

**Name of study:** Smelt Larval Survey (SLS)

**Program element:** 096

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**Purpose/Objective:** Monitor and provide information on larval longfin smelt abundance and distribution in the upper San Francisco Estuary.

Conduct larval fish surveys to determine the timing, distribution, and abundance of longfin smelt larvae. Help estimate larval longfin smelt fish losses and determine the magnitude of entrainment of larval longfin smelt at CVP and SWP intakes.

**Data collected:** temperature, electro-conductivity, water transparency, turbidity, water volume, tidal stage, and identification and lengths of fishes.

**Geographic range of field work:** Lower Napa River to the city of Napa, eastern Carquinez Strait upstream throughout Suisun Bay; San Joaquin River to Stockton, Old and Middle Rivers in the south Delta to West Canal; Sacramento River to Rio Vista; Cache Slough from Rio Vista to Shag Slough ; 1 station at the mouth of the Sacramento Deep-water Ship Channel.

**Number of sites:** 44 stations.

**Period of record (start year):** 2009.

**Size for complete database for program element in KB (MB):** 30+ megabytes.

**Number of individual files:** one local database contains all data and an application for data entry. Data is uploaded and housed on tier 3 server.

**Sample frequency per time unit (second, week, month):** starting in January sampling is conducted every other week and continues through early spring (March) or until catch efficiency decreases and/or longfin smelt are no found in the central or south Delta in numbers and in danger of being entrained at the CVP and SWP.

**Field sampling:** The SLS uses a cone shaped net 3.35 meters in length with a mouth area of 0.37 m<sup>2</sup>. A single tow is conducted at each of 44 sampling stations. The net itself is composed of 505 µm Nitex<sup>®</sup> and is mounted on a fixed metal tube frame with skids. The mesh was altered prior to the 2014 season to 500 µm Nitex<sup>®</sup>, when new nets were purchased and the original mesh was no longer available (see 2014 changes below). These net nets were incorporated as old nets became unusable. The net is connected to the frame by a canvas mouth. At the end of each tow, net contents are washed into a cod-end jar and then the jar is removed and its contents preserved in 10% formalin for identification in the lab. A General Oceanics flowmeter is mounted across the net's mouth to estimate the water volume filtered.

**Laboratory analysis:** The distinctively labeled sample jars are taken to the laboratory at the California Department of Fish and Wildlife's Bay Delta Region, Stockton. For fish samples, the complete contents are sorted and any larval fish present are identified and counted. All fish are identified to species or lowest possible taxon. The first 50 fish from each tow are randomly selected and measured (FL) to the nearest millimeter. All longfin smelt are measured regardless of catch size.

**Relative density analysis:** The mean number of fish per volume water sampled (standardized to 1,000 m<sup>3</sup>) is calculated using the following equations:

$$V_t = A * K * D$$

Where: V = volume of water (m<sup>3</sup>) filtered through the net per tow (t)

A = mouth opening of the net (m<sup>2</sup>)

K = calibration factor for the flow meter

D = difference in flow meter counts from start to finish of tow

$$n_t = F_t / V_t * 1,000 \text{ m}^3$$

Where: n = number of fish per 1,000 m<sup>3</sup> per tow (t)

F = fish sampled per tow

$V$  = volume of water filtered through the net ( $m^3$ ) per tow

**Changes over time and important notes:**

2009 – Project start. Five biweekly delta-wide (35 stations) surveys conducted from early January to early March

2010 – Temporal extension of sampling; 6 biweekly delta-wide (35 stations) surveys conducted from early January to late March. Implementation of the use of a Hach Model # 2100P Turbidimeter as Standard Operating Procedure to record turbidity in NTU's. Recorded Latitude and Longitude on datasheets, but not entered into database.

2011 – Latitude and Longitude recorded in database. Yolk sac and oil globule presence noted in data.

2012 - Sixth survey added.

2013 – N/A

2014 – Spatial extension of sampling into Napa River as part of an agreement with the State Water Contractors (stations 340, 342, 343, 344, 345, 346, 347, 348, and 349). Database was revised by Tuongvan Nguyen at ITB as part of the Bay Delta Application Hosting to move public facing data onto secure Tier 3 server. Data is now entered into SLS\_Local.mdb, housed in SLS\_Query.mdb (local server), and appended to the tier 3 server before uploading to webpage. New nets were incorporated (manufactured on 5/10/2013 by Lodi Tent and Awning) with a different Nitex Mesh purchased from Sefar (500 micron, 47% open space. Part # 06-500/47).

2015 – Factory k value (0.026873027) used in MeterCorrections table. Flowmeters were not calibrated at UC Davis due to machinery malfunction. Facility is awaiting repair.

2016 – Continued using factory k value for MeterCorrections. Flowmeters were sent to General Oceanic for refurbishing prior to field season.

2017 - Continued using factory k value for MeterCorrections. Flowmeters were sent to General Oceanic for refurbishing prior to field season.

2018- Continued using factory k value for MeterCorrections.

2019- Continued using factory k value for MeterCorrections. Ceased sampling stations within the Napa River (stations 340, 342, 343, 344, 345, 346, 347, 348, and 349).