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

Section 1: Overview

Date: 01/04/2022

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 tagged Delta Smelt has been collected since 12/28/2021. The implementation of the Early Winter Pulse Protection 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. 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. The SMT has determined that risk of entrainment is low for larvae and older fish due to the observed distribution. LFS adults are present in the Delta based on detections by Chipps Island Trawl and EDSM. There is evidence that the spawning has commenced based on detections of larvae in the Delta by SLS. Due to dry hydrology observed over the season, the SMT expects to see larvae in the central and south Delta when they begin to emerge. Longfin Smelt protections would be relaxed under wet conditions described in COA 8.4.3, however, the thresholds described within have not been met.

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
    - 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 Delta.
    - LFS: Low risk of entrainment. There is potential for adult and sub-adult movement into the central Delta. Spawning migration has begun, recent wet conditions reduce the likelihood of adults and sub-adults moving into the south and central Delta. Larvae do not exhibit swimming behaviors that would result in volitional movement into areas with a higher risk of entrainment.
- 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 prevalent in the south Delta. The likelihood of adult DS entrainment is low given the most recent detections, persistent low turbidity in the south Delta, 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)
        - Preliminary results for the 12 central and south Delta stations listed in COA 8.4.2, SLS 13 showed a low density of larvae. Detections were insufficient to trigger COA 8.4.2.
- 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.
- 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.

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 index[1] 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

- 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.

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

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.

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). Preliminary data for SLS 13 (12/27/2021 through 12/30/2021) did not trigger this COA. **NOTE**: **Data reported for SLS 13 is preliminary and will undergo the standard QA/QC process including a second round of identification.**

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). 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.

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.
    - Grantline barrier has been breached. This changes the OMRI calculation.
- 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 = 8.13°C
- Tidal Cycle: Not discussed
- Turbidity:
    - 8.3.1 Freeport 3-day average = NA
    - 8.5.1 Old River at Bacon Island (OBI) Turbidity = 4.59 FNU
- Salinity: X2 = 67 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: 1,800 cfs to 2,000 cfs. Will decrease to 1,300 cfs to 1,500 cfs at end of week depending on San Joaquin River flow at Vernalis.
    - Jones: 3,500 cfs increasing to 4,200 cfs Thursday.
- Meteorological Forecast: Forecast for Antioch, CA shows a chance of precipitation tonight and again on Friday. Forecast for Stockton, CA shows a chance of precipitation on Friday. Rainfall totals are not expected to be as substantial as those observed in December.

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

- DCC Gates position: Closed 11/30/2021.
- Sacramento River flow at Rio Vista was 22,000 cfs and is expected to decrease.
- San Joaquin River flow at Vernalis: 1,500 cfs and is expected to decrease.
- Qwest: +1,000 cfs and is expected to decrease to -1,000 cfs. Seven-day average Qwest was +7,400 cfs.
- OBI Turbidity: 4.59 FNU
- Expected changes in South Delta Exports: Exports may increase based on San Joaquin River flow at Vernalis. Combined exports are targeting an OMRI no more negative than -5,000 cfs.
- NDOI: 18,400 cfs (From DWR OCO Operations Summary for January 4, 2022).
- Upstream releases: (Note: upstream releases may increase due to flood management)
    - Keswick = 3,250 cfs
    - Nimbus = 5,000 cfs for flood space encroachment control
    - 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 01/04/2022. **Note**: Averages for OMR indices after 12/22/2021 were not available on SacPAS.

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
01/04/2022	Daily	Not Reported	-4,500 cfs
12/22/2021	5-day	-4,680 cfs	-4,730 cfs
12/22/2021	14-day	-3,960 cfs	-4,100 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 12/29/2021 in the lower Sacramento River.
- EDSM: From 12/27/2021 to 12/29/2021, EDSM collected three tagged DS in the Lower Sacramento River.
- Chipps Island Trawl: One marked DS was collected on 12/29/2021.
- 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
- Smelt Larva Survey 12 (SLS 12) began on 12/13/2021 and did not collect any DS. Sample processing is complete. SLS 13 sampled from 12/27/2021 through 12/30/2021. Preliminary data has been reported for the 12 stations listed in COA 8.4.2 and station 716 in Barker Slough. No DS were detected. Salvage: No DS have been salvaged at either facility.

