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

Section 1: Overview

Date: February 2, 2021

Life Stages Present:

Delta Smelt: Adult, Juvenile (EDSM has collected two Delta Smelt in the juvenile size bin)
Longfin Smelt: Adult, Larvae

Advice to WOMT:

Condition of Approval 8.4.2, Larval and Juvenile Longfin Smelt Entrainment Protection, was triggered when Smelt Larva Survey 2 (SLS 2) reported the detection of Longfin Smelt larvae at five of the 12 relevant stations in the south and central Delta. This Condition of Approval limits OMR to -5,000 cfs on a running 7-day average for seven consecutive days and tasks the SMT with recommending an OMR level between -1,250 cfs and -5,000 cfs that is sufficiently protective. During an off-cycle SMT meeting on 1/29/2021, the SMT determined that an additional OMR restriction was not warranted but cautioned that operating to an OMR more negative than the projected level, -2,500 cfs, would result in high risk of entrainment for larvae in the central Delta. See the Discussion of Conditions of Approval section for further details. Risk has increased compared to last week due to Qwest decreasing and having a relatively low long-term average (Jan 1st through yesterday) compared to low salvage years examined at the previous meeting. Based on the reduced Qwest, the SMT changed risk of entrainment due to current operations from low to moderate for larvae in the lower San Joaquin River. The SMT determined that no advice was warranted based on projected operations and hydrology.

Condition of Approval 8.12, Barker Slough Pumping Plant operations is still in effect. SLS 2 collected two larval LFS at station 716. This Condition of Approval limits Barker Slough Pumping Plant exports to be less than 60 cfs on a 7-day running average. Average 7-day was 33 cfs ending February 1st.

Risk Assessment:

Risk of entrainment into the central and south Delta or into the export facilities in the south Delta is low for Delta Smelt and moderate to high for Longfin Smelt across the range of expected OMR Index levels.

Delta Smelt: Based on distribution patterns over the past decade and four recent detections, Delta Smelt are unlikely to be prevalent in the South Delta. Limited detection data supports Delta Smelt being present in Suisun Marsh, west of the Sacramento-San Joaquin confluence, and within the Sacramento Deep Water Ship Channel. The distribution of Delta Smelt is expected to extend upstream of the confluence which is supported by historical Spring Kodiak Trawl data analysis. Precipitation and in-stream flows may contribute to increases in turbidity at Old River at Bacon Island (OBI), but it is unlikely to reach 12 FNU in the next 7 days. The

likelihood of Delta Smelt adult entrainment is slightly elevated relative to the previous seven days due to seasonal timing and widespread increases in turbidity. The overall probability of Delta Smelt moving into the south Delta is low. The projected OMR Index limits are at a level that is sufficiently protective of Delta Smelt.

Longfin Smelt: Smelt Larva Survey 2 (SLS 2) detected Longfin Smelt (LFS) larvae at five of the 12 stations listed in Condition of Approval 8.4.2. Twenty-two were collected at station 809, eight were collected at 812, two were collected at 815, two were collected at 901, and one was collected at 906. This meets the criteria to trigger this Condition of Approval which limits the 7-day average OMR Index to be no more negative than -5,000 cfs on a running 7-day average for seven consecutive days and tasks the SMT with recommending an OMR level between -1,250 cfs and -5,000 cfs that is sufficiently protective. The condition was triggered on 1/26/2021. The OMR Index has been less negative than -5,000 cfs for much of WY 2021 and is projected to be less negative than -2,500 cfs on a 7-day running average over the next week. In Delta precipitation turned Qwest positive over the weekend which, under current export levels, may facilitate downstream transport of larval LFS in the central Delta. However, risk has increased compared to last week due to Qwest decreasing and having a relatively low long-term average (January 1st through yesterday) compared to low salvage years examined at the previous meeting. Increased exports will increase the risk of entrainment. As a result, the SMT determined that an OMRI level of -4,000 cfs would pose a high risk of entrainment for larvae in the central Delta.

SLS 2 also reported 2 larvae collected at station 716 which continues the Barker Slough pumping plant limit in accordance with Condition of Approval 8.12.

Enhanced Delta Smelt Monitoring (EDSM) detected three LFS (FL = 74 – 81 mm) at the mouth of Suisun Slough and four LFS (FL = 57 – 83 mm) in Grizzly Bay during sampling conducted this week. Previously, EDSM reported a ripe LFS in the lower Sacramento River on 1/20/2021 and two more age-1+ LFS in Suisun Marsh on 1/21/2021. Chipps Island Trawl detected 10 LFS during sampling conduced from 1/20/2021 to 1/25/2021 with fork lengths ranging from 65 to 105 mm. The presence of adult fish, including a ripe female, indicates that spawning is ongoing.

