

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

Section 1: Overview

Date: 12/20/2022

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 and the position of X2 in the Sacramento River support Delta Smelt presence in the lower Sacramento River. The last Delta Smelt observations were on December 14, 2022, in the lower Sacramento River. One of these detections was from the November 30 Delta Smelt release. These detections may be an indication that Delta Smelt are staging near X2 in preparation for seasonal migration into freshwater. The likelihood of Delta Smelt entrainment is low due to seasonal timing. The Integrated Early Winter Pulse Protection (IEWPP) period began on December 1, 2022, and based on weather conditions is unlikely to be triggered this week.

Longfin Smelt: No adult LFS have been detected by Enhanced Delta Smelt Monitoring (EDSM) in the lower San Joaquin River or the Central or South Delta in recent sampling. One larval LFS was detected in the Lower San Joaquin River (station 812) by Smelt Larvae Survey (SLS) 13, and one larval LFS was detected in the Lower Sacramento River (station 707) by SLS 12. LFS adults are moving into spawning habitat, and spawning has begun. Adult and sub-adult LFS were detected by EDSM in Suisun Marsh, Suisun Bay, and the Lower Sacramento River. Based on distribution data and life history, adults and sub-adults are not expected to be prevalent in the Central or South Delta and therefore are expected to be at low risk of entrainment. However, there was one larva detected in the Lower San Joaquin River and many stations in Central and South Delta are still being processed for SLS 13. OMRI is expected to be less negative (-2400 cfs to -1500 cfs) than the previous week, resulting in low risk of entrainment. As of 12/1/2022, ITP Conditions of Approval 8.3.1 and 8.3.3 are active but not triggered. The September to November FMWT index

is 321, which sets the current salvage threshold for COA 8.3.3 to 32 LFS. The final FMWT index will be available later in December.

Section 1-A: Sacramento River and Confluence

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

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
DS larvae and juveniles	Exposure Risk (Hydrology)	NA	Spawning hasn't started, no larvae present.
DS subadults and adults	Routing Risk (Behavior and life history)	Low	Turbidity remains low, staging near X2 is on going, water temperatures are decreasing. FCCL detected two adults, one tagged from the experimental release and one untagged.
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	One larva detected in the Lower Sacramento River (station 707) by SLS 12.
LFS sub-adults and adults	Routing Risk (Behavior and life history)	Low	Spawning has started. Staging downstream of X2 is continuing. There was an increase in detections in the beginning of December but has decreased in the past week.
LFS	Overall Entrainment Risk	Low	Same as above.

Section 1-B: Central Delta

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

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
DS subadults and adults	Exposure Risk (Hydrology)	Low	No subadults or adults have been detected in the Central Delta in field surveys.

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	One larva detected in the Lower San Joaquin River (station 812) by SLS 13. OMR is expected to remain less negative and QWEST is near zero.
LFS sub-adults and adults	Exposure Risk (Hydrology)	Low	No subadults or adults have been detected in the Central Delta in field surveys.

- 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 remains low. Two adults were detected by FCCL lampara net sampling in the Lower Sacramento River last week, indicating that staging near X2 is ongoing. One of the DS caught by FCCL was a marked fish from the DS Experimental Release that occurred on 11/30/22 which released a total of 13,140 DS in the Sacramento River near Rio Vista.
- LFS: Risk remains low. Two larvae were detected so far this season by SLS but many stations are still being processed. Spawning has started. There was an increase in detections of adults and sub-adults in the beginning of December but has decreased in the past week. Reporting Old and Middle River Index (OMRI) *(Number and range of OMRI bins will vary based on anticipated hydrology and operations)*
 - Relevant Conditions of Approval (COAs) 8.3.1 and 8.3.3 are active but not triggered.
 - Expected OMRI range this week: -2,400 cfs to -1,500 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 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.

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

- Cumulative combined LFS salvage (total estimated LFS counts at the CVP and SWP salvage facilities beginning December 1 through February 28 exceeds the most recent Fall Midwater Trawl (FMWT) LFS index¹ divided by 10, OR

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.