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

- FMWT Index for LFS = 323
- Other Surveys:
  - EDSM: From 12/27/2021 through 12/29/2021 EDSM collected 14 LFS. See Table 1 for details.
  - Chipps Island Trawl: From 12/26/2021 through 01/01/2022 Chipps Island Trawl collected 74 LFS. See Table 2 for details.
  - 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

The SMT viewed turbidity distribution on the Bay Delta Live website.

Notes:

- The pilot larval entrainment monitoring program began 01/03/2022. Processing of samples started today and data will be provided as soon as possible, however routine real-time monitoring processing will be prioritized.
- The SMT will request a PTM run if data from SLS 13 triggers COA 8.4.2 when the finalized data is released.
- FCCL Broodstock collection of LFS has been paused. Seventy-nine of the 100 fish allotment have been transferred to FCCL.
- The SMT discussed the need for expression data for real time water operations. DOP data processing will be prioritized for DS. Any DS collected will not be checked for expression in the field. Reproductive status will be reported to SMT as it becomes available. The SMT recommended that expression checks for LFS can stop for this season, but should be carried out in subsequent years until LFS larvae are detected. The reproductive status of adult LFS informs the transition from COA 8.4.1, which is in effect until spawning is detected in the Delta, to COA 8.4.2. Spawning has been detected this season as evidenced by the detection of LFS larvae by SLS. In subsequent years the SMT will look to reproductive status of adult LFS and presence of larvae to inform the transition from COA 8.4.1 to COA 8.4.2. The SMT also recommended that field crews note any distended fish or expression of gametes that appear during normal handling, but acknowledged that there is no standardized method to determine reproductive status based on non-invasive visual observations.

Attachments: Table 1: EDSM Catch Table, Figure 1: EDSM Sample Locations, Table 2: Chipps Island Catch Table, Table 3: SLS 12 Catch Table.

Table 1. Delta Smelt (DSM) and Longfin Smelt (LFS) catch per station for EDSM 2022 Phase 1 Kodiak trawls, from 12/27/2021–12/29/2021. 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	22-22-CF01	12/27/2021	4	NA	NA	NA	NA	Suisun Bay
2022	1	22-22-SBM02	12/27/2021	4	LFS	None	88	1	Suisun Bay
2022	1	22-22-SBW03	12/27/2021	4	LFS	None	65	1	Suisun Bay
2022	1	22-22-SBW03	12/27/2021	4	LFS	None	75	1	Suisun Bay
2022	1	22-22-SBM01	12/28/2021	4	NA	NA	NA	NA	Suisun Bay
2022	1	22-22-SBW01	12/28/2021	4	NA	NA	NA	NA	Suisun Bay
2022	1	22-22-SBW02	12/28/2021	4	NA	NA	NA	NA	Suisun Bay
2022	1	22-22-SM01	12/29/2021	4	LFS	None	80	1	Suisun Marsh
2022	1	22-22-SM02	12/29/2021	4	LFS	None	79	1	Suisun Marsh
2022	1	22-22-SM02	12/29/2021	4	LFS	None	105	1	Suisun Marsh
2022	1	22-22-SM03	12/29/2021	4	LFS	None	62	1	Suisun Marsh

Water Year	Phase	Station Code	Date	# Tows	Species	Mark Type	Fork Length	Total Catch	Stratum
2022	1	22-22-SM03	12/29/2021	4	LFS	None	63	1	Suisun Marsh
2022	1	22-22-SM03	12/29/2021	4	LFS	None	73	1	Suisun Marsh
2022	1	22-22-SM03	12/29/2021	4	LFS	None	75	1	Suisun Marsh
2022	1	22-22-SM03	12/29/2021	4	LFS	None	79	1	Suisun Marsh
2022	1	22-22-SM03	12/29/2021	4	LFS	None	83	2	Suisun Marsh
2022	1	22-22-SM03	12/29/2021	4	LFS	None	85	4	Suisun Marsh
2022	1	22-22-LSR01	12/27/2021	2	DSM	AdClipped	76	1	Lower Sac River
2022	1	22-22-LSR02	12/27/2021	4	NA	NA	NA	NA	Lower Sac River
2022	1	22-22-LSR03	12/27/2021	4	NA	NA	NA	NA	Lower Sac River
2022	1	22-22-RV01	12/28/2021	4	LFS	None	73	1	Lower Sac River
2022	1	22-22-RV02	12/28/2021	2	DSM	AdClipped	50	1	Lower Sac River