Section 1-A: Sacramento River and Confluence

Risk of entrainment into central Delta and export facilities for Delta Smelt and Longfin Smelt in Sacramento River (8.1.5.2 C ii, iii, iv)

- Exposure Risk (Hydrology):
    - Delta Smelt: Low
    - Longfin Smelt: Low
- Routing Risk (Behavior and life history):
    - Delta Smelt: Low
    - Longfin Smelt: Moderate risk of adults moving from the confluence into the Central Delta of their own volition. Adults have been detected in the Sacramento DWSC (SKT 1) which indicates that migration is well underway, and presence of larvae in the lower San Joaquin River indicates that adults have entered the Lower San Joaquin and successfully spawned. A ripe female was detected by EDSM in the Lower Sacramento River.
- Overall Entrainment Risk
    - Delta Smelt: Low
    - Longfin Smelt: Low

Section 1-B: Central Delta

Risk of entrainment into the export facilities for Delta Smelt and Longfin Smelt in the central Delta

- Exposure Risk:
    - Delta Smelt: Low
    - Longfin Smelt: Moderate
- Change in exposure from previous week:
    - Delta Smelt: Slightly elevated due to seasonal timing and elevated turbidity in the central Delta.
    - Longfin Smelt: Risk has increased compared to last week due to Qwest decreasing and having a relatively low long-term average (Jan 1st through yesterday) compared to low salvage years examined at the previous meeting. Continued larval presence in the lower San Joaquin River exposes larvae to entrainment, however, anticipated OMR Index levels are sufficiently protective.
    - Qwest – exceeded 11,000 cfs for four days, from 1/29/2021 to 2/1/2021. By the end of the next seven days Qwest is projected to be near zero which increases the risk of entrainment for larval LFS in the lower San Joaquin River.
    - OMRI is predicted to be between -2000 cfs and -3000 cfs through the week.
- Reporting Old and Middle River Index (OMRI) *(Number and range of OMRI bins will vary based on anticipated hydrology and operations)*
    - OMRI is approximately -1,800 cfs and is projected to reach -2,500 cfs and stabilize over the next several days.
        - The seven-day average OMRI is projected to be less negative than -2,500 for the coming week.
        - Average Qwest from January 1st to today is approximately +1,300 cfs.
    - OMRI (Export Scenario OMRI = -2,500 cfs)
        - Delta Smelt: Low Risk
        - Longfin Smelt: Moderate Risk
            - As Qwest approaches zero and becomes negative risk increases for larval LFS.
    - OMRI (Export Scenario OMRI = -4,000 cfs), this scenario is outside of projected operations.
        - Delta Smelt: Low
        - Longfin Smelt: High

Section 2: Basis for Advice

The 2020 Incidental Take Permit for Long-Term Operation of the State Water Project in the Sacramento-San Joaquin Delta 2081-2019-066-00 (ITP) states that advice to Water Operations Management Team (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.

8.1.5.2 Smelt Monitoring Team Risk Assessment

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 OMR index no more negative than -2,000 cfs, and convene the Smelt Monitoring Team 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 is greater than, or equal to, 50 Nephelometric Turbidity Units (NTU), OR
- The Smelt Monitoring Team 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 OMR index no more negative than -2,000 cfs for 14 days, Permittee shall maintain a 14-day average OMR index 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 been initiated, Permittee shall reduce south Delta exports to maintain a 14-day average OMR index no more negative than -5,000 cfs and initiate OMR Management (Condition of Approval 8.3) if:

- Cumulative combined LFS expanded 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 Smelt Monitoring Team staff.

When evaluating the possibility of LFS movement into areas that may be subject to an elevated risk of entrainment, the Smelt Monitoring Team 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 Smelt Monitoring Team 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 Smelt Monitoring Team 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 Smelt Monitoring Team may provide advice to restrict south Delta exports for seven consecutive days to achieve a seven-day average OMR index 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 Smelt Monitoring Team determines that a more restrictive OMR flow requirement is needed to minimize take of adult LFS, the Smelt Monitoring Team 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 Smelt Monitoring Team, or, if there is disagreement and resolution is not reached within WOMT, as determined by CDFW. The Smelt Monitoring Team shall consider results from Additional LFS Larval Sampling (Condition of Approval 7.6.1) to inform its assessment of the start of LFS spawning.

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[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.

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 Smelt Monitoring Team 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 Smelt Monitoring Team 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 Smelt Monitoring Team 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 Smelt Monitoring Team 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 Smelt Monitoring Team shall provide advice on the appropriate OMR flow targets to minimize LFS entrainment or entrainment risk, or both. The Smelt Monitoring Team 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 Smelt Monitoring Team 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).

8.5.1 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 NTU. If the daily average turbidity at OBI is greater than 12 NTU, 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 NTU.

