	1	NA
2023	12	322	2	1	LFS	70	1	NA
2023	12	322	2	1	LFS	66	1	NA
2023	12	322	2	1	LFS	64	1	NA
2023	12	322	2	1	LFS	54	1	NA
2023	12	322	2	1	LFS	56	1	NA
2023	12	323	2	1	LFS	69	1	NA
2023	12	325	2	1	LFS	111	1	NA
2023	12	325	2	1	LFS	108	1	NA
2023	12	325	2	1	LFS	59	1	NA
2023	12	325	2	1	LFS	55	1	NA
2023	12	325	2	1	LFS	57	1	NA
2023	12	345	2	1	LFS	58	1	NA
2023	12	346	2	1	LFS	61	1	NA
2023	12	346	2	1	LFS	85	1	NA
2023	12	427	1	1	LFS	66	1	NA

Year	Survey	Station	Net	Tow	Species	Fork Length (mm)	Frequency	Plus Count
2023	12	427	1	1	LFS	68	1	NA
2023	12	427	1	1	LFS	64	1	NA
2023	12	427	1	1	LFS	53	1	NA
2023	12	427	1	1	LFS	50	1	NA
2023	12	427	1	1	LFS	56	1	NA
2023	12	430	2	1	LFS	61	1	NA
2023	12	430	2	1	LFS	54	1	NA
2023	12	431	2	1	LFS	62	1	NA
2023	12	432	2	1	LFS	60	1	NA
2023	12	433	1	1	LFS	101	1	NA
2023	12	534	1	1	LFS	58	1	NA
2023	12	535	2	1	LFS	69	1	NA
2023	12	535	2	1	LFS	68	1	NA
2023	12	535	2	1	LFS	58	1	NA
2023	12	535	1	1	LFS	94	1	NA
2023	12	535	1	1	LFS	93	1	NA
2023	12	535	1	1	LFS	65	1	NA
2023	12	535	1	1	LFS	98	1	NA
2023	12	736	1	1	LFS	54	3	NA
2023	12	736	1	1	LFS	55	2	NA
2023	12	736	1	1	LFS	56	2	NA
2023	12	736	1	1	LFS	58	1	NA
2023	12	736	1	1	LFS	59	1	NA
2023	12	736	1	1	LFS	60	2	NA
2023	12	736	1	1	LFS	61	1	NA
2023	12	736	1	1	LFS	62	2	NA
2023	12	736	1	1	LFS	63	2	NA
2023	12	736	1	1	LFS	64	1	NA
2023	12	736	1	1	LFS	65	2	NA
2023	12	736	1	1	LFS	66	1	NA
2023	12	736	1	1	LFS	68	2	NA
2023	12	736	1	1	LFS	69	1	NA
2023	12	736	1	1	LFS	70	1	NA
2023	12	736	1	1	LFS	71	1	NA
2023	12	736	1	1	LFS	72	1	NA
2023	12	736	1	1	LFS	75	1	NA
2023	12	750	1	1	LFS	53	1	NA
2023	12	750	1	1	LFS	57	3	NA
2023	12	750	1	1	LFS	60	1	NA
2023	12	750	1	1	LFS	61	2	NA

Year	Survey	Station	Net	Tow	Species	Fork Length (mm)	Frequency	Plus Count
2023	12	750	1	1	LFS	65	2	NA
2023	12	750	1	1	LFS	66	1	NA
2023	12	750	1	1	LFS	68	1	NA
2023	12	750	1	1	LFS	69	1	NA
2023	12	750	1	1	LFS	71	2	NA
2023	12	750	1	1	LFS	72	1	NA
2023	12	750	1	1	LFS	77	1	NA
2023	12	751	1	1	LFS	95	1	NA

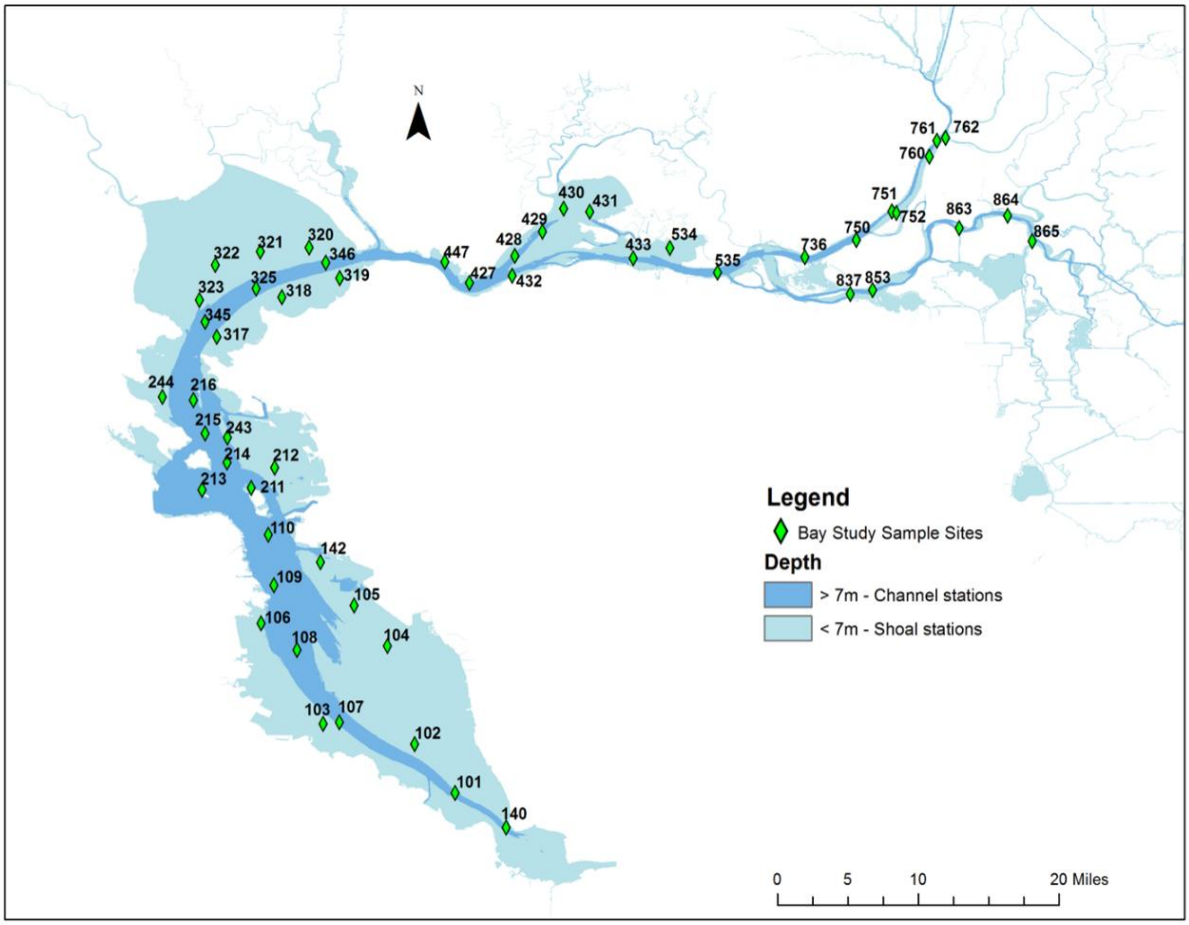

Figure 1: Map of San Francisco Bay Study sampling stations.