

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

Section 1: Overview

Date: 01/11/2022

Life Stages Present:

Delta Smelt (DS): Adults, sub-adults

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

Advice to Water Operations Management Team (WOMT):

No Advice.

Risk Assessment:

Delta Smelt: Based on distribution patterns over the past decade and rare detections, DS are unlikely to be prevalent in the south Delta. Limited detection data support DS being present in the Sacramento Deep Water Ship Channel (SDWSC), lower San Joaquin River, and the lower Sacramento River. One unmarked Delta Smelt has been collected since 1/4/2022. The implementation of the Early Winter Pulse Protection measure (COA 8.3.1) has ended. If the daily average turbidity in Old River at Bacon Island (OBI) cannot be maintained less than 12 FNU, exports will be managed to achieve an OMR no more negative than -2,000 cfs until daily average turbidity at Bacon Island drops below 12 FNU (COA 8.5.1). The likelihood of Delta Smelt adult entrainment remains low given the most recent detections, current low turbidity in the south Delta, and the expected OMR index range over the next seven days.

Longfin Smelt: OMR is projected to be no more negative than -5,000 cfs due to initiation of OMR management. X2 remains near Port Chicago due to recent storm runoff, which reflects favorable hydrology. The SMT has determined that the overall risk of entrainment is low for larvae and older fish due to the observed distribution and predicted hydrology. LFS adults are present in the Delta based on detections by Chipps Island Trawl and EDSM. There is evidence that spawning has occurred in the south Delta due to detections by Smelt Larva Survey (SLS) 13 and Larval Entrainment Pilot Study (LEPS), however, SLS 1 has been canceled due to COVID mitigation which limits data availability. This distribution is consistent with the expected upstream spawning distribution associated with drier hydrology. Longfin Smelt protections would be relaxed under wet conditions described in COA 8.4.3, however, the thresholds described within have not been met.

Barker Slough: The relevant COA (8.12) is not active based on the current Sacramento River Index Forecast as of January 1, 2022, being Below Normal. If subsequent water year forecasts reflect a drier hydrology of Dry or Critical, then 8.12 will become active.

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 expected to have made their migration in response to first flush and be holding in anticipation for temperatures conducive to spawning. Low turbidity persists in the OMR corridor, adult DS are associated with areas of higher turbidity. Therefore, we expect DS to have a lower likelihood of moving into areas with higher risk of entrainment.
 - LFS: Risk for larvae is low due to OMR management being initiated. See 'Routing Risk' for more information on adults and sub-adults.
- Routing Risk (Behavior and life history):
 - DS: Low due to low turbidity in 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. Spawning migration is underway. There is potential for adult and sub-adult movement into the central Delta. However, recent wet conditions, as indexed by X2, reduce the likelihood of adults and sub-adults moving into the south and central Delta.
- Overall Entrainment Risk:
 - DS: Low. Turbidity Bridge Avoidance is expected to maintain low turbidity conditions in the central and south Delta.
 - LFS: Low for adults, sub-adults and larvae, due to:
 - Exports targeting OMR no more negative than -5,000 cfs reduces risk of entrainment for larvae.
 - Lack of detections of adults and sub-adults in the Lower San Joaquin/South Delta.
 - Adult salvage has been rare following the Pelagic Organism Decline.

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: Low. DS are unlikely to be present in the south Delta. The likelihood of adult DS entrainment is low given the most recent detections, persistent low turbidity in the OMR corridor, and expected OMR index range over the next seven days.
 - LFS: Low risk for adult and sub-adult LFS entrainment if they are present in the Lower San Joaquin River and south Delta. No LFS have been detected by EDSM in the southern Delta and Lower San Joaquin strata.
 - Low risk for larvae observed in the lower San Joaquin River by SLS 12 due to favorable hydrology (Positive Qwest and exports targeting OMRI no more negative than -5,000 cfs).