Water Year	Phase	Station Code	Date	# Tows	Species	Mark Type	Fork Length	Total Catch	Stratum
2022	1	22-22-RV03	12/28/2021	2	DSM	AdClipped	74	1	Lower Sac River
2022	1	22-22-LSSC01	12/29/2021	4	NA	NA	NA	NA	Sac DW Ship Channel
2022	1	22-22-LSSC02	12/29/2021	4	NA	NA	NA	NA	Sac DW Ship Channel
2022	1	22-22-LSSC03	12/29/2021	4	NA	NA	NA	NA	Sac DW Ship Channel
2022	1	22-22-FT02	12/27/2021	4	NA	NA	NA	NA	Southern Delta
2022	1	22-22-FT04	12/27/2021	4	NA	NA	NA	NA	Southern Delta
2022	1	22-22-GLW01	12/27/2021	4	NA	NA	NA	NA	Southern Delta
2022	1	22-22-MIW01	12/28/2021	4	NA	NA	NA	NA	Southern Delta
2022	1	22-22-MIW02	12/28/2021	4	NA	NA	NA	NA	Southern Delta
2022	1	22-22-MIW03	12/28/2021	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.

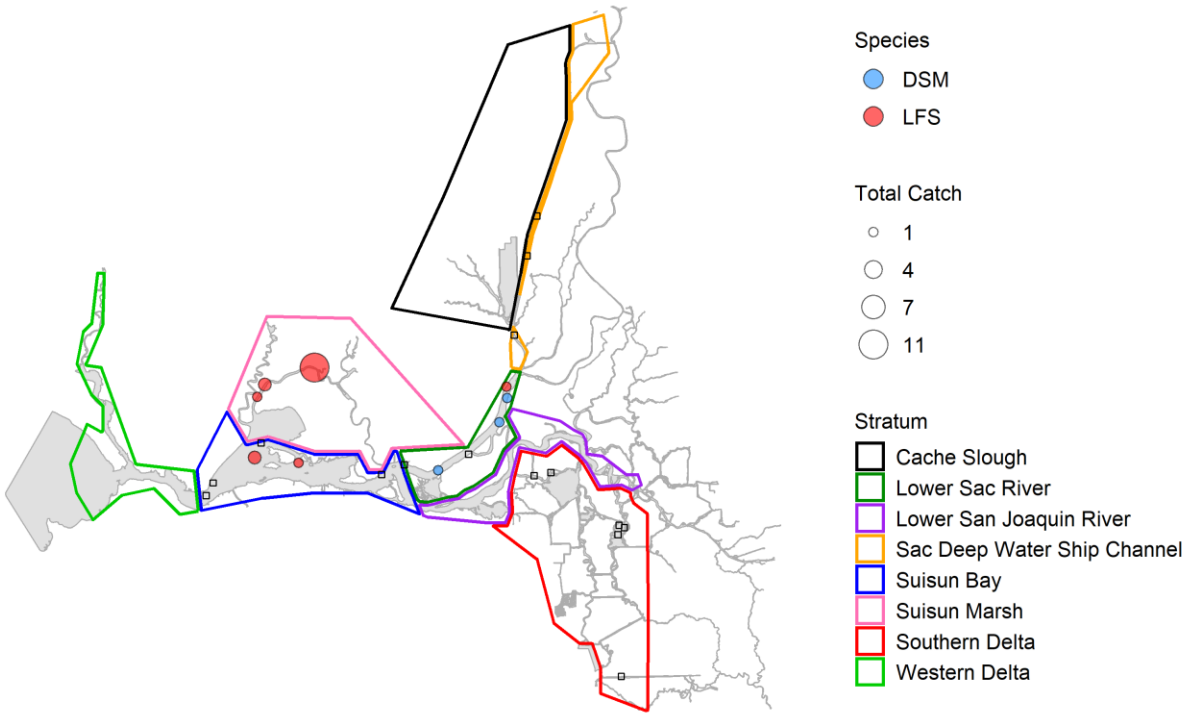

Figure 1. Delta Smelt (DSM) and Longfin Smelt (LFS) catch per station for EDSM 2022 Phase 1 Kodiak trawls, from 12/27/2021–12/29/2021. Sites with no DSM or LFS catch are indicated with squares.

