

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

## Section 1: Overview

**Date: 04/12/2022**

### **Life Stages Present:**

Delta Smelt (DS): Adults, sub-adults, and larvae

Longfin Smelt (LFS): Adults, sub-adults, juveniles, and larvae

### **Advice to Water Operations Management Team (WOMT):**

ITP COA 8.4.2 was triggered on April 11<sup>th</sup> by 20-mm survey 2 with the detection of 82 LFS at five of the stations in the central and south Delta, including larvae and juveniles in Franks Tract and at stations 902 and 914 in the Old and Middle River (OMR) corridor. The Smelt Monitoring Team (SMT) recommends continuing to limit OMR Index (OMRI) to -1,250 cfs on a 7-day average to limit risk of entrainment of larval and juvenile LFS. This recommendation is based on continued larval and juvenile LFS presence in the central and south Delta and the sharp increase in LFS juvenile salvage this last week.

### **Risk Assessment:**

*Delta Smelt:* Based on recent detections, DS are present in the Lower San Joaquin River. Detection data support DS also being present in the Sacramento Deep Water Ship Channel, Lower Sacramento River, Cache Slough Liberty Island, Suisun Marsh, and the Lower San Joaquin River. DS adults and sub-adults are less likely to move into the south and central delta since turbidity remains low. Twenty-four larval DS were collected since 4/5/2022. Larval DS have been detected in the Lower San Joaquin River, the Lower Sacramento River, and the North Delta. The expected OMRI represents a low likelihood of entrainment for larval DS in the Lower San Joaquin River.

*Longfin Smelt:* 20-mm 2 detected 82 larval and juvenile LFS in the central and south Delta, including areas at high risk of entrainment. Additionally, juvenile LFS salvage has dramatically increased in the last week. 20-mm 2 triggered ITP COA 8.4.2 on April 11<sup>th</sup> and the SMT recommends continuing to limit OMRI to -1,250 cfs on a 7-day average to limit risk of entrainment of larval and juvenile LFS. This recommendation is based on continued larval and juvenile LFS presence in the most recent surveys in the central and south Delta and the sharp increase in juvenile LFS salvage over the last week.

The SMT makes this recommendation to articulate our continued concern for larval and juvenile LFS in the south Delta, as risk remains high. This recommendation is made to prevent and minimize entrainment this week and future entrainment later this season of larval and

juvenile LFS and to maintain consistency with past recommendations, with the understanding that this recommendation will be superseded by ITP COA 3.8 not requiring combined exports to drop below 1500 cfs for health and safety.

20-mm survey 2 detected 82 larval and juvenile LFS at 5 of the stations in the central and south Delta, with some small larvae still being detected. This indicates that hatching is ongoing, and fish continue to be present in areas at high risk of entrainment. 20-mm survey 2 detected 76 larvae and juveniles in the Lower San Joaquin River (stations 809 and 812) with fork lengths ranging from 6 mm to 23 mm, four in Frank's Tract (901) with fork lengths ranging from 6 mm to 20 mm, and two in the South Delta (902 and 914) with fork lengths of 8 mm and 20 mm. Additionally, a sub-adult LFS was caught in the lower San Joaquin River by Enhanced Delta Smelt Monitoring (EDSM) on March 9th. From 4/4/2022 through 4/10/2022, 534 juvenile LFS were salvaged at the SWP fish facility and 1,082 juvenile LFS were salvaged at the CVP fish facility, resulting in a total salvage of 2,632 juvenile LFS this season, which is higher than salvage numbers at this point in WY2020 or WY2021. LFS larvae also continue to be detected in qualitative larval sampling at both fish facilities. The SMT has determined that the overall risk of entrainment is low for sub-adults and adults.

Barker Slough: COA 8.12 was not triggered by 20-mm survey 2, thereby lifting the 60 cfs maximum diversion rate limitation at Barker Slough Pumping Plant (BSPP) that was previously triggered by 20-mm survey 1.

## **Section 1-A: Sacramento River and Confluence**

### **Risk of entrainment into the central Delta and export facilities for DS and LFS in Sacramento River (8.1.5.2 C ii, iii, iv)**

- Exposure Risk (Hydrology):
  - DS: Low. DS are spawning and larvae have been detected. 20-mm 2 detected a DS larva in the lower Sacramento River at station 706. DS adults/sub-adults were last detected in the lower Sacramento River by SKT 3 on March 17<sup>th</sup>. Low risk of entrainment this week due to low exports and low turbidity.
  - LFS: Risk for larvae is low, due to low exports. Planned operations will not result in an increase in risk for larvae in the Sacramento River and confluence. See "Routing Risk" for more information on adults and sub-adults.
- Routing Risk (Behavior and life history):
  - DS: Low. Water temperatures are increasing, and spawning has begun, however turbidity remains low and DS are unlikely to move into the central and south Delta.
  - LFS: Low risk of entrainment. Larvae do not exhibit swimming behaviors that would result in volitional movement into areas with a higher risk of entrainment. Some larger juveniles are being detected that will start having volitional movement soon, however low turbidity and minimal exports result in a hydrology that should not cue juveniles to enter areas with a higher risk of entrainment. Adult detections are continuing, and there is potential for adult/sub-adult movement into the central Delta however, risk remains low as exports will be minimal this week.

- Overall Entrainment Risk:
  - DS: Low.
  - LFS: Low for adults, sub-adults, juveniles, and larvae, due to projected operations this week. X2 is currently estimated at approximately 86 km, and is expected to move further upstream with decreasing inflows and a spring tide occurring later this week. Qwest is currently 136 cfs and is expected to increase to 400-500 cfs for the next couple of days before dropping negative later this week as inflows decrease.