- 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, 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.

8.3.3: No adult LFS have been salvaged. The FMWT LFS index for September through November is 321, therefore the salvage threshold to trigger this COA is 32 LFS until it is updated to include the December index.

8.4.1: This COA begins with the onset of OMR management, which has not been triggered, and terminates when spawning has been detected in the system. The first December SLS survey detected a LFS larva in the Lower Sacramento River, which off-ramps this COA.

8.4.2: This COA begins with 8.4.1 off-ramping, or January 1, whichever is later. With the off-ramping of 8.4.1 this week, 8.4.2 will be active starting January 1.

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.
 - OMR management has not been initiated.
- Controlling Factors: Water Quality
- Water Temperature:
 - Clifton Court Forebay (CCF) Daily Average Water Temperature = NA
 - 3 Station Average = 8.96°C
- Tidal Cycle: Spring tide peaks 12/23/22.
- Turbidity:
 - 8.3.1 Freeport 3-day average = 4.27 formazin nephelometric units (FNU)
 - 8.5.1 Old River at Bacon Island (OBI) Turbidity = 4.65 FNU
- Salinity: X2 > 82 km, estimated at 88.7 km for Sacramento River as of 12/18/22, and 91.5 km for San Joaquin River as of 12/19/22.
- 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: 300 to 1,500 cfs
 - Jones: 800 to 1,800 cfs
- Meteorological Forecast: Chance of light precipitation in northern mountains Tuesday and Thursday, which may disrupt fog and low clouds in Valley. Signs of wet weather returning next week, however, uncertainty on how pattern will evolve.
- Storm Event Projection: NA

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

- DCC Gates position: Scheduled to remain closed for seasonal operation. Adjustments could be necessary to respond to real-time salinity conditions
- Sacramento River flow at Freeport: 8,235 cfs
- San Joaquin River flow at Vernalis: 1,308 cfs
- Qwest: -600 cfs
- OBI Turbidity: 4.65 FNU
- NDOI: 4,240 cfs
- Upstream releases:
 - Keswick = 3,250 cfs. No anticipated changes.
 - Nimbus = 1,300 cfs. No anticipated changes.
 - 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 13 December 2022.

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
12/16/2022	Daily	-6,420	-6,840
12/16/2022	5-day	-3,430	-4,350
12/16/2022	14-day	-2,140	-2,290

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 subadult DS (Fork-length (FL): 55mm) and one adult DS (FL: 62mm) were detected in lower Sacramento River on November 3rd and 7th respectively.
- Fall Mid-water Trawl (FMWT) Index for Delta Smelt: November Index: 0
- Delta Smelt life cycle model (LCM) discussion: NA
- Biological Conditions: NA
- % of population in Delta zones: NA
- Smelt Larva Survey (SLS) or 20mm Survey: SLS sampling began 12/5/2022.
- Salvage: No DS have been salvaged at either facility this water year.
- FCCL lampara net sampling detected two adult DS (FL: ~60mm [estimated since fish were not directly handled]) in the Lower Sacramento River last week. One fish was untagged, and the other fish was tagged with red VIE tag (hard release) from the experimental release.
- Experimental release: 13,140 fish were released in the Sacramento River near Rio Vista on 11/30/22.

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

- FMWT Index: November Index = 53
 - September to November Index = 321
- Other Surveys:
 - EDSM: One sub-adult LFS (FL: 63mm) was detected in Suisun Marsh during the week of December 12th-16th (Table 1).
 - Chipps Island Trawl: one sub-adult LFS (61mm) and 11 adults (92-119 mm) were detected during the week of December 12th-16th (Table 2).
 - SLS: one larval LFS (7mm) was caught in the Lower San Joaquin River (station 812) (Table 3). Yolk sac was not present in this fish.
 - Bay Study: In September, 36 sub-adult LFS (44-78mm) were detected from south of Bay Bridge (station 110) to San Pablo Bay (station 322). Distribution shifted further upstream in October with 47 sub-adult LFS (FL: 42-83mm) and five adult LFS (FL: 86-97mm) detected from near the San Mateo Bridge (station 101) to the Lower Sacramento River (station 750). In November, the center of distribution continued to move upstream from Central Bay to San Pablo and Suisun Bay with a total of 73 sub-adult LFS (FL: 47-76mm) and three adult LFS (FL: 87-89mm) detected. In December, 101 sub-adult LFS (FL: 48-80 mm) and 14 adult LFS (84-109 mm) were detected from south of Bay Bridge (station 140) to Lower Sacramento River (station 751) (Table 4).
- 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:

Attachments: Table 1: EDSM Catch Table, Table2: Chipps Island Trawl Catch Table, Table 3: SLS Catch Table, Table 4: Bay Study Catch Table, and Figure 1: San Francisco Bay Study Station Locations

Table 1: DS and LFS catch for EDSM 2022 Phase 1 Kodiak trawls of December 12th- 15th. Only stations with catch of these species are reported here. These data are preliminary and subject to change.

Date	Stratum	Subregion	Station Code	Species	Mark Type	Fork Length (mm)	Total Catch	Disposition
12/15/2022	Suisun Marsh	Suisun Marsh	23-20-SM04	LFS	None	63	1	Released

Table 2: LFS catch for Chipps Island Trawls December 12th-16th. These data are preliminary and subject to change.

Date	Station Code	Species	Mark Type	Fork Length	Total Catch	Disposition
12/12/2022	SB018S	LFS	None	92	1	FCCL
12/12/2022	SB018S	LFS	None	99	3	FCCL
12/12/2022	SB018S	LFS	None	102	1	FCCL
12/12/2022	SB018S	LFS	None	104	1	FCCL
12/12/2022	SB018S	LFS	None	118	1	FCCL
12/12/2022	SB018S	LFS	None	119	1	FCCL
12/13/2022	SB018N	LFS	None	67	1	Released
12/13/2022	SB018N	LFS	None	113	1	FCCL
12/15/2022	SB018M	LFS	None	95	2	FCCL
12/15/2022	SB018N	LFS	None	92	1	FCCL
12/15/2022	SB018N	LFS	None	100	1	FCCL
12/15/2022	SB018S	LFS	None	110	1	FCCL

Table 3: LFS catch for SLS December 12th- 16th. These data are preliminary and subject to change.

Year	Survey #	SLS Station	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length (mm)	Max Length (mm)	Mean Length (mm)
2022	13	812			In-progress	Longfin Smelt		QC completed	7	7	7

Table 4: LFS catch for Bay Study in December. These data are preliminary and subject to change.

Year	Survey	Station	Net	Tow	Species	Length (mm)	Frequency	Comment
2022	12	102	2	1	LFS	64	1	

Year	Survey	Station	Net	Tow	Species	Length (mm)	Frequency	Comment
2022	12	103	2	1	LFS	71	1	
2022	12	107	2	1	LFS	48	1	
2022	12	107	2	1	LFS	61	1	
2022	12	107	2	1	LFS	70	1	
2022	12	108	1	1	LFS	54	1	
2022	12	108	1	1	LFS	56	1	
2022	12	108	1	1	LFS	58	2	
2022	12	108	1	1	LFS	62	1	
2022	12	108	1	1	LFS	63	1	
2022	12	108	1	1	LFS	66	1	
2022	12	108	2	1	LFS	56	1	
2022	12	108	2	1	LFS	59	1	
2022	12	108	2	1	LFS	62	1	
2022	12	108	2	1	LFS	63	1	
2022	12	108	2	1	LFS	65	1	
2022	12	108	2	1	LFS	67	1	
2022	12	108	2	1	LFS	70	1	
2022	12	109	2	1	LFS	63	1	
2022	12	109	2	1	LFS	73	1	
2022	12	110	2	1	LFS	72	1	
2022	12	140	2	1	LFS	61	1	
2022	12	140	2	1	LFS	62	1	
2022	12	140	2	1	LFS	64	1	
2022	12	140	2	1	LFS	66	1	
2022	12	140	2	1	LFS	68	1	
2022	12	140	2	1	LFS	72	1	
2022	12	140	2	1	LFS	76	1	
2022	12	140	2	1	LFS	77	1	