Table 2. Delta Smelt (DSM) and Longfin Smelt (LFS) catch in Chipps Island mid-water trawls from 12/26/2021 – 01/01/20222. These data are preliminary and subject to change.

Year	Station Code	Date	Species	Fork Length	Total Catch	Maturation	Special Study	Location
2022	SB018M	12/26/2021	LFS	115	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	108	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	115	1	M	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	85	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	97	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	88	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	100	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	101	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	103	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	105	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	105	1	X	n/a	Chipps Island
2022	SB018M	12/26/2021	LFS	107	1	M	n/a	Chipps Island
2022	SB018N	12/26/2021	LFS	99	1	M	n/a	Chipps Island
2022	SB018N	12/26/2021	LFS	98	1	M	n/a	Chipps Island
2022	SB018N	12/26/2021	LFS	100	1	E	n/a	Chipps Island
2022	SB018N	12/26/2021	LFS	100	1	X	n/a	Chipps Island
2022	SB018N	12/26/2021	LFS	105	1	X	n/a	Chipps Island
2022	SB018N	12/26/2021	LFS	110	1	X	n/a	Chipps Island

Year	Station Code	Date	Species	Fork Length	Total Catch	Maturation	Special Study	Location
2022	SB018N	12/26/2021	LFS	100	1	X	n/a	Chipps Island
2022	SB018S	12/26/2021	LFS	96	1	X	n/a	Chipps Island
2022	SB018S	12/26/2021	LFS	76	1	X	n/a	Chipps Island
2022	SB018S	12/26/2021	LFS	84	1	X	n/a	Chipps Island
2022	SB018M	12/27/2021	LFS	105	1	X	n/a	Chipps Island
2022	SB018M	12/27/2021	LFS	73	1	X	n/a	Chipps Island
2022	SB018M	12/27/2021	LFS	86	1	X	n/a	Chipps Island
2022	SB018M	12/27/2021	LFS	101	1	X	n/a	Chipps Island
2022	SB018M	12/27/2021	LFS	102	1	X	n/a	Chipps Island
2022	SB018M	12/27/2021	LFS	110	1	X	n/a	Chipps Island
2022	SB018M	12/27/2021	LFS	110	1	X	n/a	Chipps Island
2022	SB018N	12/27/2021	LFS	77	1	X	n/a	Chipps Island
2022	SB018N	12/27/2021	LFS	97	1	X	n/a	Chipps Island
2022	SB018N	12/27/2021	LFS	103	1	X	n/a	Chipps Island
2022	SB018S	12/27/2021	LFS	70	1	X	n/a	Chipps Island
2022	SB018S	12/27/2021	LFS	95	1	X	n/a	Chipps Island
2022	SB018S	12/27/2021	LFS	102	1	X	n/a	Chipps Island
2022	SB018S	12/27/2021	LFS	83	1	X	n/a	Chipps Island
2022	SB018S	12/27/2021	LFS	99	1	n/p	n/a	Chipps Island

Year	Station Code	Date	Species	Fork Length	Total Catch	Maturation	Special Study	Location
2022	SB018M	12/28/2021	LFS	99	1	X	n/a	Chipps Island
2022	SB018M	12/28/2021	LFS	104	1	X	n/a	Chipps Island
2022	SB018M	12/28/2021	LFS	76	1	X	n/a	Chipps Island
2022	SB018M	12/28/2021	LFS	100	1	X	n/a	Chipps Island
2022	SB018N	12/28/2021	LFS	105	1	X	n/a	Chipps Island
2022	SB018N	12/28/2021	LFS	103	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	67	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	77	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	84	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	95	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	77	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	90	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	98	1	E	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	101	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	108	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	72	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	80	1	X	n/a	Chipps Island
2022	SB018S	12/28/2021	LFS	105	1	X	n/a	Chipps Island
2022	SB018M	12/29/2021	LFS	80	1	X	n/a	Chipps Island