### **Section 1-B: Central Delta**

#### **Risk of entrainment into the export facilities for DS and LFS in the central Delta (8.1.5.2 D iii, iv, v)**

- Exposure Risk (Low, Medium, High):
  - DS:
    - Adults and sub-adults: Low. The likelihood of adult and sub-adult DS entrainment remains low, due to no recent detections. There is a high degree of uncertainty regarding the response of cultured fish to environmental cues typically applied to wild DS. Water temperatures are increasing, spawning has begun, and larvae are present.
    - Larvae: Low. 20-mm 2 detected a larval DS at station 812 in the Lower San Joaquin River. PTM run results discussed 3/29/2022 showed that at the less negative OMRI expected this week, DS larvae in the Lower San Joaquin River are at low risk of entrainment. Hydrological conditions have not changed greatly since last week, so results from this PTM run continue to be used to evaluate risk.
  - LFS:
    - Adults and sub-adults: Low risk for adult and sub-adult LFS entrainment. EDSM collected one sub-adult LFS in the lower San Joaquin River on 03/09/2022, providing evidence that sub-adults/adults are still present. Projected operations being minimum exports creates a low risk of entrainment this week. Low risk for adults as adult salvage has been rare in recent years.
    - Larvae and juveniles:
      - Low risk for larvae and juveniles observed in the lower San Joaquin River by 20-mm 2. X2 is currently estimated at approximately 86 km and is expected to move further upstream with decreasing inflows and a spring tide occurring later this week. Qwest is currently 136 cfs and is expected to increase to 400-500 cfs for the next couple of days before dropping negative later this week as inflows decrease. PTM run results discussed 3/29/2022 showed that at the less negative OMRI expected this week, larvae in the lower San Joaquin River are at low risk of entrainment. Hydrological conditions have not changed greatly since last week, so results from this PTM run continue to be used to evaluate risk.



- The SMT determined that risk of entrainment is low for adult and sub-adult LFS, low for LFS larvae in the lower San Joaquin River, and high for LFS larvae in the OMR corridor at the less negative OMRI expected this week.

## 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 index<sup>1</sup> divided by 10, OR

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<sup>1</sup> The Fall Midwater Trawl (FMWT) Survey annual abundance index for LFS is calculated as the sum of September through December monthly abundance indices and is typically reported at about the same date as adult salvage

- Real-time monitoring of abiotic and biotic factors indicates a high risk of LFS movement into areas at high risk of future entrainment, as determined by DWR and CDFW SMT staff.

When evaluating the possibility of LFS movement into areas that may be subject to an elevated risk of entrainment, the SMT shall evaluate catch of LFS with fork length  $\geq 60$  mm by the 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:

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begins in December. The FMWT Index available beginning on December 1 each year shall be used to establish this threshold.

- LFS larvae or juveniles found in four or more of the 12 SLS or 20 mm stations in the central Delta and south Delta (Stations 809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, 919), or
- LFS catch per tow exceeds five LFS larvae or juveniles in two or more of the 12 stations in the central Delta and south Delta (Stations 809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, 919).

Permittee shall restrict south Delta exports for seven consecutive days to maintain a seven-day average OMR index no more negative than -5,000 cfs. Permittee shall also immediately convene the SMT to conduct a risk assessment (see Condition of Approval 8.5.1.2) to assess the risk of larval and juvenile LFS entrainment into the South Delta Export Facilities, determine if an OMR flow restriction is warranted, and recommend an OMR flow limit between -1,250 and -5,000 cfs. The SMT risk assessment and operational advice shall be reviewed by the WOMT (Condition of Approval 8.1.3) via the Collaborative Real-time Decision-making process (Condition of Approval 8.1.4). Permittee shall operate to the export restriction and OMR flow target approved through Conditions of Approval 8.1.3 and 8.1.4. Each week the SMT shall convene to conduct a new risk assessment and determine whether to maintain, or off ramp from, export restrictions based on the risk to LFS, or until the DS and LFS off-ramp has been met as described in Condition of Approval 8.8 (End of OMR Management).

From January 1 through June 30, DWR and CDFW SMT staff shall conduct weekly, or more often as needed, risk assessments (see Condition of Approval 8.5.1.2) to assess the risk of larval and juvenile LFS entrainment into the South Delta Export Facilities. As a part of the risk assessment the SMT shall provide advice on the appropriate OMR flow targets to minimize LFS entrainment or entrainment risk, or both. The SMT shall provide its advice to WOMT (Condition of Approval 8.1.3) and use the Collaborative Approach to Real-time Risk Assessment process described in Condition of Approval 8.1.4 to determine if an OMR flow restriction is warranted and determine OMR flow limit between -1,250 and -5,000 cfs. The OMR flow limit shall be in place until the next risk assessment conducted by the SMT determines that it is no longer necessary to minimize take or related impacts to LFS, or until the DS and LFS off-ramp has been met as described in Condition of Approval 8.8 (End of OMR Management).

8.4.3 High Flow Off-Ramp from Longfin Smelt OMR Restrictions. OMR management for adult, juvenile, or larval LFS as described in Conditions of Approval 8.4.1 and 8.4.2 are not required, or would cease if previously required, when river flows are (a) greater than 55,000 cfs in the Sacramento River at Rio Vista or (b) greater than 8,000 cfs in the San Joaquin River at Vernalis. If flows subsequently drop below 40,000 cfs in the Sacramento River at Rio Vista or below 5,000 cfs in the San Joaquin River at Vernalis, the OMR limit previously required as a part of Conditions of Approval 8.4.1 and 8.4.2 shall resume.

8.5.1 Turbidity Bridge Avoidance. The purpose of this Condition is to minimize the risk of entrainment of adult DS in the corridors of the Old and Middle rivers into the south Delta export facilities. This Condition is intended to avoid the formation of a turbidity bridge from the San Joaquin River shipping channel to the south Delta export facilities, which historically has been associated with elevated salvage of pre-spawning adult DS.