- SLS 13 showed a low density of larvae at the south and central Delta stations. Detections were insufficient to trigger COA 8.4.2.
- One LFS larvae was detected in West Canal near Clifton Court Forebay (CCF) by LEPS (COA 7.6.2) on 1/5/2022. Larvae present in the South Delta are at high risk of entrainment. However, an OMR recommendation would not mitigate risk for larvae already present in the immediate vicinity of CCF.
- Change in exposure from previous week: (Note: The change in risk compared to previous weeks is not required by the Incidental Take Permit [ITP]).
 - DS: No change from last week.
 - LFS: No change from last week for LFS larvae outside of the zone of influence of the export facilities. However, the presence of LFS larvae in the immediate vicinity of the export facilities has been confirmed by recent sampling.
- Reporting Old and Middle River Index (OMRI) (Number and range of OMRI bins will vary based on anticipated hydrology and operations)
 - The SMT determined that risk of entrainment is low across the range of expected OMRI values for fish outside of the Old and Middle River corridor. SLS 13 detected 3 LFS larvae in the south and central Delta, however this is insufficient to trigger COA 8.4.2.

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 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 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 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 index¹ divided by 10, OR

¹ The Fall Midwater Trawl (FMWT) Survey annual abundance index for LFS is calculated as the sum of September through December monthly abundance indices and is typically reported at about the same date as adult salvage begins in December. The FMWT Index available beginning on December 1 each year shall be used to establish this threshold.

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

8.4.3 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 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 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 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 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 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 1st. The Smelt Monitoring Team 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 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).

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 Smelt larva Survey (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). Data for SLS 13 (12/27/2021 through 12/30/2021) did not trigger this COA. **SLS 1 has been canceled due to COVID mitigation.** SLS 2 is scheduled for the week of Jan 24.

8.5.1: This COA went into effect on 01/03/2022 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 FMWT Annual Index for DS is zero for the fourth consecutive year. The salvage threshold is one Juvenile DS. No DS have been salvaged this water year.

8.12: This COA is not active due to water year type. The current water year type forecast is Below Normal. This COA may become active as the Water Year Type forecast is updated.

8.13: The Sacramento Valley Water Year Type Index (SVI) January forecast corresponding to the 50% probability of exceedance is 7.5 which is in the range for a Below Normal water year classification. The forecast was reported on the California Data Exchange Center (CDEC) [Water Supply Index Webpage](#), accessed on 01/11/2022.

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 01/03/2021 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 01/02/2021.
 - DCC gates closed on 11/30/2021.
 - The Drought barrier at False River has been notched.
- Controlling Factors: OMRI 14-day average no more negative than -5,000 cfs.
- Water Temperature:
 - Clifton Court Forebay (CCF) Daily Average Water Temperature = NA
 - 3 Station Average = 9.68°C
- Tidal Cycle: Not discussed
- Turbidity:
 - 8.3.1 Freeport 3-day average = NA
 - 8.5.1 Old River at Bacon Island (OBI) Turbidity = 5.25 FNU
- Salinity: X2 = 65 km
- Hydrologic Footprint: No Particle Tracking Models were requested.

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

- Outages:
 - State Water Project (SWP): None
 - Central Valley Project (CVP): None.
- Exports: Combined exports are targeting an OMRI no more negative than -5,000 cfs.
 - CCF: 1,700 cfs and may decrease
 - Jones: 4,200 cfs
- Meteorological Forecast: No significant precipitation is in the forecast.

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

- DCC Gates position: Closed 11/30/2021.
- Sacramento River flow at Rio Vista remains near 22,000 cfs and is expected to decrease.
- San Joaquin River flow at Vernalis: 1,000 cfs and is expected to decrease.
- Qwest: -1,000 cfs on a 7-day average.
- OBI Turbidity: 5.25 FNU
- Expected changes in South Delta Exports: Exports are not expected to change substantially in the next 7 days.
- NDOI: 17,400 cfs and is expected to decrease.
- Upstream releases: (Note: upstream releases may increase due to flood management)
 - Keswick = 3,250 cfs
 - Nimbus = 2,000 to 5,000 cfs depending on inflow into Folsom Reservoir.
 - Goodwin = 200 cfs
 - Oroville = 950 cfs

Table 1: Comparison of OMR and OMR Index (5-day and 14-day averages for OMR Index and USGS gauge were reported on [SacPAS website](#), accessed 01/11/2022.

| Date | Averaging Period | USGS gauges (cfs) | Index (cfs) |
|------------|------------------|-------------------|-------------|
| 01/04/2022 | Daily | Not Reported | -4,800cfs |
| 01/08/2022 | 5-day | -4,320 cfs | -4,890 cfs |
| 01/08/2022 | 14-day | -2,870 cfs | -3,310 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 DS detection occurred on 1/05/2022 in the lower Sacramento River.

