

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

Section 1: Overview

Date: 12/13/2022

Life Stages Present:

Delta Smelt (DS): Sub-adults and Adults

Longfin Smelt (LFS): Larvae, Sub-adults, and Adults

Advice to Water Operations Management Team (WOMT):

No Advice.

Risk Assessment:

Delta Smelt: Based on distribution patterns over the past decade and low detections in this water year, Delta Smelt are unlikely to be prevalent in the Central and South Delta. Limited detection data from the past month and the position of X2 in the Sacramento River support Delta Smelt presence in the lower Sacramento River. The last Delta Smelt observations were on November 3 & 7, 2022, in the lower Sacramento River. These detections may be an indication that DS are starting to stage near X2 in preparation for seasonal migration into freshwater. The likelihood of Delta Smelt entrainment is low due to seasonal timing. However, storms in the past few weeks have increased flows and exports, which may result in more negative OMRI (below -5000 cfs). With the environmental conditions and recent Delta Smelt releases, the risk of Delta Smelt entrainment may be increasing. The Integrated Early Winter Pulse Protection (IEWPP) period began on December 1, 2022, and based on weather conditions is unlikely to be triggered this week.

Longfin Smelt: No adult LFS have been detected by Enhanced Delta Smelt Monitoring (EDSM) in the lower San Joaquin River or the Central or South Delta in recent sampling. EDSM and Chipps Island Trawl LFS detections are increasing and one larva was detected by Smelt Larvae Survey 12 in the Lower Sacramento River. LFS adults are moving into spawning habitat, and spawning has begun. Adult and sub-adult LFS were detected by EDSM in Suisun Marsh, Suisun Bay, and the Lower Sacramento River. Based on distribution data and life history, adults and sub-adults are not expected to be prevalent in the Central or South Delta and therefore are expected to be at low risk of entrainment. There have been no detection of larvae in Central or South Delta. However, the increased flow and exports resulting in a more negative OMRI may increase risk of entrainment. As of 12/1/2022, ITP Conditions of Approval 8.3.1 and 8.3.3 are active but not triggered. The September to November FMWT index is 321, which sets the current salvage

threshold for COA 8.3.3 to 32 LFS. The final FMWT index will be available later in December. ITP COA 8.4.1 off-ramped with the detection of a LFS larva.

Section 1-A: Sacramento River and Confluence

Table 1: Risk of entrainment into the central Delta and export facilities for Delta Smelt in the Sacramento River and confluence:

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
DS larvae and juveniles	Exposure Risk (Hydrology)	NA	Spawning hasn't started, no larvae present.
DS subadults and adults	Routing Risk (Behavior and life history)	Low	Turbidity remains low, staging near X2 may be starting soon, water temperatures are decreasing. However, with the increased flow and exports may result in a more negative OMRI value, the risk may increase.
DS	Overall Entrainment Risk	Low	Same as above.

Table 2: Risk of entrainment into the central Delta and export facilities for Longfin Smelt in the Sacramento River and confluence:

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
LFS larvae and juveniles	Exposure Risk (Hydrology)	Low	One larva detected in the Lower Sacramento River (station 707) by SLS 12.
LFS sub-adults and adults	Routing Risk (Behavior and life history)	Low	Spawning has started. Staging downstream of X2 is continuing. There were increased detections last few weeks in Chipps Island especially of adult LFS.
LFS	Overall Entrainment Risk	Low	Same as above.

Section 1-B: Central Delta

Table 3: Risk of entrainment into the export facilities for Delta Smelt in the central Delta:

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
DS subadults and adults	Exposure Risk (Hydrology)	Low	No subadults or adults have been detected in the Central Delta in field surveys.

Table 4: Risk of entrainment into the export facilities for Longfin Smelt in the central Delta:

Species and life stage	Risk type	Risk level	Rationale (turbidity, exports, OMR level, X2, Q west, temperature, distribution etc.)
LFS larvae	Exposure Risk (Hydrology)	Low	No larvae have been detected in the Central Delta in field surveys.
LFS sub-adults and adults	Exposure Risk (Hydrology)	Low	No subadults or adults have been detected in the Central Delta in field surveys.