After the Integrated Early Winter Pulse Protection (Condition of Approval 8.1.3) or February 1 (whichever comes first), until April 1, Permittee shall manage exports to maintain daily average turbidity in Old River at Bacon Island (OBI) at a level of less than 12 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 and the daily average turbidity at OBI is not less than 12 NTU, the SMT may convene to assess the risk of entrainment of DS (Condition of Approval 8.1.5.2). The SMT 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 SMT 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 SMT 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 in 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 SMT 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 SMT may provide advice to further restrict south Delta exports to maintain a more positive OMR than -5,000 cfs. The SMT 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 SMT 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 SMT 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 SMT 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 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 SMT 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 SMT, 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 SMT.

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 SMT 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 SMT, 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 (SVI) unless otherwise noted.

Additionally, ITP COA 3.8 Describes the Minimum Export Rate: As described in Permittee's December 2019 ITP application (page 3-56), in order to meet health and safety needs, critical refuge supplies, and obligations to senior water rights holders, the combined CVP and SWP export rates at Jones Pumping Plant and Banks Pumping Plant will not be required to drop below 1,500 cfs and SWP exports will not be required to drop below 600 cfs.

### **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 initiating OMR management went into effect December 1<sup>st</sup>. The SMT conducted a Risk Assessment based on COA 8.1.5.2.

8.3.1: This COA was triggered by conditions measured on 12/17/2021 when the running three-day average of daily flow and turbidity reached 27,152 cfs and 66.79 FNU respectively. Operations were reduced on 12/20/2021 targeting a 14-day average OMR index no more negative than -2,000 cfs for 14 consecutive days. 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).

8.3.3: This COA is no longer active due to the initiation of an Integrated Early Winter Pulse Protection (COA 8.3.1).

8.4.1: This COA is no longer active due to the detection of larval LFS by SLS.

8.4.2: This COA went into effect on 01/03/2022 following the 14-day Integrated Early Winter Pulse Protection (COA 8.3.1).

- SLS 1 was initially canceled due to COVID mitigation, however, the 12 south and central Delta stations listed in this COA were sampled on 1/18/2022. The resulting data triggered this COA by detection of larval LFS at more than four stations (809, 812, 815, 901, 906, and 910) and larval catch exceeded 5 fish per tow at two stations (809 and 812).
- Data collected by SLS 2 triggered this action for the second time this season on 1/31/2022. Larval LFS were detected at four of the relevant stations (809, 812, 815 and 906) and catch per tow exceeded five LFS at two stations (809 and 812). The SMT did not advise a less negative OMR Index under this COA due to reduced exports.
- Data collected by SLS 3 did not trigger this COA.
- Data collected by SLS 4 triggered this action for the third time this season on 2/28/2022. Larval LFS were detected at five of the relevant stations (809, 812, 901, 902, and 915) and catch per tow exceeded five LFS at three stations (809, 812, and 901). However, the SMT did not advise a less negative OMRI under this COA due to low exports and positive Qwest. On March 8<sup>th</sup> the SMT requested a PTM run to help inform risk for larvae and determine if the fate of particles in the lower San Joaquin River and the central and south Delta would change if a recommendation to limit OMR was made. The injection points selected were at stations 812, 815, and 902. The scenarios modeled compared planned exports (-3000 cfs for a couple of days slowly ramping down to -1,400 cfs) with a recommendation to limit OMR to -1,250 cfs.
- Data collected by SLS 5 triggered this action for the fourth time this season on 03/11/2022. Larval LFS were detected at four of the relevant stations (809, 812, 815, and 901). Of the 21 larvae detected, 12 had yolk sacs indicating spawning is ongoing. On March 11<sup>th</sup> the SMT met to discuss the results of the PTM run and evaluate survey and salvage data. The PTM results show that with a more negative OMRI of -3,000 cfs as with the base case scenario 43% of particles are entrained into the facilities and into the OMR corridor after 3 weeks. Whereas the -1,250 cfs scenario showed 31% of particles are entrained into the facilities and into the OMR corridor after 3 weeks. This shows that at the more negative OMRI scenario (base case) there is an increased risk to larvae and juveniles in the OMR corridor, and this difference in particles entrained under different scenarios is consistent with prior years when recommendations to limit OMR were made. The SMT met on 3/15/2022 and continued the recommendation that was made on 3/11/2022 to limit OMRI to no more negative than -1,250 cfs for the protection of juvenile LFS. The SMT met on 3/22/2022 and discussed OMRI was expected to temporarily become as negative as -2,500 cfs on the 25th, however new PTM run results discussed showed very little to no difference in particles entrained into the OMR corridor and the projects between a -1,250 cfs recommendation and an OMRI temporarily as negative as -2,000 cfs. Therefore, the SMT decided not to continue the recommendation from 3/11/2022 and 3/15/2022.

- Data collected by SLS 6 and 20mm survey 1 triggered this action for the fifth time this season on 03/29/2022. SLS 6 detected 34 LFS larvae at 5 of the 11 stations processed so far in the central and south Delta (see table 1 in attachments), and densities were higher than those detected by SLS 5 earlier in March. Some of the larvae detected by SLS 6 in the central and south Delta still had yolk-sacs. 20mm survey 1 detected 71 LFS larvae at 5 of the 6 stations processed so far in the central and south Delta (see table 2 in attachments). On March 29<sup>th</sup> the SMT met to discuss the results of the PTM run and evaluate survey and salvage data. After 3 weeks, the PTM run results show that 10% of the particles at 815 (lower San Joaquin River) were entrained into the OMR corridor and projects at the -5,000 cfs scenario, whereas 5% were entrained into the OMR corridor and projects at the -1,250 cfs scenario. PTM results also show that at station 902 with a more negative OMRI of -5,000 cfs as with the base case scenario, 63% of particles are entrained into the projects and into the OMR corridor after 3 weeks (27% to the projects, 36% into the OMR corridor). Whereas the -1,250 cfs scenario, showed 55% of particles entrained into the facilities and into the OMR corridor after 3 weeks (12% to the projects, 43% into the OMR corridor). This shows that a recommendation of -1,250 cfs on a 7-day average will help decrease risk of entrainment of LFS larvae and juveniles in the OMR corridor, particularly entrainment to the projects, under these two scenarios. Juvenile LFS salvage is increasing and expected to peak in April and May, this recommendation is made to help decrease the risk of higher salvage this year. The SMT continued this recommendation on 4/5/2022.
- Data collected by 20-mm 2 triggered this COA for the sixth time this season.