- EDSM: From 01/03/2022 through 01/06/2022 EDSM collected one unmarked DS in the lower Sacramento River near Rio Vista.
- Chipps Island Trawl did not collect any DS during sampling conducted from 01/02/2022 through 01/07/2022.
- Fall Mid-water Trawl (FMWT) Index for DS = 0
- DS life cycle model (LCM) discussion: NA
- Biological Conditions: NA
- % of population in Delta zones: NA
- SLS

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

- FMWT Index for LFS = 323
- Other Surveys:
 - EDSM: From 01/03/2022 through 01/06/2022 EDSM collected 15 LFS See Table 1 for details.
 - Chipps Island Trawl: From 01/02/2022 through 01/07/2022 Chipps Island Trawl collected 29 LFS. See Table 2 for details.
 - SLS 13 reported 4 LFS larvae in samples processed to date. See Table 3 for details. Sample processing has been postponed due to COVID mitigation. SLS 1 has been canceled due to COVID mitigation.
 - From 01/03/2022 through 01/05/2022 LEPS conducted 33 tows in West Canal near Clifton Court Forebay. LEPS reported one larval LFS (Total Length = 7 mm, yolk sac present) collected on 01/05/2022.
 - Salvage: No LFS have been salvaged at either facility.

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

Notes:

- COVID mitigation measures have disrupted sample collection and processing. SLS 1 has been canceled and LEPS paused sampling until 1/18/2022. SLS 13 sample processing has been postponed as well.
- Spring Kodiak Trawl is scheduled to begin 1/18/2022.
- The second experimental release of DS is scheduled for 1/11/2022 and 1/12/2022. 12,800 DS will be released over 2 hard releases. An additional hard release of several thousand DS is scheduled for 1/24/2022. The final release is scheduled for the week of 1/31/2022.
- Results from genetic analysis of unmarked DS collected this water year are not yet available.
- Abundance estimates calculated from EDSM catch now will include marked and unmarked DS.
- The SMT will reassess the need to initiate qualitative larval sampling at the fish facilities on a weekly basis.

Attachments: Table 1: EDSM Catch Table, Figure 1: EDSM Sample Locations, Table 2: Chipps Island Catch Table, Table 3: SLS 13

Table 1. Delta Smelt (DSM) and Longfin Smelt (LFS) catch per station for EDSM 2022 Phase 1 Kodiak trawls, from 1/3/2022–1/6/2022. These data are preliminary and subject to change.

| Water Year | Phase | Station Code | Date | # Tows | Species | Mark Type | Fork Length | Total Catch | Stratum |
|------------|-------|--------------|----------|--------|---------|-----------|-------------|-------------|--------------|
| 2022 | 1 | 22-23-SBW01 | 1/5/2022 | 4 | LFS | None | 66 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-SBW01 | 1/5/2022 | 4 | LFS | None | 67 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-SBW01 | 1/5/2022 | 4 | LFS | None | 70 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-SBW01 | 1/5/2022 | 4 | LFS | None | 72 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-SBW01 | 1/5/2022 | 4 | LFS | None | 78 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-SBW01 | 1/5/2022 | 4 | LFS | None | 95 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-SBW01 | 1/5/2022 | 4 | LFS | None | 104 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-SBW02 | 1/5/2022 | 4 | NA | NA | NA | NA | Suisun Bay |
| 2022 | 1 | 22-23-SBW03 | 1/5/2022 | 4 | LFS | None | 65 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-SBW03 | 1/5/2022 | 4 | LFS | None | 98 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-SBW03 | 1/5/2022 | 4 | LFS | None | 102 | 1 | Suisun Bay |
| 2022 | 1 | 22-23-CF04 | 1/6/2022 | 4 | NA | NA | NA | NA | Suisun Bay |
| 2022 | 1 | 22-23-SBM02 | 1/6/2022 | 4 | NA | NA | NA | NA | Suisun Bay |
| 2022 | 1 | 22-23-SBM03 | 1/6/2022 | 4 | NA | NA | NA | NA | Suisun Bay |
| 2022 | 1 | 22-23-GB01 | 1/4/2022 | 4 | LFS | None | 0 | 1 | Suisun Marsh |
| 2022 | 1 | 22-23-GB01 | 1/4/2022 | 4 | LFS | None | 62 | 1 | Suisun Marsh |