Year	Survey	Station	Net	Tow	Species	Length (mm)	Frequency	Comment
2022	12	140	2	1	LFS	80	1	
2022	12	211	2	1	LFS	61	1	
2022	12	211	2	1	LFS	63	1	
2022	12	214	2	1	LFS	58	1	
2022	12	215	2	1	LFS	62	1	
2022	12	215	2	1	LFS	92	1	
2022	12	216	2	1	LFS	58	1	Plus 1 not measured (head only)
2022	12	216	2	1	LFS	59	2	
2022	12	216	2	1	LFS	60	3	
2022	12	216	2	1	LFS	61	1	
2022	12	216	2	1	LFS	63	3	
2022	12	216	2	1	LFS	64	1	
2022	12	216	2	1	LFS	65	1	
2022	12	216	2	1	LFS	67	1	
2022	12	216	2	1	LFS	73	1	
2022	12	216	2	1	LFS	103	1	
2022	12	216	2	1	LFS	107	1	
2022	12	243	2	1	LFS	63	1	
2022	12	244	2	1	LFS	55	1	
2022	12	318	2	1	LFS	63	1	
2022	12	318	2	1	LFS	73	1	
2022	12	320	2	1	LFS	58	1	
2022	12	321	2	1	LFS	64	1	
2022	12	321	2	1	LFS	67	1	
2022	12	321	2	1	LFS	70	1	
2022	12	321	2	1	LFS	75	1	
2022	12	321	2	1	LFS	80	1	

Year	Survey	Station	Net	Tow	Species	Length (mm)	Frequency	Comment
2022	12	321	2	1	LFS	85	1	
2022	12	321	2	1	LFS	88	1	
2022	12	321	2	1	LFS	98	1	
2022	12	321	2	1	LFS	100	1	
2022	12	322	2	1	LFS	100	1	
2022	12	325	1	1	LFS	59	1	
2022	12	325	2	1	LFS	103	1	
2022	12	345	2	1	LFS	57	1	
2022	12	345	2	1	LFS	58	2	
2022	12	345	2	1	LFS	59	1	
2022	12	345	2	1	LFS	60	1	
2022	12	345	2	1	LFS	61	3	
2022	12	345	2	1	LFS	62	1	
2022	12	345	2	1	LFS	63	2	
2022	12	345	2	1	LFS	64	2	
2022	12	345	2	1	LFS	65	1	
2022	12	345	2	1	LFS	66	1	
2022	12	345	2	1	LFS	69	1	
2022	12	345	2	1	LFS	71	2	
2022	12	345	2	1	LFS	79	1	
2022	12	345	2	1	LFS	109	1	
2022	12	346	1	1	LFS	60	1	
2022	12	427	2	1	LFS	65	1	
2022	12	428	1	1	LFS	67	1	
2022	12	428	1	1	LFS	77	1	
2022	12	428	1	1	LFS	103	1	
2022	12	428	2	1	LFS	96	1	
2022	12	429	1	1	LFS	62	1	

Year	Survey	Station	Net	Tow	Species	Length (mm)	Frequency	Comment
2022	12	430	1	1	LFS	63	1	
2022	12	430	1	1	LFS	66	1	
2022	12	430	1	1	LFS	68	1	
2022	12	430	1	1	LFS	70	1	
2022	12	430	1	1	LFS	71	1	
2022	12	430	1	1	LFS	76	1	
2022	12	430	2	1	LFS	63	1	
2022	12	430	2	1	LFS	64	1	
2022	12	430	2	1	LFS	65	1	
2022	12	430	2	1	LFS	69	1	
2022	12	430	2	1	LFS	73	1	
2022	12	431	2	1	LFS	71	1	
2022	12	432	1	1	LFS	60	1	
2022	12	432	2	1	LFS	72	1	
2022	12	736	1	1	LFS	73	1	
2022	12	736	2	1	LFS	72	1	
2022	12	751	1	1	LFS	103	1	
2022	12	751	1	1	LFS	105	1	