8.5.1: This COA went into effect on 1/3/2022 following the 14-day Integrated Early Winter Pulse Protection (COA 8.3.1). Current OBI turbidity levels are below the threshold.

8.5.2: The 2021 FMWT Annual Index for DS is zero for the fourth consecutive year. The salvage threshold is one Juvenile DS. No juvenile DS have been salvaged this water year. One cultured subadult DS (fork length = 54 mm, adipose fin clipped) was salvaged on 1/16/2022.

8.12: This COA became active on 2/8/2022 when the Sacramento Valley Water Year Type Index (SVI) February Forecast was released. The forecasted value of 6.2 (50% exceedance) is within the range for a dry water year. SLS 2 detected larvae at station 716, however, this COA was not active at the time based on the January SVI. SLS 3 collected 3 LFS larvae at station 716. This data was reported to the SMT via email on 2/14/2022, triggering this COA for the first time this season thereby limiting BSPP maximum diversion rate to no more than 60 cfs on a 7-day average. SLS 4 did not detect LFS or DS larvae at station 716, therefore this COA was not triggered thereby removing the limitation on BSPP of no more than 60 cfs exports on a 7-day average that was previously triggered by SLS 3. SLS 5 collected 3 LFS larvae at station 716. This data was reported to the SMT via email on 3/11/2022, triggering this COA for the second time this season. 20-mm survey 1 detected 5 larval DS on 3/21/2022, triggering this COA for the third time this season. BSPP LFS protections off-ramped March 31<sup>st</sup>. An amendment to this COA was

approved on April 1<sup>st</sup> that allows the permittee to meet and confer with CDFW in the event this COA is triggered to determine if a higher maximum export rate than 60 cfs is needed for health and safety. 20-mm 2 did not detect DS at 716, so this COA was not triggered thereby removing the limitation on BSPP of no more than 60 cfs exports on a 7-day average on April 11<sup>th</sup> that was previously triggered by 20-mm 1.

8.13: The SVI February forecast corresponding to the 50% probability of exceedance is 6.2 which is in the range for a Dry water year classification. The forecast was reported on the California Data Exchange Center (CDEC) [Water Supply Index Webpage](#), accessed on 2/8/2022. The updated March SVI forecast was released on 3/8/2022 is 4.8 (50% exceedance) within the range for a critically dry water year. The updated April SVI forecast was 4.2 (50% exceedance) within the range for a critically dry water year.

### 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.*)
  - OMR Management was initiated on 1/3/2022 following the 14-day Integrated Early Warning Pulse Protection action (COA 8.3.1).
  - COA 8.3.1 was triggered by conditions measured on 12/17/2021. Exports were reduced to comply with this COA on 12/20/2021 through 1/2/2022.
  - DCC gates closed on 11/30/2021.
  - The Drought barrier at False River is being reconstructed and is expected to be completed this week.
- Controlling Factors: The Temporary Urgency Change Petition was approved and the Temporary Urgency Change Order (TUCO) can be found on the SWRCB website ([link to TUCO](#)). Combined exports are targeting a Net Delta Outflow Index (NDOI) of 4,000 cfs, combined exports limited to 1,500 cfs when NDOI is below 7,100 cfs for April through June per the TUCO.
- Water Temperature:
  - Clifton Court Forebay (CCF) Daily Average Water Temperature = 18.26°C (64.86°F), 0 days > 25°C (77°F)
  - 3 Station Average = 16.93°C
- Tidal Cycle: Emerging out of neap and coming into full moon with stronger spring tides on 16<sup>th</sup>.
- Turbidity:
  - 8.3.1 Freeport 3-day average = NA
  - 8.5.1 OBI Turbidity Daily Average = 5.22 FNU.
- Salinity: X2 is > 81 km. Estimated at 86.8 km on Sacramento River and 86.3 km on San Joaquin River.

- Hydrologic Footprint: Hydrologic footprint using the less negative (-1,250 cfs scenario) from 3/29/2022 PTM run was used to assess risk for larval and juvenile smelt in the lower San Joaquin River and the south Delta. Hydrology has not changed dramatically since last week, so results from this PTM run continued to be used to evaluate risk.

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

- Outages:
  - State Water Project (SWP): None
  - Central Valley Project (CVP): None
- Exports: Combined exports are targeting an NDOI of 4,000 cfs, combined exports limited to 1,500 cfs when NDOI is below 7,100 cfs for April through May per the TUCO.
  - SWP: 300 to 600 cfs
  - CVP: 800 to 950 cfs

**Meteorological Forecast: No significant precipitation is in the forecast.**

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

- No significant precipitation is expected this week.
- DCC Gates position: Closed 11/30/2021.
- Sacramento River flow at Freeport 6,400 cfs, will be decreasing as the week goes on.
- San Joaquin River flow at Vernalis 700-750 cfs.
- Qwest: 136 cfs today, will be at 400-500 cfs for the next couple days, then drop negative later this week.
- Expected changes in South Delta Exports: Minimum exports expected to remain stable; CCF has been at 600 cfs since April 1<sup>st</sup>, CVP is at 900 cfs and will stay there.
- NDOI: 4,900 cfs yesterday decreasing as inflows decrease.
- Upstream releases:
  - Keswick = 3,250 cfs
  - Nimbus = 1,000 cfs
  - Goodwin = 200 cfs, anticipating a pulse more details next week, looks like 3 peaks month long April 18<sup>th</sup>-May 18<sup>th</sup> with peaks up to 1,000-1,250 cfs
  - Oroville = 1,100 cfs, will be in the 1,000-2,000 cfs range this week to maintain water quality in the Delta.