| Water Year | Phase | Station Code | Date | # Tows | Species | Mark Type | Fork Length | Total Catch | Stratum |
|------------|-------|--------------|----------|--------|---------|-----------|-------------|-------------|-------------------------|
| 2022 | 1 | 22-23-GB01 | 1/4/2022 | 4 | LFS | None | 75 | 2 | Suisun Marsh |
| 2022 | 1 | 22-23-GB01 | 1/4/2022 | 4 | LFS | None | 83 | 1 | Suisun Marsh |
| 2022 | 1 | 22-23-GB02 | 1/4/2022 | 4 | NA | NA | NA | NA | Suisun Marsh |
| 2022 | 1 | 22-23-SM01 | 1/4/2022 | 4 | NA | NA | NA | NA | Suisun Marsh |
| 2022 | 1 | 22-23-RV01 | 1/4/2022 | 4 | NA | NA | NA | NA | Lower Sac River |
| 2022 | 1 | 22-23-RV03 | 1/4/2022 | 4 | LFS | None | 77 | 1 | Lower Sac River |
| 2022 | 1 | 22-23-LSR01 | 1/5/2022 | 4 | LFS | None | 82 | 1 | Lower Sac River |
| 2022 | 1 | 22-23-LSR01 | 1/5/2022 | 4 | LFS | None | 113 | 1 | Lower Sac River |
| 2022 | 1 | 22-23-LSR03 | 1/5/2022 | 4 | NA | NA | NA | NA | Lower Sac River |
| 2022 | 1 | 22-23-RV02 | 1/5/2022 | 4 | NA | NA | NA | NA | Lower Sac River |
| 2022 | 1 | 22-23-RV04 | 1/5/2022 | 4 | DSM | None | 62 | 1 | Lower Sac River |
| 2022 | 1 | 22-23-LSJ01 | 1/5/2022 | 4 | NA | NA | NA | NA | Lower San Joaquin River |
| 2022 | 1 | 22-23-SJT01 | 1/5/2022 | 4 | NA | NA | NA | NA | Lower San Joaquin River |

| Water Year | Phase | Station Code | Date | # Tows | Species | Mark Type | Fork Length | Total Catch | Stratum |
|------------|-------|--------------|----------|--------|---------|-----------|-------------|-------------|-------------------------|
| 2022 | 1 | 22-23-SJT02 | 1/5/2022 | 4 | NA | NA | NA | NA | Lower San Joaquin River |
| 2022 | 1 | 22-23-PP01 | 1/6/2022 | 4 | NA | NA | NA | NA | Lower San Joaquin River |
| 2022 | 1 | 22-23-PP02 | 1/6/2022 | 4 | NA | NA | NA | NA | Lower San Joaquin River |
| 2022 | 1 | 22-23-PP03 | 1/6/2022 | 4 | NA | NA | NA | NA | Lower San Joaquin River |
| 2022 | 1 | 22-23-LSSC01 | 1/3/2022 | 4 | NA | NA | NA | NA | Sac DW Ship Channel |
| 2022 | 1 | 22-23-LSSC02 | 1/3/2022 | 4 | NA | NA | NA | NA | Sac DW Ship Channel |
| 2022 | 1 | 22-23-LSSC03 | 1/3/2022 | 4 | NA | NA | NA | NA | Sac DW Ship Channel |
| 2022 | 1 | 22-23-MIW01 | 1/3/2022 | 4 | NA | NA | NA | NA | Southern Delta |
| 2022 | 1 | 22-23-MIW02 | 1/3/2022 | 4 | NA | NA | NA | NA | Southern Delta |
| 2022 | 1 | 22-23-MRW01 | 1/3/2022 | 4 | NA | NA | NA | NA | Southern Delta |
| 2022 | 1 | 22-23-FT01 | 1/4/2022 | 4 | NA | NA | NA | NA | Southern Delta |
| 2022 | 1 | 22-23-FT04 | 1/4/2022 | 4 | NA | NA | NA | NA | Southern Delta |

| Water Year | Phase | Station Code | Date | # Tows | Species | Mark Type | Fork Length | Total Catch | Stratum |
|------------|-------|--------------|----------|--------|---------|-----------|-------------|-------------|----------------|
| 2022 | 1 | 22-23-MIW04 | 1/4/2022 | 4 | NA | NA | NA | NA | Southern Delta |

Unmarked DSM collected during Phase 1 are transferred alive to FCCL to contribute to DSM broodstock if tow temperatures are below 17°C. If tow temperatures are above 17°C, unmarked DSM are flash frozen in liquid nitrogen and transferred to the UC Davis Aquatic Health Program for processing. All marked DSM are flash frozen in liquid nitrogen and transferred to UC Davis for processing.