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 NTU the Smelt Monitoring Team may convene to assess the risk of entrainment of DS (Condition of Approval 8.1.5.2). The Smelt Monitoring Team may provide advice to WOMT regarding changes in operations that could be conducted to minimize the risk of entrainment of DS (Condition of Approval 8.1.3). The Smelt Monitoring Team may also determine that OMR restrictions to manage turbidity are infeasible and may instead provide advice for a different OMR flow target that is between -2,000 and -5,000 cfs and is protective based on turbidity and adult DS distribution and salvage to the WOMT for consideration (Condition of Approval 8.1.3). Operational decisions shall be made following the process described in Condition of Approval 8.1.4 (Collaborative Real Time Risk Assessment).

Turbidity readings at individual sensors can generate spurious results in real time. Spurious results could be incorrectly interpreted as a turbidity bridge, when in fact the cause is a result of local conditions or sensor error. To assess whether turbidity readings at OBI are attributable to a sensor error or a localized turbidity spike, Permittee, in coordination with Reclamation, may consider and review data from other nearby locations and sources. Additional information that will be reviewed include regional visualizations of turbidity, alternative sensors, and boat-based turbidity mapping, particularly if there was evidence of a local sensor error. Permittee may bring data from these additional sources to the Smelt Monitoring Team for consideration during the development of a risk assessment to be provided to the WOMT for evaluation (Condition of Approval 8.1.3).

Permittee shall use the decision-making process described Condition of Approval 8.1.4 (Collaborative Real-time Risk Assessment) to determine if south Delta exports may increase after five-days of OMR no more negative than -2,000 cfs, or to determine that this action is not warranted due to a sensor error or localized turbidity event. Permittee shall implement this action until CDFW is in agreement that the action may be ended or modified.

8.5.2 Larval and Juvenile Delta Smelt Protection.

If the five-day cumulative salvage of juvenile DS at the CVP and SWP facilities is greater than or equal to one plus the average prior three years' FMWT index (rounded down), Permittee shall restrict south Delta exports for seven consecutive days to maintain a seven-day average OMR index no more negative than -5,000 cfs. Additionally, if the five-day cumulative salvage threshold is met or exceeded, Permittee shall immediately convene the Smelt Monitoring Team to conduct a risk assessment (Condition of Approval 8.1.5.2) and determine the future risk of entrainment and take of larval and juvenile DS. The Smelt Monitoring Team may provide advice to further restrict south Delta exports to maintain a more positive OMR than -5,000 cfs. The Smelt Monitoring Team may provide advice for further restrictions within three risk categories:

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

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

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

If expanded salvage at the CVP and SWP facilities of juvenile DS exceeds 11 within a three-day period under this condition, Permittee shall restrict south Delta exports for seven consecutive days to maintain a seven-day average OMR index no more negative than -3,500 cfs. If juvenile DS continue to be salvaged at the CVP and SWP facilities during the seven days of OMR restrictions, then Permittee shall continue restrictions and request a risk assessment by the Smelt Monitoring Team to determine if additional advice and subsequent restrictions are warranted and provide advice to WOMT (see Condition of Approval 8.1.3) and follow the decision-making process described in Condition of Approval 8.1.4.

8.12 Barker Slough Pumping Plant Longfin and Delta Smelt Protection.

Permittee shall operate the Barker Slough Pumping Plant (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 sentence or two addressing criteria for each Condition of Approval listed in "Basis for Advice" section. Refer to data below where appropriate.

SMT will conduct weekly risk assessments as described in Condition of Approval 8.1.5.2.

8.3.1 Environmental conditions did not exceed the thresholds identified in this condition during Water Year 2021. This Condition of Approval terminated on 1/31/2021.

8.3.3 No LFS have been salvaged this water year. The cumulative expanded salvage threshold is 3 based on the most recently available FMWT Index. The annual index for 2020 is 28 and was reported to the SMT via email on 1/4/2020. The SMT examined abiotic conditions and determined that risk is low to moderate for Longfin Smelt. See section 4-B for the discussion of the FMWT Index.

8.4.1 This Condition of Approval begins with the onset of OMR management and terminates when spawning is detected in the system. The second December SLS detected larval LFS in the lower San Joaquin River on 12/28/2020 which terminated this Condition of Approval.

8.4.2 This Condition of Approval was triggered by the detection of larval LFS at 5 of the criteria stations listed in Condition of Approval 8.4.2. Twenty-two were collected at station 809, eight were collected at 812, two were collected at 815 two were collected at 901 and one was collected at 906. This condition triggered on 1/26/2021. The OMR Index has been less negative than -5,000 cfs for most of the current water year. During an off cycle SMT meeting on 1/29/2021, the SMT determined that an additional OMR restriction was not warranted given projected operations and hydrology. The following is a summary of that discussion:

Smelt Larva Survey 2 (SLS 2) sample processing is ongoing. SLS 2 detected Longfin Smelt (LFS) larvae at 5 of the stations listed in Condition of Approval 8.4.2. Twenty-two were collected at station 809, 8 were collected at 812, 2 were collected at 815, 2 were collected at 901 and one was collected at 906. The sample collected at station 906 had not been processed at the time of the Tuesday SMT meeting and was reported to the SMT via email on 1/28/2021. This meets the criteria to trigger this Condition of Approval which limits the 7-day average OMR Index to be no more negative than -5,000 cfs and tasks the SMT with determining if an OMR flow restriction is warranted and, if so, recommending an OMR flow limit between -1,250 and -5,000 cfs.