**Table 1:** Comparison of OMR and OMR Index (5-day and 14-day averages in this table for OMR Index and USGS gauge were reported on [SacPAS website](#), accessed 4/12/2022). USGS OMR gauges have not updated on SacPAS since 04/03/2022, the gauge is experiencing difficulties and SMT was cautioned against using numbers after this date.

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)

4/3/2022	Daily	-1,229 cfs	-1,280 cfs
4/3/2022	5-day	-2,320 cfs	-1,850 cfs
4/3/2022	14-day	-2,500 cfs	-1,790 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**

- The last marked adult DS detection occurred on 3/31/2022 in the Sacramento Deep Water Ship Channel (n=1). The last wild adult DS detection occurred on 1/5/2022 in the lower Sacramento River stratum. Spawning has started and larval fish are being detected.
- 20mm: Survey 2 was on the water from 4/4/2022 through 4/7/2022. Processing is ongoing. So far, 23 larval DS were detected. One was detected in the Lower San Joaquin River, one was detected in the lower Sacramento River, and 21 were detected in the north Delta in Miner Slough (724 and 726). See Table 1 in attachments for details.
- EDSM: From 4/4/2022 through 4/8/2022 EDSM completed sampling at 40 sites. This was the first week of Phase 2, 20mm sampling for the season. So far, no DS have been detected; processing is ongoing and preliminary data is in Table 2 in attachments. No abundance estimate is available yet for last week.
- Chipps: From 4/3/2022 through 4/9/2022 Chipps Island Trawl completed 50 tows and collected no DS. See Table 3 in Attachments for details.
- Spring Kodiak Trawl (SKT): Survey 3 is complete and 11 marked DS were caught in the SDWSC, the Lower Sacramento River, and Suisun Marsh. Two ripe females were detected in Suisun Marsh on 3/17/2022. Survey 4 is on the water this week.
- Bay Study: Survey 3 sampling is complete, and no DS were detected.
- Fish Restoration Program: Caught a larval DS in a restoration site last week in the Cache Slough complex. The fish was preserved in ethanol and will be sent to UC Davis for genetics to determine if parentage was cultured fish.
- Salvage: No DS have been salvaged at either facility in the past seven days and no larvae have been detected.
- FMWT Index for DS = 0
- DS life cycle model (LCM) discussion: NA
- Biological Conditions: Water temperatures are within the range conducive to spawning as reported in Damon et al. (2016) and larval fish have been detected, indicating that spawning and hatching have begun.
- % of population in Delta zones: NA

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

- FMWT Index for LFS = 323

- SLS: Survey 6 was on the water from 3/21/2022 through 3/24/2022. Processing is ongoing. SLS 6 detected 34 larvae at 6 stations in the central and south Delta and some larvae still had yolk sacs.
- 20mm: Survey 2 was on the water from 4/4/2022 through 4/7/2022. Processing is ongoing. So far LFS were detected in the lower San Joaquin River, the central and south Delta, the Sacramento River, and the confluence. See table 1 in attachments for details. Survey 1 was on the water from 3/21/2022 through 3/28/2022. Processing is ongoing. Seventy-one LFS larvae were detected at 5 of the stations in the central and south Delta.
- EDSM: From 4/4/2022 through 4/8/2022 EDSM completed sampling at 40 sites. This was the first week of Phase 2, 20mm sampling for the season. Processing is ongoing, so far LFS were detected in Suisun Bay, Suisun Marsh, and the lower Sacramento River. See Table 2 in attachments for details.
- Chipps: From 4/3/2022 through 4/9/2022 Chipps Island Trawl completed 50 tows and collected 42 LFS. See Table 3 in attachments for details.
- SKT survey 3 sampling is complete and 73 LFS were detected in Suisun Marsh and Suisun Bay. SKT survey 4 is on the water this week.
- LEPS larval sample processing is ongoing, however final data will not be available until the end of the season. Larval LFS were detected at low densities as of sampling conducted on 2/25/2022. No yolk sac larvae were present as of February 25<sup>th</sup>. LEPS is sampling again in April using a 20-mm net.
- Salvage: 1,082 juvenile LFS were salvaged at the CVP fish facility from 4/4/2022 through 4/10/2022, bringing the total federal salvage this season to 1,362. 534 juvenile LFS were salvaged at the SWP fish facility from 4/4/2022 through 4/10/2022, bringing the total state salvage this season to 1,270.
- Qualitative larval sampling began at both facilities on February 7<sup>th</sup> and larvae were detected at both facilities this week.

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

##### **Notes:**

- The SMT discussed the presence of DS larvae in every historical habitat that has been processed so far is a promising sign that fish have spread out to all available habitat and that perhaps experimental release was successful this year. Suisun Marsh data has not been processed yet.
- The SMT discussed the range of sizes of LFS that are being collected by the surveys and in salvage (6-39 mm). The wide range in sizes of larval and juvenile LFS currently present indicate that the spawning season may be longer this year and that the large number of spawners that returned are resulting in more larvae and juveniles in the system. These smaller LFS larvae being collected by 20-mm and EDSM are well below the catch size that is efficiently caught by the 20-mm net.
- There will be two outages this week at the CVP fish salvage facility for four hours each day for inspection and repair work. Salvage will cease from 0800-1200 hours on April 13<sup>th</sup> and April 14<sup>th</sup>. No fish salvage will occur during the outages. Export pumping at



Jones Pumping Plant will not be interrupted. The outages are necessary to dredge the holding tank flapper valve vault (April 13) and to inspect the holding tank flapper valves (April 14).