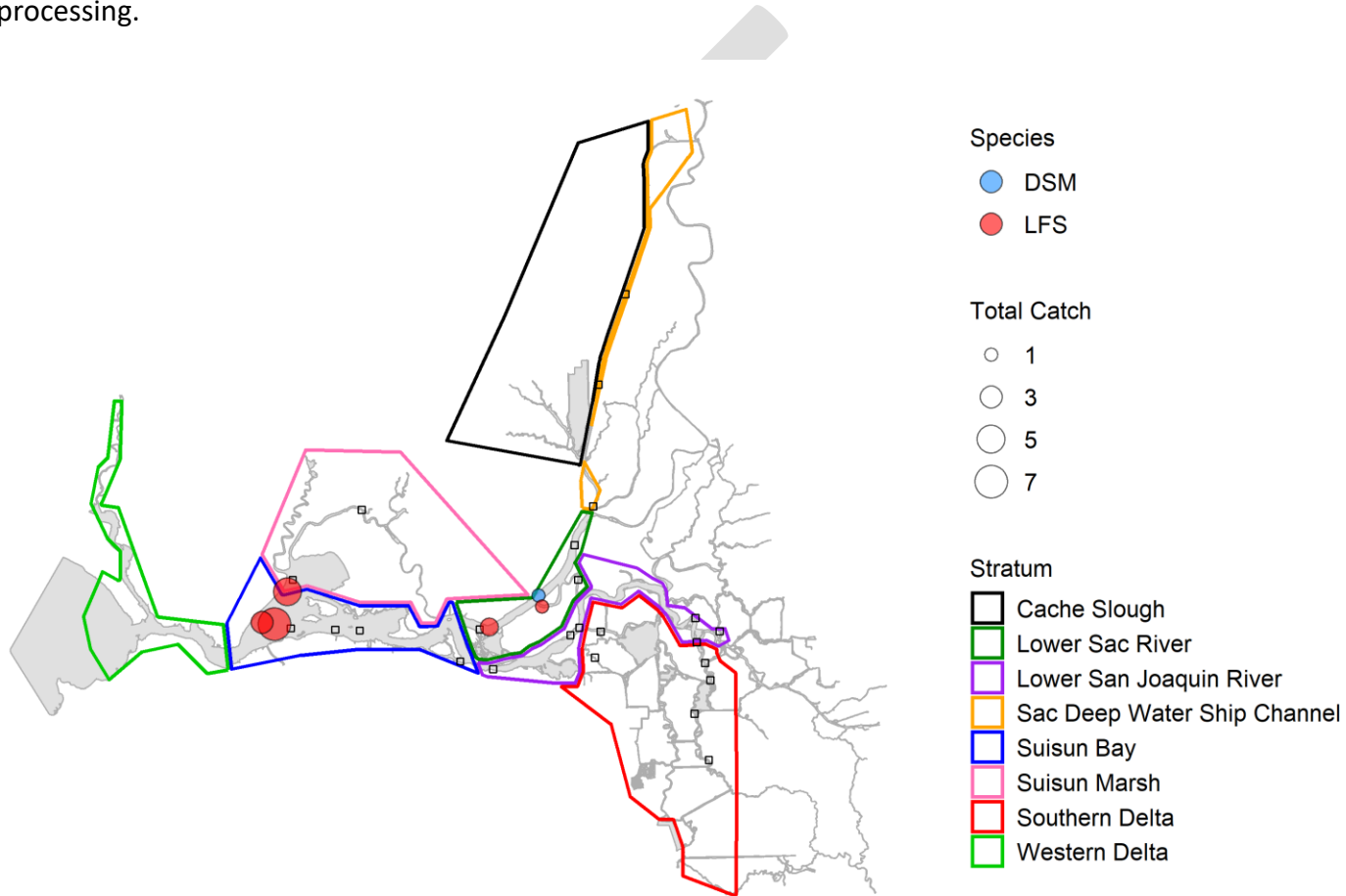


Figure 1. Delta Smelt (DSM) and Longfin Smelt (LFS) catch per station for EDSM 2022 Phase 1 Kodiak trawls, from 1/3/2022–1/6/2022. Sites with no DSM or LFS catch are indicated with squares.