Enhanced Delta Smelt Monitoring (EDSM) detected a ripe LFS in the lower Sacramento River on 1/20/2021 and two more age-1+ LFS in Suisun Marsh on 1/21/2021. Chipps Island Trawl detected 10 LFS during sampling conduced from 1/20/2021 to 1/25/2021 with fork lengths ranging from 65 to 105 mm. The presence of adult fish, including a ripe female, indicates that spawning is ongoing.

The SMT used a comparative approach to inform this risk assessment. CDFW presented data summaries of SLS catch at the stations listed in ITP condition of approval 8.4.2, 7-day average OMR, 7-day average Qwest and daily average San Joaquin River flow at Vernalis for four comparative years as well as the current year. The 7-day average OMR values presented were calculated from the tidally filtered USGS gauge data. Two of the years selected, 2009 and 2010, represented relatively low salvage years. The other two years, 2012 and 2020, represented relatively high salvage years. SLS data was presented as two heat maps showing catch at each station for each survey. The hydrological data was displayed as plots of data from January 1st through the end of May for each of the comparative years, and data from January 1st to January 25th (tidally filtered OMR) and 27th (QWEST and VNS) for the current year. Expanded Longfin Smelt salvage for both facilities was also displayed on each plot of hydrological data. The x and y axis were held constant across all plots to ease interpretation. A separate plot of X2 for all years examined was also presented.

For the years prior to the most recent drought, SLS distribution was similar among the two low years (2009, 2010) and the high salvage year (2012), with higher counts in the lower San Joaquin River and larvae present in the OMR corridor. Larval LFS catch was lower in the high salvage year, 2020, and in 2021 for stations sampled to date, when compared to years prior to the most recent drought. However larval catch is higher in the first two Smelt Larva Surveys of 2021 compared to the same time in 2020. SLS catch distribution in the current year also differed from 2020, in that early in 2020 some larvae were detected in the OMR corridor. Larvae in the OMR corridor are likely entrained into the salvage facilities before they reach 20mm, which is the size at which they begin to be counted in salvage.

Discussion of hydrology largely focused on 7-day average OMR and 7-day average Qwest during January and February, when larval LFS are most susceptible to hydrologic influence. Conceptually, a more negative OMR increases the risk of larval LFS entrainment into the OMR corridor and the export facilities, while a positive Qwest is theorized to provide a flushing effect to volitionally move larval LFS downstream.

OMR was less negative than -5,000 cfs during this period in the low salvage years and was at -5,000 cfs during the high salvage years. OMR was more negative in the high salvage years, however, the mean of 7-day average OMR, from Jan 1st up to the date of first salvage, did not differ enough to entirely explain the difference in salvage. The largest difference in OMR appeared to be the minimum 7-day average from January 1st to the date of first salvage. Values calculated for the first days of January are influenced by hydrology at the end of December. As a result, the minimum 7-day average for the high salvage years were more negative than -5,000 cfs despite operating to an OMR no more negative than -5,000 cfs beginning January 1st of those years.

The difference in Qwest during January and February was more pronounced. During low salvage years, the 7-day average Qwest tended was more positive during January and February. During high salvage years, the 7-day average Qwest tended to be near or below zero during January and February. The mean of 7-day average Qwest was more than one order of magnitude greater in the low salvage years, when averaged over January 1st to the date of first salvage. This was interpreted as evidence that Qwest being substantially positive for a prolonged period could mitigate the effects of negative OMR. The SMT does not suggest attempting to manipulate Qwest as a management tool. Rather, the SMT should continue to consider the magnitude and direction of Qwest when assessing LFS risk.

X2 was less informative in predicting salvage in that it tended to be similar during January and February of the four comparative years. It was noted that X2 has been upstream of Collinsville for all of December and January of the current water year. USFWS analysis, previously referenced by the SMT, showed a statistically significant correlation between LFS catch in the Spring Kodiak Trawl and X2. This is consistent with our understanding of LFS life history and indicates that spawning likely occurred further upstream than in wetter years.

During the current water year, OMR has been consistently near -2,500 cfs on a 7-day running average, however, Qwest has been near zero up until the recent storm event. Qwest is projected to reach 10,000 cfs and remain high until the next SMT meeting. The SMT determined that formal advice is not warranted based on projected operations. OMR is not likely to become more negative prior to the next SMT meeting and Qwest is projected to remain positive. However, the SMT cautions against allowing OMR to become more negative than -2,500 cfs given that Qwest has been negative or close to zero for most of this water year.