- USFWS shared preliminary analyses of historical salvage patterns for LFS specifically looked at salvage divided by acre feet of water exported, found a higher volume of water exported resulted in higher salvage in general. This was also scaled by the log of the FMWT index to estimate salvage per adult. Results show since 2020 there has been a period of higher salvage density than historically, when not taking into account FMWT index. There was also a spike in 2002 and 2008, and a significant spike in 2020-2022. In spite of incredibly low abundance of adults, salvage is higher as is salvage density. USFWS will share preliminary analyses later after review.
- CDFW shared a plot that compared LFS salvage with combined exports so far in 2022 as of April 1<sup>st</sup> compared to all of 2020 and 2021. Despite lower exports in 2022, salvage is much higher to date than it was in 2020 and 2021. Salvage started earlier in 2022 and a spike occurred on March 29<sup>th</sup> with increased exports. CDFW is working to update the code and will send out the updated plot when it is available. Adding OMRI and Qwest to the plot is desirable. The SMT also recommended adding information about when recommendations were made and when those recommendations were controlling to give the plot context.
- CDFW also shared total LFS salvage divided by the prior FMWT index to estimate salvage by adult spawners. So far, although salvage is high in 2022 when scaled by the FMWT index, the salvage rate by adult spawners is still much lower in 2022 so far (9) than in 2020 (61) or 2021 (31).

#### Literature cited:

Damon, L. J., S. B. Slater, R. D. Baxter, and R. W. Fujimura. 2016. Fecundity and reproductive potential of wild female Delta smelt in the upper San Francisco Estuary, California. *California Fish and Game* 102(4):188–210.

Grimaldo L. F., Sommer T., Van Ark N., Jones G., Holland E., Moyle P.B., Herbold B., Smith P. 2009. Factors affecting fish entrainment into massive water diversions in a tidal freshwater estuary: can fish losses be managed? *North American Journal of Fisheries Management* 29:1253-1270.

Attachments: Table 1: 20-mm 2 Catch Table, Figure 1: 20-mm Station Locations, Table 2: EDSM Catch Table, Table 3: Chipps Island Catch Table

Table 1. Longfin Smelt and Delta Smelt catch per station from 2022 20-mm 2, survey 2 was conducted 4/4/2022 through 4/7/2022. Processing is ongoing. This data is preliminary and subject to change.

Year	Survey	Station	Date	# Tows Processed	Species	Total Catch	Min Length	Max Length	Avg Length	Region
2022	2	328	NA	0	Not Yet Processed	0	NA	NA	NA	San Pablo Bay
2022	2	329	NA	0	Not Yet Processed	0	NA	NA	NA	San Pablo Bay
2022	2	334	NA	0	Not Yet Processed	0	NA	NA	NA	San Pablo Bay
2022	2	335	NA	0	Not Yet Processed	0	NA	NA	NA	San Pablo Bay
2022	2	336	NA	0	Not Yet Processed	0	NA	NA	NA	San Pablo Bay
2022	2	323	NA	0	Not Yet Processed	0	NA	NA	NA	San Pablo Bay
2022	2	340	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	342	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	343	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	344	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	345	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	346	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	405	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	411	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	418	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	501	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	504	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	519	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	602	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	606	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	609	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	610	NA	0	Not Yet Processed	0	NA	NA	NA	Suisun Bay & West
2022	2	508	NA	0	Not Yet Processed	0	NA	NA	NA	Confluence
2022	2	513	NA	0	Not Yet Processed	0	NA	NA	NA	Confluence
2022	2	520	NA	0	Not Yet Processed	0	NA	NA	NA	Confluence
2022	2	801	04-Apr-22	3	Longfin Smelt	11	6	25	15.4	Confluence
2022	2	804	06-Apr-22	3	Longfin Smelt	31	8	23	15.9	Confluence
2022	2	703	04-Apr-22	3	Longfin Smelt	256	10	23	19.3	Sac. River System
2022	2	704	NA	0	Not Yet Processed	0	NA	NA	NA	Sac. River System
2022	2	705	NA	0	Not Yet Processed	0	NA	NA	NA	Sac. River System
2022	2	706	04-Apr-22	3	<b>Delta Smelt</b>	1	11	11	11.0	Sac. River System
2022	2	706	04-Apr-22	3	Longfin Smelt	12	9	15	12.0	Sac. River System
2022	2	707	NA	0	Not Yet Processed	0	NA	NA	NA	Sac. River System
2022	2	711	NA	0	Not Yet Processed	0	NA	NA	NA	Sac. River System
2022	2	716	07-Apr-22	3	Longfin Smelt	1	10	10	10.0	Sac. River System

Year	Survey	Station	Date	# Tows Processed	Species	Total Catch	Min Length	Max Length	Avg Length	Region
2022	2	718	07-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Sac. River System
2022	2	719	07-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Sac. River System
2022	2	720	07-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Sac. River System
2022	2	723	07-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Sac. River System
2022	2	724	07-Apr-22	3	<b>Delta Smelt</b>	14	10	12	11.2	Sac. River System
2022	2	726	07-Apr-22	3	<b>Delta Smelt</b>	7	9	14	11.3	Sac. River System
2022	2	809	06-Apr-22	3	Longfin Smelt	65	6	23	15.9	Central & South Delta
2022	2	812	06-Apr-22	3	Longfin Smelt	11	11	18	14.9	Central & South Delta
2022	2	812	06-Apr-22	3	<b>Delta Smelt</b>	1	10	10	10.0	Central & South Delta
2022	2	815	06-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Central & South Delta
2022	2	901	05-Apr-22	3	Longfin Smelt	4	6	20	9.5	Central & South Delta
2022	2	902	05-Apr-22	3	Longfin Smelt	1	8	8	8.0	Central & South Delta
2022	2	906	06-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Central & South Delta
2022	2	910	05-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Central & South Delta
2022	2	912	05-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Central & South Delta
2022	2	914	05-Apr-22	3	Longfin Smelt	1	20	20	20.0	Central & South Delta
2022	2	915	05-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Central & South Delta
2022	2	918	05-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Central & South Delta
2022	2	919	06-Apr-22	3	No Smelt Catch	0	NA	NA	NA	Central & South Delta

Processing complete through 4/11/2022.