- 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: Risk remains low, though two fish were detected by EDSM in the lower Sacramento River in early November, indicating that staging may be starting soon. The increase in flow and planned increase in exports may result in increased risk. The DS Experimental Release occurred on 11/30/22 and released a total of 13,140 DS in the Sacramento River near Rio Vista.
 - LFS: Risk remains low, spawning has started. The increase in flow and planned increase in exports may result in increased risk. Presence of adults is increasing in Chipps Island Trawl and EDSM, and one larva was detected by SLS 12.
- Reporting Old and Middle River Index (OMRI) *(Number and range of OMRI bins will vary based on anticipated hydrology and operations)*
 - Relevant Conditions of Approval (COAs) 8.3.1 and 8.3.3 are active but not triggered.

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 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 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 ≥ 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:

- 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.

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 OMR management went into effect December 1st. The Smelt Monitoring Team (SMT) conducted a Risk Assessment based on COA 8.1.5.2.

8.3.1: Conditions are not likely to exceed the thresholds described in this COA in the next seven days.

8.3.3: No adult LFS have been salvaged. The FMWT LFS index for September through November is 321, therefore the salvage threshold to trigger this COA is 32 LFS until it is updated to include the December index.

8.4.1: This COA begins with the onset of OMR management, which has not been triggered, and terminates when spawning has been detected in the system. The first December SLS survey detected a LFS larva in the Lower Sacramento River, which off-ramps this COA.

8.4.2: This COA begins with 8.4.1 off-ramping, or January 1, whichever is later. With the off-ramping of 8.4.1 this week, 8.4.2 will be active starting January 1.

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.)*
 - DCC is closed as of 11/28/22.
 - OMR management has not been initiated.
- Controlling Factors: Water Quality
- Water Temperature:
 - Clifton Court Forebay (CCF) Daily Average Water Temperature = NA
 - 3 Station Average = 10.42°C
- Tidal Cycle: Neap tide peaks 12/16/22.
- Turbidity:
 - 8.3.1 Freeport 3-day average = 11.21 formazin nephelometric units (FNU)
 - 8.5.1 Old River at Bacon Island (OBI) Turbidity = 2.61 FNU
- Salinity: X2 > 81 km, estimated at 90.0 km for Sacramento River as of 12/12/22, and 94.2 km for San Joaquin River as of 12/12/22.
- 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:
 - CCF: 300 to 6,680 cfs
 - Jones: 800 to 2,700 cfs
- Meteorological Forecast: Dry weather returns this week. Cold nights and early mornings with below normal temperatures
- Storm Event Projection: NA

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

- DCC Gates position: Scheduled to remain closed for seasonal operation. Adjustments could be necessary to respond to real-time salinity conditions
- Sacramento River flow at Freeport: 16,553.96 cfs
- San Joaquin River flow at Vernalis: 1,293.44 cfs
- Qwest: 4,613 cfs
- OBI Turbidity: 2.61 FNU
- NDOI: 13,409 cfs
- Upstream releases:
 - Keswick = 3,250 cfs. No anticipated changes.
 - Nimbus = 1,300 cfs. No anticipated changes.
 - Goodwin = 200 cfs. No anticipated changes.
 - Oroville = 950 cfs. No anticipated changes.

Table 5: Comparison of OMR and OMR Index (5-day and 14-day averages for OMR Index and USGS gauge were reported on [SacPAS website](#), accessed 13 December 2022.

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
12/9/2022	Daily	-1,958	-1,160
12/9/2022	5-day	-1,400	-1,140
12/9/2022	14-day	-1,260	-1,210

Section 4: Distribution and Biology.

8.1.5.2.B. Assessment of biological information for Delta Smelt and Longfin Smelt

Section 4-A: Delta Smelt population status 8.1.5.2.B. i

- EDSM: One subadult DS (Fork-length (FL): 55mm) and one adult DS (FL: 62mm) were detected in lower Sacramento River on November 3rd and 7th respectively.
- Fall Mid-water Trawl (FMWT) Index for Delta Smelt: November Index: 0
- Delta Smelt life cycle model (LCM) discussion: NA
- Biological Conditions: NA
- % of population in Delta zones: NA
- Smelt Larva Survey (SLS) or 20mm Survey: SLS sampling began 12/5/2022.
- Salvage: No DS have been salvaged at either facility this water year.
- Experimental release: 13,140 fish were released in the Sacramento River near Rio Vista on 11/30/22.