Table 2. Delta Smelt (DSM) and Longfin Smelt (LFS) catch in Chipps Island mid-water trawls from 1/2/2022–1/7/2022. These data are preliminary and subject to change.

| Year | Station Code | Date | Species | Fork Length | Total Catch | Maturation | Special Study | Location |
|------|--------------|----------|---------|-------------|-------------|------------|---------------|---------------|
| 2022 | SB018M | 1/2/2022 | LFS | 96 | 1 | E | SB018M | Chipps Island |
| 2022 | SB018M | 1/2/2022 | LFS | 99 | 1 | E | SB018M | Chipps Island |
| 2022 | SB018M | 1/2/2022 | LFS | 100 | 1 | X | SB018M | Chipps Island |
| 2022 | SB018M | 1/2/2022 | LFS | 100 | 1 | X | SB018M | Chipps Island |
| 2022 | SB018M | 1/2/2022 | LFS | 110 | 1 | X | SB018M | Chipps Island |
| 2022 | SB018M | 1/2/2022 | LFS | 108 | 1 | X | SB018M | Chipps Island |
| 2022 | SB018N | 1/2/2022 | LFS | 103 | 1 | X | SB018N | Chipps Island |
| 2022 | SB018N | 1/2/2022 | LFS | 115 | 1 | E | SB018N | Chipps Island |
| 2022 | SB018N | 1/2/2022 | LFS | 113 | 1 | X | SB018N | Chipps Island |
| 2022 | SB018S | 1/2/2022 | LFS | 99 | 1 | X | SB018S | Chipps Island |
| 2022 | SB018S | 1/2/2022 | LFS | 98 | 1 | E | SB018S | Chipps Island |
| 2022 | SB018S | 1/2/2022 | LFS | 75 | 1 | E | SB018S | Chipps Island |
| 2022 | SB018M | 1/3/2022 | LFS | 91 | 1 | E | SB018M | Chipps Island |
| 2022 | SB018M | 1/3/2022 | LFS | 84 | 1 | X | SB018M | Chipps Island |
| 2022 | SB018M | 1/3/2022 | LFS | 85 | 1 | E | SB018M | Chipps Island |
| 2022 | SB018M | 1/3/2022 | LFS | 92 | 1 | E | SB018M | Chipps Island |
| 2022 | SB018N | 1/3/2022 | LFS | 105 | 1 | E | SB018N | Chipps Island |
| 2022 | SB018N | 1/3/2022 | LFS | 114 | 1 | M | SB018N | Chipps Island |
| 2022 | SB018N | 1/3/2022 | LFS | 112 | 1 | M | SB018N | Chipps Island |
| 2022 | SB018N | 1/3/2022 | LFS | 106 | 1 | E | SB018N | Chipps Island |

| Year | Station Code | Date | Species | Fork Length | Total Catch | Maturation | Special Study | Location |
|------|--------------|----------|---------|-------------|-------------|------------|---------------|---------------|
| 2022 | SB018N | 1/3/2022 | LFS | 89 | 1 | E | SB018N | Chipps Island |
| 2022 | SB018S | 1/3/2022 | LFS | 77 | 1 | E | SB018S | Chipps Island |
| 2022 | SB018M | 1/4/2022 | LFS | 106 | 1 | M | SB018M | Chipps Island |
| 2022 | SB018N | 1/4/2022 | LFS | 99 | 1 | X | SB018N | Chipps Island |
| 2022 | SB018S | 1/4/2022 | LFS | 100 | 1 | M | SB018S | Chipps Island |
| 2022 | SB018S | 1/4/2022 | LFS | 98 | 1 | X | SB018S | Chipps Island |
| 2022 | SB018S | 1/4/2022 | LFS | 98 | 1 | X | SB018S | Chipps Island |
| 2022 | SB018M | 1/6/2022 | LFS | 93 | 1 | E | SB018M | Chipps Island |
| 2022 | SB018M | 1/7/2022 | LFS | 70 | 1 | n/p | SB018M | Chipps Island |