Year	Station Code	Date	Species	Fork Length	Total Catch	Maturation	Special Study	Location
2022	SB018M	12/29/2021	LFS	67	1	X	n/a	Chipps Island
2022	SB018M	12/29/2021	LFS	95	1	X	L	Chipps Island
2022	SB018M	12/29/2021	LFS	103	1	X	n/a	Chipps Island
2022	SB018M	12/29/2021	LFS	105	1	E	n/a	Chipps Island
2022	SB018M	12/29/2021	LFS	110	1	X	n/a	Chipps Island
2022	SB018M	12/29/2021	LFS	78	1	X	n/a	Chipps Island
2022	SB018M	12/29/2021	LFS	105	1	X	n/a	Chipps Island
2022	SB018N	12/29/2021	DSM	71	1	n/p	L	Chipps Island
2022	SB018N	12/29/2021	LFS	96	1	X	n/a	Chipps Island
2022	SB018N	12/29/2021	LFS	119	1	X	n/a	Chipps Island
2022	SB018N	12/29/2021	LFS	115	1	X	n/a	Chipps Island
2022	SB018N	12/29/2021	LFS	104	1	X	n/a	Chipps Island
2022	SB018N	12/29/2021	LFS	101	1	E	n/a	Chipps Island
2022	SB018N	12/29/2021	LFS	102	1	X	n/a	Chipps Island
2022	SB018S	12/29/2021	LFS	74	1	X	L	Chipps Island
2022	SB018S	12/29/2021	LFS	80	1	X	n/a	Chipps Island
2022	SB018S	12/29/2021	LFS	93	1	X	n/a	Chipps Island
2022	SB018S	12/29/2021	LFS	94	1	X	n/a	Chipps Island
2022	SB018S	12/29/2021	LFS	105	1	X	n/a	Chipps Island

As requested, LFS > 80 mm fork length collected in Chipps Island trawls during Dec-Apr are transferred live 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 preservation.

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

Year	Survey #	SLS Station	Turbidity (NTU)	Sample Status	Species	Smelt Catch	Min Length	Max Length	Mean Length
2021	12	340	15.7	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	342	15.5	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	343	25.4	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	344	58.8	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	345	85.3	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	346	118.0	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	347	86.1	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	348	63.8	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	349	51.6	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	405	15.4	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	411	21.6	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	418	21.1	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	501	16.9	Processed	Longfin Smelt	1	6	6	6.0
2021	12	504	18.1	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	508	30.5	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	513	21.2	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	519	22.3	Processed	Longfin Smelt	1	7	7	7.0

Year	Survey #	SLS Station	Turbidity (NTU)	Sample Status	Species	Smelt Catch	Min Length	Max Length	Mean Length
2021	12	520	18.8	Processed	Longfin Smelt	3	8	8	8.0
2021	12	602	22.5	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	606	37.4	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	609	24.7	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	610	29.8	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	703	17.3	Processed	Longfin Smelt	4	8	8	8.0
2021	12	704	34.2	Processed	Longfin Smelt	2	7	7	7.0
2021	12	705	13.6	Processed	Longfin Smelt	1	8	8	8.0
2021	12	706	25.0	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	707	27.3	Processed	Longfin Smelt	1	7	7	7.0
2021	12	711	14.5	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	716	52.7	Processed	Longfin Smelt	1	7	7	7.0
2021	12	723	54.2	Processed	Longfin Smelt	1	7	7	7.0
2021	12	801	21.3	Processed	Longfin Smelt	1	7	7	7.0
2021	12	804	20.2	Processed	Longfin Smelt	1	7	7	7.0
2021	12	809	10.5	Processed	Longfin Smelt	3	7	8	7.3
2021	12	812	12.8	Processed	Longfin Smelt	1	8	8	8.0
2021	12	815	5.8	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	12	901	61.8	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	902	4.5	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	906	8.2	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	910	5.8	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	912	3.8	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	914	3.6	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	915	3.1	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	918	4.8	Processed	NA	No Smelt Catch	NA	NA	NA
2021	12	919	4.6	Processed	NA	No Smelt Catch	NA	NA	NA