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

- FMWT Index: November Index = 53
 - September to November Index = 321
- Other Surveys:
 - EDSM: 59 sub-adult LFS (FL: 63-84mm), 10 adult LFS (FL: 85-110mm), and one unmeasured LFS were detected in Suisun Marsh during the week of December 5th-9th (Table 1).
 - Chipps Island Trawl: two sub-adult LFS (61-80mm) were detected during the week of December 5th-9th (Table 2).
 - Bay Study: In September, 36 sub-adult LFS (20-84mm) were detected from south of Bay Bridge (station 110) to San Pablo Bay (station 322). Distribution shifted further upstream in October with 47 sub-adult LFS (FL: 20-84mm) and five adult LFS (FL: 86-97mm) detected from near the San Mateo Bridge (station 101) to the lower Sacramento River (station 750). In November, the center of distribution continued to move upstream from Central Bay to San Pablo and Suisun Bay with a total of 73 sub-adult LFS (FL: 20-84mm) and three adult LFS (FL: 87-89mm) detected.
 - SLS: one larval LFS (6mm) was caught in the Lower Sacramento River (station 707) (Table 3). Yolk sac was not present in this fish.
- Salvage: No LFS have been salvaged at either facility this water year.

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

Notes:

- No experimentally released DS have been caught by any field surveys yet.

Attachments: Table 1: EDSM Catch Table, Table 2: Chipps Island Trawl Catch Table, and Table 3 SLS Catch Table

Table 1: DS and LFS catch for EDSM 2022 Phase 1 Kodiak trawls of December 5th- 9th. Only stations with catch of these species are reported here. FCCL = Fish Conservation and Culture Lab. These data are preliminary and subject to change. *LFWO: fish died upon capture, returned to Lodi FWO office. **Fork Length N/A: Fish not measured.

Date	Stratum	Subregion	Station Code	Species	Mark Type	Fork Length	Total Catch	Disposition
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	88	1	FCCL
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	110	1	FCCL
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	63	4	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	66	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	68	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	69	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	71	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	74	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	75	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	77	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM04	LFS	None	84	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	87	1	FCCL
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	92	1	FCCL
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	94	2	FCCL
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	95	1	FCCL
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	80	1	LFWO*
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	63	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	64	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	65	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	66	4	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	67	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	68	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	70	3	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	71	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	72	3	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	73	3	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	74	4	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	75	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	76	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	79	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	80	2	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	81	3	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	87	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM05	LFS	None	96	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM06	LFS	None	85	1	FCCL
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM06	LFS	None	72	1	Released
12/07/2022	Suisun Marsh	Suisun Marsh	23-19-SM06	LFS	None	79	1	Released
12/08/2022	Suisun Marsh	Suisun Marsh	23-19-SM02	LFS	None	N/A	1	Released
12/08/2022	Suisun Marsh	Suisun Marsh	23-19-SM02	LFS	None	73	1	Released
12/08/2022	Suisun Marsh	Suisun Marsh	23-19-SM02	LFS	None	74	1	Released
12/08/2022	Suisun Marsh	Suisun Marsh	23-19-SM02	LFS	None	76	1	Released

Date	Stratum	Subregion	Station Code	Species	Mark Type	Fork Length	Total Catch	Disposition
12/08/2022	Suisun Marsh	Suisun Marsh	23-19-SM02	LFS	None	80	1	Released

Table 2: LFS catch for Chipps Island Trawls December 5th-9th. These data are preliminary and subject to change.

Date	Station Code	Species	Mark Type	Fork Length	Total Catch	Disposition
12/05/2022	SB018S	LFS	None	80	1	Released
12/05/2022	SB018S	LFS	None	61	1	Released

Table 3: LFS catch for SLS December 5th-9th. These data are preliminary and subject to change.

Year	Survey #	SLS Station	Turbidity (NTU)	Secchi (cm)	Sample Status	Species	Smelt Catch	ID Status	Min Length	Max Length	Mean Length
2022	12	707	10.4	80	Processed	Longfin Smelt	1	Complete	6	6	6.0