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

Section 1: Overview

Date: 11/23/2021

Life Stages Present:

Delta Smelt (DS): Sub-Adult
Longfin Smelt (LFS): Adults are not likely to be present within the Delta. Juveniles and adults are present in Suisun Bay, San Pablo and Central Bays. Adults are present in the Suisun Marsh stratum. Juveniles > 60 mm were detected at Chipps Island.

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) and life history information support the centroid of distribution being close to the X2 position (Sommer et al. 2011). The last DS observed was in the SDWSC on 8/20/2021. The likelihood of DS subadult entrainment is low due to seasonal timing and spatial distribution. First flush conditions are not anticipated to occur within the next seven days. The regulations for Integrated Early Winter Pulse Protection does not go into effect until 12/1/2021.

Longfin Smelt: Juveniles > 60 mm have been detected in Chipps Island Trawl. Adult LFS have been detected in Suisun Marsh and Suisun Bay. LFS adults are expected to move into the Delta beginning in December. Based on distribution data and life history, they are not expected to be present in the Delta and therefore are not at risk of entrainment.

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: Low
- Routing Risk (Behavior and life history):
    - DS: Low

    - LFS: Low
- Overall Entrainment Risk
    - DS: Low
    - LFS: Low

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
    - LFS: Low
- 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
    - LFS: No change
- 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) are not active.

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 the following Conditions of Approval:

List relevant Condition of Approval number and title based on species/life stage, time of year, etc.

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 go into effect December 1st. The Smelt Monitoring Team (SMT) conducted a Risk Assessment based on COA 8.1.5.2 and noted that there is no regulatory mechanism in place to provide advice until December 1st.

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 gates opened 11/19/2021 and remained open for Delta salinity through 11/22/2021. Gates were closed 11/23/2021 for Rio Vista requirement. May be opened again for Delta salinity.
    - OMR management has not been initiated.
    - Grantline barrier has been breached. This changes the OMRI index calculation.
- Controlling Factors: Delta Outflow
- Water Temperature:
    - Clifton Court Forebay (CCF) Daily Average Water Temperature = NA
    - 3 Station Average = 14.39°C
- Tidal Cycle: Not discussed
- Turbidity:
    - 8.3.1 Freeport 3-day average = 5.42 formazin nephelometric units (FNU)
    - 8.5.1 Old River at Bacon Island (OBI) Turbidity = NA
- Salinity: X2 = >82 km, estimated at 93.1 km for Sacramento River and 93.5 km for San Joaquin River.
- 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 cfs
    - Jones: 2,700 to 1,700 cfs
- Meteorological Forecast: No precipitation is expected.
- Storm Event Projection: NA

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

- DCC Gates position: Closed 11/23/2021, may open again for Delta salinity.
- Sacramento River flow at Freeport: 6,000 cfs and may continue to decline
- San Joaquin River flow at Vernalis: 600 cfs and expected to stay remain stable
- Qwest: -6,000 to -7,000 cfs
- OBI Turbidity: NA
- Expected changes in South Delta Exports: CVP exports are projected to decrease to 1,700 cfs on Thursday. SWP exports are not expected to change.
- NDOI: 2,600 cfs
- Upstream releases:
    - Keswick = 3,250 cfs
    - Nimbus = 550 cfs
    - 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 23 November 2021.

Date	Averaging Period	USGS gauges (cfs)	Index (cfs)
11/23/21	Daily	Not Reported	-2,800 cfs
11/16/21	5-day	-6,630 cfs	-6,650 cfs
11/16/21	14-day	-6,260 cfs	-6,020 cfs

Section 4: Distribution and Biology.
8.1.5.2.B. Assessment of biological information for Delta Smelt and Longfin Smelt

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

- EDSM: No Delta Smelt have been collected during recent sampling
- Fall Mid-water Trawl (FMWT) Index for Delta Smelt: September and October Indices = 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 will begin 12/13/2021.