As requested, LFS > 80 mm fork length collected in Chipps Island trawls during Dec-Apr are transferred alive to FCCL to contribute to LFS broodstock if tow temperatures are below 14.5°C. Generally, LFS collected >65 mm are checked for expression (M=milt, E=eggs, X=no expression). Fish transferred to FCCL are NOT expressed. All DSM are flash frozen in liquid nitrogen and transferred to the UC Davis Aquatic Health Program for processing. L*: Fish dead, taken back to LFWO lab for preservatio

Table 3. Longfin Smelt catch per station from 2021 Smelt Larva Survey, Survey 13. Longfin incidental take permit criteria stations are highlighted in blue (Barker Slough Pumping Plant) and yellow (South Delta exports). Survey 13 was in the field from 12/27/2021 – 12/30/2021.

| Year | Survey # | SLS Station | Turbidity (NTU) | Sample Status | Species | Smelt Catch | Min Length | Max Length | Mean Length |
|------|----------|-------------|-----------------|---------------|---------------|----------------|------------|------------|-------------|
| 2021 | 13 | 340 | 41.0 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 342 | 53.1 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 343 | 35.8 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 344 | 36.7 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 345 | 41.1 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 346 | 43.6 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 347 | 22.5 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 348 | 20.6 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 349 | 16.7 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 405 | 37.2 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 411 | 40.4 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 418 | 28.3 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 501 | 48.8 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 504 | 55.3 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 508 | 46.4 | Processed | Longfin Smelt | 7 | 5 | 8 | 6.7 |
| 2021 | 13 | 513 | 40.2 | Processed | Longfin Smelt | 9 | 5 | 7 | 6.3 |
| 2021 | 13 | 519 | 67.8 | Processed | Longfin Smelt | 6 | 5 | 9 | 7.0 |
| 2021 | 13 | 520 | 35.8 | Processed | Longfin Smelt | 5 | 6 | 8 | 6.8 |
| 2021 | 13 | 602 | 67.3 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 606 | 100.0 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 609 | 36.9 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 610 | 52.6 | Not Processed | NA | NA | NA | NA | NA |
| 2021 | 13 | 703 | 34.1 | Processed | NA | No Smelt Catch | NA | NA | NA |

| Year | Survey # | SLS Station | Turbidity (NTU) | Sample Status | Species | Smelt Catch | Min Length | Max Length | Mean Length |
|------|----------|-------------|-----------------|---------------|---------------|----------------|------------|------------|-------------|
| 2021 | 13 | 704 | 42.9 | Processed | Longfin Smelt | 1 | 6 | 6 | 6.0 |
| 2021 | 13 | 705 | 32.8 | Processed | Longfin Smelt | 1 | 6 | 6 | 6.0 |
| 2021 | 13 | 706 | 48.8 | Processed | Longfin Smelt | 1 | 6 | 6 | 6.0 |
| 2021 | 13 | 707 | 40.4 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 711 | 42.4 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 716 | 45.3 | Processed | Longfin Smelt | 1 | 5 | 5 | 5.0 |
| 2021 | 13 | 723 | 45.4 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 801 | 37.0 | Processed | Longfin Smelt | 5 | 6 | 7 | 6.8 |
| 2021 | 13 | 804 | 33.3 | Processed | Longfin Smelt | 5 | 7 | 10 | 7.8 |
| 2021 | 13 | 809 | 17.3 | Processed | Longfin Smelt | 2 | 6 | 7 | 6.5 |
| 2021 | 13 | 812 | 21.8 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 815 | 20.1 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 901 | 12.2 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 902 | 6.0 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 906 | 11.2 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 910 | 11.9 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 912 | 33.8 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 914 | 4.8 | Processed | Longfin Smelt | 1 | 9 | 9 | 9.0 |
| 2021 | 13 | 915 | 4.2 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 918 | 4.2 | Processed | NA | No Smelt Catch | NA | NA | NA |
| 2021 | 13 | 919 | 27.9 | Processed | NA | No Smelt Catch | NA | NA | NA |