\*Reduced tow time (5 minutes)

\*\*Reduced tow time (2.5 minutes)

Figure 1: 20mm station locations.

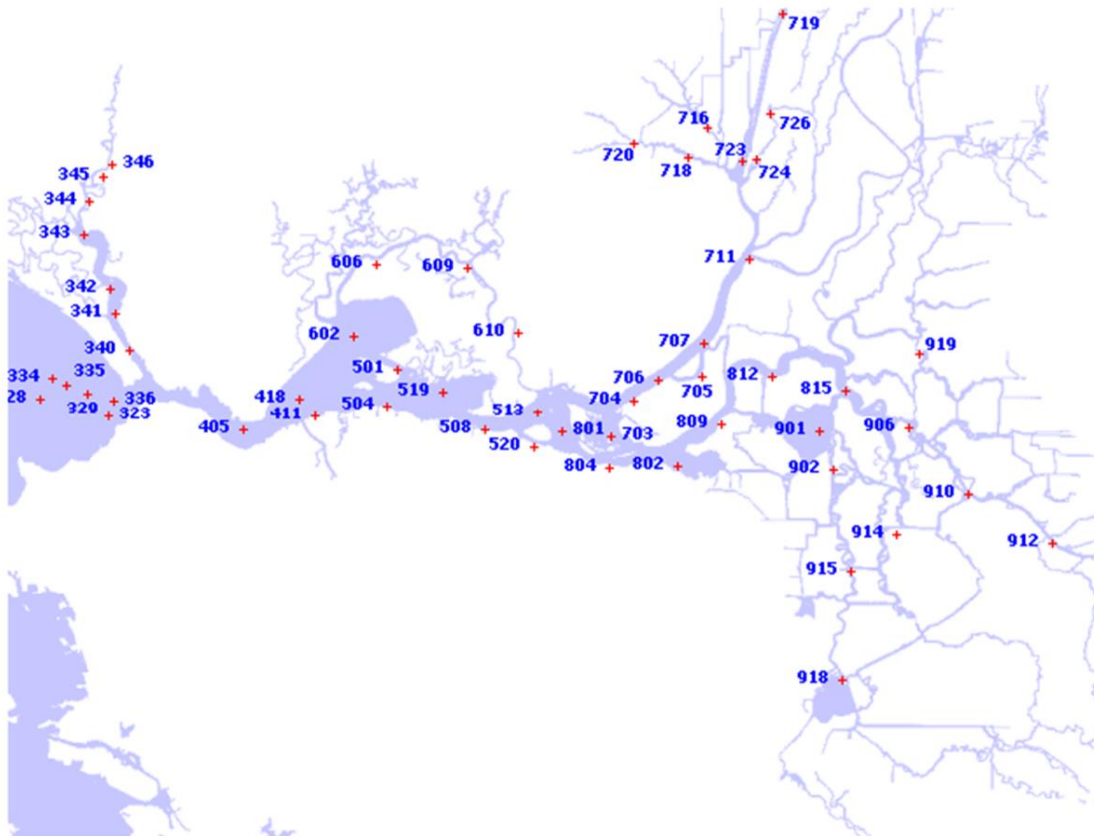


Table 2. Week 36 (4/4/2022–4/8/2022) EDSM 2022 Phase 2 (20mm) Delta Smelt (DSM), Longfin Smelt (LFS), and unidentified Osmerid (OSM) catch per station. This data is preliminary and subject to change.

Water Year	Phase	Station Code	Date	# Tows	Lab ID Status	Species	Mark Type	Fork Length Range	Total Catch	Stratum
2022	2	22-36-SB01	4/5/2022	2	Primary	LFS	None	12.6	1	Suisun Bay
2022	2	22-36-SB03	4/5/2022	2	Primary	No smelt catch	NA	NA	NA	Suisun Bay
2022	2	22-36-SB04	4/5/2022	2	Primary	No smelt catch	NA	NA	NA	Suisun Bay
2022	2	22-36-SB05	4/5/2022	2	Primary	No smelt catch	NA	NA	NA	Suisun Bay
2022	2	22-36-SB06	4/5/2022	2	Complete	No smelt catch	NA	NA	NA	Suisun Bay
2022	2	22-36-SM01	4/4/2022	2	Complete	LFS	None	14.5	1	Suisun Marsh
2022	2	22-36-SM03	4/4/2022	2	Primary	LFS	None	12.0–24.5	26	Suisun Marsh
2022	2	22-36-SM03	4/4/2022	2	Primary	OSM	None	n/p	1	Suisun Marsh
2022	2	22-36-SM04	4/4/2022	2	Primary	LFS	None	10.5–21.9	17	Suisun Marsh