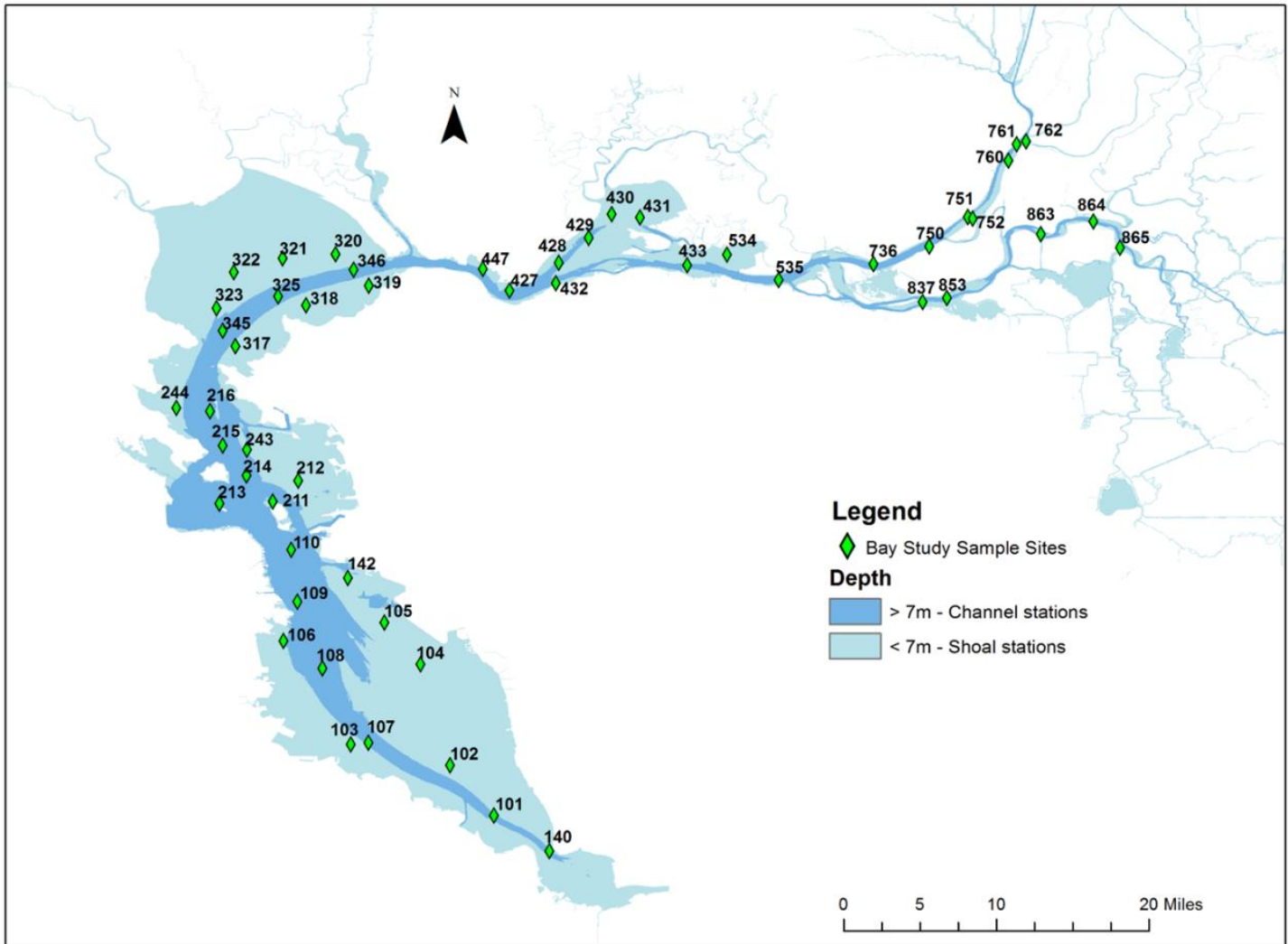


Figure 1: San Francisco Bay Study Station Locations