8.5.1 This Condition of Approval has not been triggered. Turbidity at OBI was below 12 FNU on 2/1/2021 and remains low. However, daily average turbidity at OBI did increase to 14 FNU earlier in the week before dropping to current levels.

8.5.2 The three-year average FMWT Index for Delta Smelt is zero, resulting in a salvage threshold of one for juvenile Delta Smelt. Young of year Delta Smelt are not expected to be present at this time of year.

8.12 This condition was triggered by the detection of one LFS larva at station 716 which was collected during SLS 1 and continues due to the detection of two LFS larvae at station 716 during SLS 2. The detection of an additional larva at station 723 during SLS 1, and adults detected during SKT 1 in the Sacramento Deep Water Ship Channel suggest that spawning has occurred in the region and more individuals are likely present. This Condition of Approval is in effect during dry and critically dry years, as defined by the Sacramento River Valley Water Year Type Index. LFS are exposed to greater risk of entrainment at Barker Slough during dry and critical years due to the proximity to low salinity habitat at multiple life stages.

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. DCC gate closure and actions such as integrated early winter pulse protection, etc.)*
    - ITP Condition of Approval 8.3.2 Salmonid Presence limits exports to maintain a 14-day running average no more negative than -5,000 cfs as of 1/1/2021.
    - DCC gates will remain closed for the remainder of the season (through May 20, 2021 per the PA description for DCC gate operations) but may be opened to maintain water quality during drought conditions for up to 5 days and for up to 2 events as per the PA in December and January. If DCC gates are opened between December 1 and January 31, the CVP and SWP will divert at Health and Safety pumping levels.
    - Grantline Canal agricultural barrier was breached on 11/11/2020. The OMRI equation was adjusted accordingly to accommodate the change in barrier status.
- Controlling Factors: Water quality
- Water Temperature:
    - CCF = Not discussed (*Condition of Approval 8.8: Daily average temperature at CCF exceeds 25°C for 3 consecutive days*)
    - 3 Station Average = 10.24°C
- Tidal Cycle: Not discussed
- Turbidity:
    - 8.3.1 Freeport 3-day average = 24.62FNU
    - 8.5.1 OBI Turbidity = 5.10 FNU
        - Reached a peak of 14.19 FNU on 1/27/2021
- Salinity: X2 is upstream of Collinsville and was estimated to be 88.7 km on the Sacramento River and 91.5 km on the San Joaquin River.
- Hydrologic Footprint:
    - The SMT requested a new PTM run with two hydrologic scenarios simulating projected hydrology and an OMR Index of -4,000 cfs, with particles injected at 809, 815, and 901. SLS 2 detected larvae at each of these stations.

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

- Outages
    - SWP: No export or salvage outages reported for the period of 1/26/2021 to 2/1/2021
    - CVP: No export or salvage outages reported for the period of 1/26/2021 to 2/1/2021
- Exports
    - CCF: 1,500 cfs, increasing to 2,000 cfs but decreasing when CVP imports increase to maintain total exports of 3,900 cfs
    - CVP: 1,650 cfs increasing to 1,900 cfs on Thursday
    - Total exports are expected to increase to 3,900 cfs later in the week.
    - Barker Slough: 7-day running average = 33 cfs as of 2/1/2021.
- Meteorological Forecast: Seven-day weather forecast for Antioch predicts decreasing chance of precipitation over the next two days.
- Storm Event Projection: No substantial precipitation events are expected in the next 7 days.

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

- DCC Gates position: Closed for season (through May 20, 2021)
- Sacramento River flow at Freeport: Peaked around 15,000 cfs on 1/31/2021 and is trending downward.
- San Joaquin River flow at Vernalis: 1,000 cfs after peaking on 1/31/2021. May drop below 1,000 cfs over the next week
- Qwest: Exceeded 11,000 cfs for four days, from 1/29/2021 to 2/1/2021, and is currently decreasing. It is expected to approach zero over the next several days.
- Old River at Bacon Island Turbidity: 5.10 FNU.
- Freeport Turbidity (3-day average): 24.62 FNU.
- Expected changes in South Delta Exports: Exports will increase to total combined exports of 3,900 cfs
- NDOI: Peaked at 30,000 cfs before dropping to 15,000 cfs. Expected to decease further.

Table 1: Comparison of OMR and OMR Index (5-day and 14-day averages OMR Index and USGS gauge reported on SacPAS website, accessed 2/2/2021. Daily value for USGS guage was reported on CDEC Website, accessed 2/2/2021.)