Water Year	Phase	Station Code	Date	# Tows	Lab ID Status	Species	Mark Type	Fork Length Range	Total Catch	Stratum
2022	2	22-36-SM06	4/4/2022	2	Primary	LFS	None	13–22	13	Suisun Marsh
2022	2	22-36-SM08	4/4/2022	2	Complete	LFS	None	16–17.1	2	Suisun Marsh
2022	2	22-36-LSR01	4/5/2022	2	Primary	LFS	None	6.7–11.1	2	Lower Sac River
2022	2	22-36-LSR03	4/5/2022	2	Primary	LFS	None	9.6–19.4	66	Lower Sac River
2022	2	22-36-LSR04	4/5/2022	1	Complete	LFS	None	14.8–18.5	5	Lower Sac River
2022	2	22-36-LSR04	4/5/2022	1	Primary	LFS	None	6.9–19.6	10	Lower Sac River
2022	2	22-36-LSR05	4/5/2022	2	Primary	No smelt catch	NA	NA	NA	Lower Sac River
2022	2	22-36-LSJ03	4/6/2022	2	Primary	No smelt catch	NA	NA	NA	Lower Sac River
2022	2	22-36-LSJ06	4/6/2022	2	Primary	No smelt catch	NA	NA	NA	Lower Sac River
2022	2	22-36-LSJ07	4/6/2022	2	Primary	No smelt catch	NA	NA	NA	Lower Sac River
2022	2	22-36-LSJ09	4/6/2022	2	Complete	No smelt catch	NA	NA	NA	Lower Sac River
2022	2	22-36-LSJ10	4/6/2022	2	Primary	No smelt catch	NA	NA	NA	Lower Sac River
2022	2	22-36-LSJ01	4/7/2022	2	Not Processed	NA	NA	NA	NA	Lower San Joaquin River
2022	2	22-36-LSJ02	4/7/2022	2	Not Processed	NA	NA	NA	NA	Lower San Joaquin River
2022	2	22-36-LSJ04	4/7/2022	2	Not Processed	NA	NA	NA	NA	Lower San Joaquin River
2022	2	22-36-LSJ05	4/7/2022	2	Not Processed	NA	NA	NA	NA	Lower San Joaquin River
2022	2	22-36-LSJ08	4/7/2022	2	Not Processed	NA	NA	NA	NA	Lower San Joaquin River
2022	2	22-36-CS04*	4/6/2022	1	Primary	No smelt catch	NA	NA	NA	Cache Slough
2022	2	22-36-CS03	4/7/2022	2	Primary	No smelt catch	NA	NA	NA	Cache Slough
2022	2	22-36-CS04	4/7/2022	2	Primary	No smelt catch	NA	NA	NA	Cache Slough
2022	2	22-36-CS08	4/7/2022	2	Primary	No smelt catch	NA	NA	NA	Cache Slough
2022	2	22-36-CS09	4/7/2022	2	Primary	No smelt catch	NA	NA	NA	Cache Slough
2022	2	22-36-CS11	4/7/2022	2	Complete	No smelt catch	NA	NA	NA	Cache Slough
2022	2	22-36-CS01	4/8/2022	2	Not Processed	NA	NA	NA	NA	Cache Slough

Water Year	Phase	Station Code	Date	# Tows	Lab ID Status	Species	Mark Type	Fork Length Range	Total Catch	Stratum
2022	2	22-36-CS02	4/8/2022	2	Not Processed	NA	NA	NA	NA	Cache Slough
2022	2	22-36-CS06	4/8/2022	2	Not Processed	NA	NA	NA	NA	Cache Slough
2022	2	22-36-CS07	4/8/2022	2	Not Processed	NA	NA	NA	NA	Cache Slough
2022	2	22-36-CS10	4/8/2022	2	Not Processed	NA	NA	NA	NA	Cache Slough
2022	2	22-36-SSC02	4/4/2022	2	Complete	No smelt catch	NA	NA	NA	Sac DW Ship Channel
2022	2	22-36-SSC03	4/4/2022	2	Complete	No smelt catch	NA	NA	NA	Sac DW Ship Channel
2022	2	22-36-SSC04	4/4/2022	2	Complete	No smelt catch	NA	NA	NA	Sac DW Ship Channel
2022	2	22-36-SSC05	4/4/2022	2	Complete	No smelt catch	NA	NA	NA	Sac DW Ship Channel
2022	2	23-36-SSC01	4/4/2022	2	Complete	No smelt catch	NA	NA	NA	Sac DW Ship Channel

\*22-36-CS04 was sampled on 4/6/2022 (Code 3/compromised sample), then sampled again on 4/7/2022.

Table 3. Delta Smelt (DSM) and Longfin Smelt (LFS) catch in Chipps Island midwater trawls from a total of 50 tows conducted on April 3, 4, 5, 7, and 8, 2022. These data are preliminary and subject to change.

Water Year	Station Code	Date	Species	Mark Type	Fork Length	Total Catch	Disposition	Location
2022	SB018N	4/3/2022	LFS	None	65	1	Released	Chipps Island
2022	SB018N	4/3/2022	LFS	None	70	1	Released	Chipps Island
2022	SB018N	4/3/2022	LFS	None	75	1	Released	Chipps Island
2022	SB018N	4/3/2022	LFS	None	78	1	Released	Chipps Island
2022	SB018N	4/3/2022	LFS	None	80	1	L	Chipps Island
2022	SB018N	4/3/2022	LFS	None	82	1	Released	Chipps Island
2022	SB018N	4/3/2022	LFS	None	85	1	Released	Chipps Island
2022	SB018N	4/4/2022	LFS	None	88	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	71	2	Released	Chipps Island

Water Year	Station Code	Date	Species	Mark Type	Fork Length	Total Catch	Disposition	Location
2022	SB018N	4/5/2022	LFS	None	73	2	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	74	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	76	2	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	77	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	78	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	80	3	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	81	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	82	1	L	Chipps Island
2022	SB018N	4/5/2022	LFS	None	82	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	83	3	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	85	6	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	86	2	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	88	2	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	89	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	92	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	93	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	94	1	Released	Chipps Island
2022	SB018N	4/5/2022	LFS	None	101	1	Released	Chipps Island
2022	SB018S	4/7/2022	LFS	None	93	1	Released	Chipps Island

\*L fish brought back to LFWO lab due to being dead upon capture.