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
2/1/2021	Daily	-1,979 cfs	-1,800 cfs
1/30/2021	5-day	-2,520 cfs	-2,470 cfs
1/30/2021	14-day	-2,430 cfs	-2,440 cfs

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 collected 1 Delta Smelt (FL = 47 mm) in the Sacramento DWSC on 1/26/2021. Previously, EDSM collected 1 Delta Smelt (FL = 51 mm) in the Sacramento DWSC on 1/6/2021.
- FCCL Broodstock collection reported one Delta Smelt collected in the Sacramento DWSC on 1/21/2021, for a total of two for the season.
- The 2021 Annual FMWT Index for Delta Smelt is zero for the third consecutive year.
- Delta Smelt LCM discussion. Not Discussed.
- Biological Conditions: The Delta Smelt collected in the Sacramento DWSC, on 1/26/2021, was well below the 58mm cutoff used to distinguish between adults (> 58mm) and juveniles. Detecting a Delta Smelt that small at this time of year is extremely rare.
- % of population in Delta zones: SMT did not discuss distribution in terms of percentage in Delta zones.
- Other Surveys: Other than EDSM and FCCL broodstock collection, no Delta Smelt detections were reported in recent sampling including, Chipps Island Trawl, SLS, and SKT.
- Salvage: No Delta Smelt have been detected at either salvage facility this season.

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

- FMWT Index: The FMWT Annual Index for Longfin Smelt is 28. Monthly indices for September and October are zero, the index for November is 22 and index for December is 6.
- Bay Study: Bay Study is off the water due to COVID restrictions. The most recent Bay Study data was collected in early November and is not likely to reflect current distribution. During November sampling, 42 Longfin Smelt were collected. One was collected in Carquinez Strait. The rest were collected in San Pablo and San Francisco Bays. December Bay Study began 12/01/2020 but was interrupted after two days of sampling. No Longfin Smelt were detected by Bay Study in December.
- Other Surveys:
    - Chipps Island Survey collected 10 LFS (FL = 65 – 105 mm) during sampling conducted from 1/20/2021 to 1/25/2021.
    - EDSM collected Four LFS (57-83 mm) and three LFS (FL = 74-81 mm) near the mouth to of Suisun Slough during sampling conducted this week. Previously EDSM collected one LFS (FL = 71 mm) in the lower Sacramento River on 1/20/2021 that was expressing eggs, and two more LFS (FL = 77 – 88 mm) in Suisun Marsh on 1/21/2021.
- SLS 2 sample collection was disrupted due to inclement weather. As a result, 12 stations downstream of the confluence were not sampled. At the time of the call, 11 samples

collected at the 12 south and central Delta stations had been processed. SLS 2 reported 22 LFS at station 809, eight at station 812, two at station 815, two at station 901 and one at station 906. Two LFS larvae were also collected at station 716 during SLS 2. See Attachment 1 for full catch details.

- January Spring Kodiak Trawl (SKT) collected 11 Longfin Smelt in Suisun Bay and Marsh and the Sacramento Deep Water Ship Channel. See previous week's Risk Assessment for catch details. February SKT began 2/1/2021 and is scheduled to run through 2/4/2021
- Salvage: No Longfin Smelt have been detected at either salvage facility.

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

- SMT estimated X2 using a tool developed by DWR staff that applies the same methodology used to calculate X2 reported on CDEC. There is interest in validating the results of this tool.
- SMT referenced an unpublished USFWS analysis of Delta Smelt and Longfin Smelt. The analysis showed that Delta Smelt catch in SKT was not correlated with X2 and distributed upstream of the confluence from January through May (2002 through 2014). Longfin Smelt SKT catch exhibited a statistically significant correlation with X2.

Notes: The SMT ITP Risk Assessments can be accessed on the CDFW Water Branch website.

Survey update: SLS 2 sampling was disrupted by inclement weather which resulted in 12 stations being dropped. All 12 of the stations not sampled were downstream of the confluence of the Sacramento and San Joaquin Rivers. February Spring Kodiak Trawl began on 2/1/2021 and is scheduled to sample through 2/4/2021. SLS 3 is scheduled to begin sampling 2/8/2021. DWR is preparing a letter to the Water Board requesting relaxation of the one-day water quality standard at Collinsville.

The SMT discussed elevated turbidity following recent storm events. Turbidity at Bacon Island (OBI) dropped below the 12 FNU threshold prior to the onset of Turbidity Bridge Avoidance. It is possible that Delta Smelt moved with the turbidity field and are now present in the OMR corridor. Elevated turbidity is entering the Delta from the San Joaquin River but has not reached the area associated with high risk of entrainment.

Members of the SMT will participate in a PTM workshop this week.

Attachments:

Attachment 1: Spring Kodiak Trawl Longfin Smelt catch for Survey 1, 2021 (1/5-1/8). Data is preliminary and subject to change.

Station	Number of Longfin Smelt collected	Range of Fork Lengths (mm)
340	0	NA
405	0	NA
411	0	NA
418	0	NA
501	0	NA
504	1	115
519	0	NA
602	1	71
606	4	51 – 82
609	0	NA
610	0	NA
508	0	NA
513	0	NA
520	0	NA
801	0	NA
804	0	NA
704	0	NA
706	0	NA
707	0	NA
711	0	NA
712	0	NA
713	0	NA
715	0	NA
716	0	NA
719	5	90 – 100
724	0	NA
809	0	NA
812	0	NA
815	0	NA
902	0	NA
906	0	NA
910	0	NA
912	0	NA
914	0	NA
915	0	NA
919	0	NA
920	0	NA
921	0	NA
922	0	NA
923	0	NA

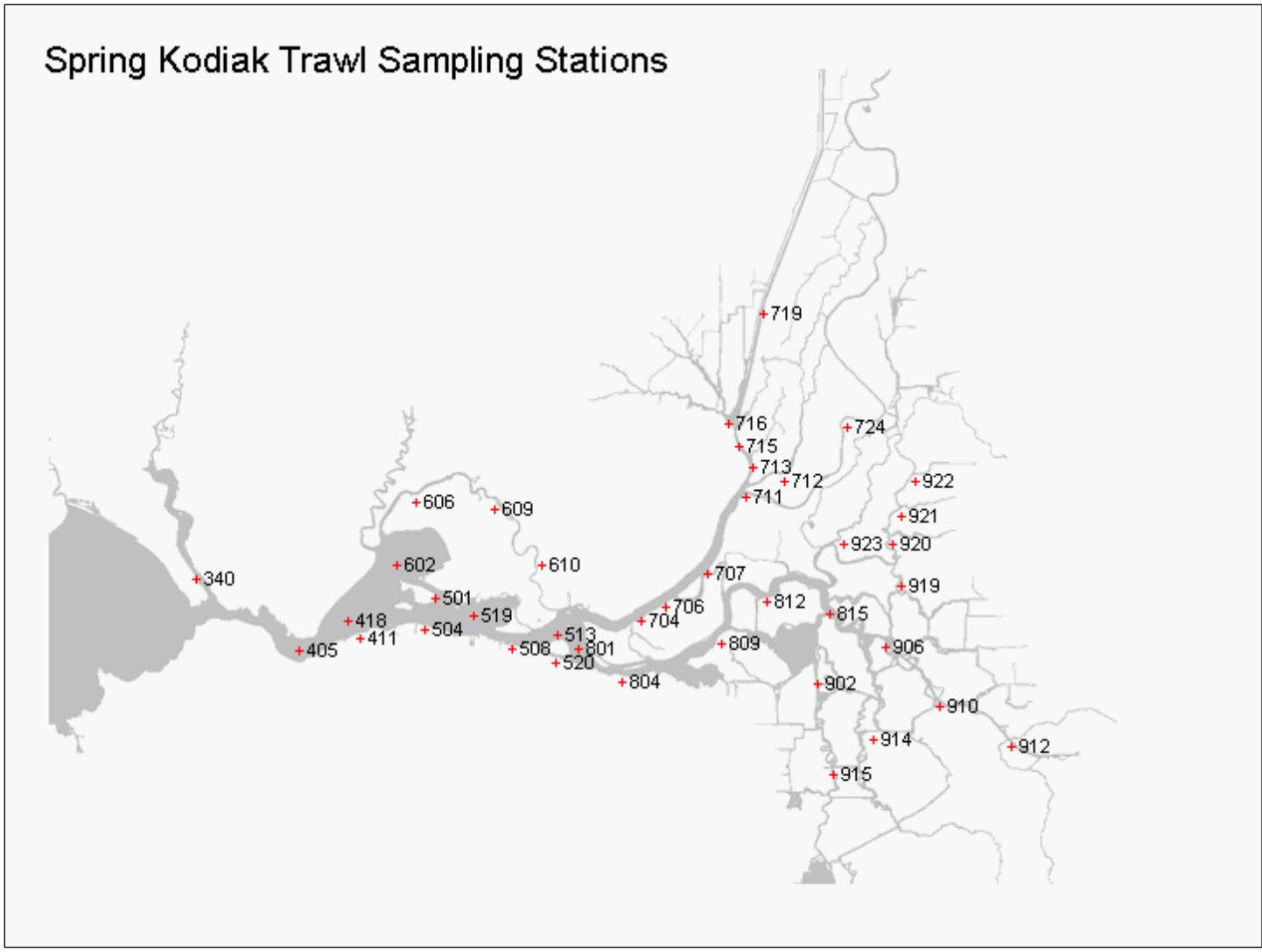


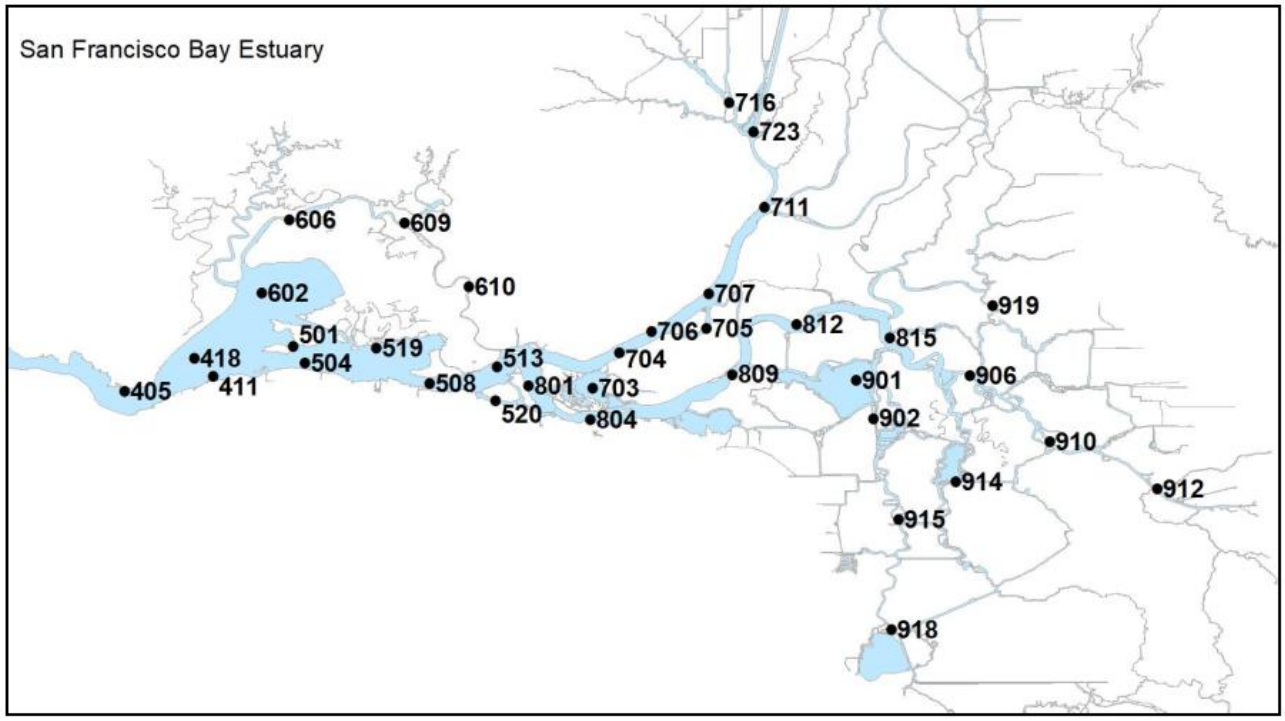
Figure 1. CDFW's Spring Kodiak Trawl Station Locations

Attachment 2: Longfin Smelt catch per station from 2021 Smelt Larva Survey, Survey 2.

Study Year	Survey #	SLS Station	Turbidity	Sample Status	Species	Smelt Catch	Minimum Length	Maximum Length	Average Length
2021	NA	405	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	411	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	418	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	501	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	504	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	508	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	513	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	519	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	520	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	602	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	606	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	609	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	610	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	703	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	704	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	705	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	706	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	707	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	711	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	716	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	723	NA	Not yet processed	NA	NA	NA	NA	NA

Study Year	Survey #	SLS Station	Turbidity	Sample Status	Species	Smelt Catch	Minimum Length	Maximum Length	Average Length
2021	NA	801	NA	Not yet processed	NA	NA	NA	NA	NA
2021	NA	804	NA	Not yet processed	NA	NA	NA	NA	NA
2021	2	809	7.6	Processed	Longfin Smelt	22	6	8	7.4
2021	2	812	6.9	Processed	Longfin Smelt	8	7	8	7.4
2021	2	815	4.1	Processed	Longfin Smelt	2	7	8	7.5
2021	2	901	6.0	Processed	Longfin Smelt	2	7	7	7.0
2021	2	902*	7.1	Processed	NA	No Smelt Catch	NA	NA	NA
2021	2	906	3.3	Processed	Longfin Smelt	1	8	8	8.0
2021	2	910	2.6	Processed	NA	No Smelt Catch	NA	NA	NA
2021	2	912	2.4	Processed	NA	No Smelt Catch	NA	NA	NA
2021	2	914	2.0	Processed	NA	No Smelt Catch	NA	NA	NA
2021	2	915	3.2	Processed	NA	No Smelt Catch	NA	NA	NA
2021	2	918	2.0	Processed	NA	No Smelt Catch	NA	NA	NA
2021	NA	919	NA	Not yet processed	NA	NA	NA	NA	NA

Processing complete through 1/28/2021



Smelt Larva Survey station locations.