- Salvage: No DS have been salvaged at either facility.

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

- FMWT Index: September Index = 1, October Index = 12
- Other Surveys:
  - EDSM: One juvenile LFS (FL = 68 mm) was collected on 11/16/2021 in Grizzly Bay in the Suisun Marsh Stratum. One adult LFS (FL = 104 mm) and one juvenile LFS (FL = 66 mm) were collected on 11/22/2021 in Suisun Slough in the Suisun Marsh Stratum. **NOTE:** LFS collected on 11/22/2021 will be reported on next week's catch table
- Chipps Island Trawl: Four juvenile LFS were collected last week. Three juvenile LFS (FL = 64, 64 and 68) were collected on 11/15/2021 and one (FL = 64 mm) was collected on 11/17/2021.
- Bay Study: November Bay Study collected 142 juvenile and 7 adult Longfin Smelt throughout the estuary. Five juveniles and 3 adults were collected in Suisun. The remainder were collected downstream of Carquinez Strait. See attached catch table for further 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

Notes:

- USFWS began a discussion of peer reviewed literature regarding correlation between X2 and Delta Smelt distribution. The discussion also included the location of the confluence in terms of river kilometer. USFWS and CDFW agreed that it appeared to be located around 77-78 km based on figures in peer reviewed literature (Davis et al. 2019, Jassby et al. 1995).
- The SMT discussed language in COA 8.3.3 which instructs the SMT to consider detection of LFS ≥ 60 mm FL as an early warning of onset of migration. CDFW confirmed that the cutoff individuals <85 mm FL are considered juveniles.
- CDFW reviewed analysis described in Appendix A of the ITP Effect Analysis that describes factors that may be used to predict the onset of LFS migration.
- The deadline to comment on daft notes and the Draft Risk Assessment has been pushed back to 4:00 PM Monday 11/29/2021 to accommodate the upcoming holiday.
- CDFW described a discrepancy between geographic terms used when describing catch. The EDSM Suisun Marsh Stratum includes parts of Grizzly Bay that may be considered part of Suisun Bay. CDFW will identify instances when more detail is needed when describing catch locations and encouraged others to do the same.
- CDFW and USFWS guest speakers provided an update on the ongoing Delta Smelt experimental release study.

Literature Cited

Davis, Brittany E., Dennis E Cocherell, Ted Sommer, Randall D Baxter, Tien-Chieh Hung, Anne E Todgham, Nann A Fangue, Sensitivities of an endemic, endangered California smelt and two non-native fishes to serial increases in temperature and salinity: implications for shifting community structure with climate change, Conservation Physiology, Volume 7, Issue 1, 2019, coy076, https://doi.org/10.1093/conphys/coy076

Jassby, Alan D., William J. Kimmerer, Stephen G. Monismith, Charles Armor, James E. Cloern, Thomas M. Powell, Jerry R. Schubel, Timothy J. Venlinski (1995) Isohaline Position as a Habitat Indicator for Estuarine Populations. Ecological Applications, 5:1, 272-289, DOI: https://doi.org/10.2307/1942069

Sommer, T., F. Mejia, M. Nobriga, and L. Grimaldo. 2011. The Spawning Migration of Delta Smelt in the Upper San Francisco Estuary. San Francisco Estuary and Watershed Science 9(2), DOI: https://doi.org/10.15447/sfews.2014v9iss2art2

Attachments: Table 1: EDSM Catch Table, Table 2: Bay Study Catch Table, Figure 1: Bay Study Map

Table 1. Delta Smelt (DSM) and Longfin Smelt (LFS) catch per station for EDSM 2021 Phase 3 Kodiak trawls, from 11/15/2021 – 11/19/2021. These data are preliminary and subject to change.

Year	Phase	Station Code	Date	# Tows	Species	Fork Length	Total Catch	Stratum
2021	3	22-16-SBM01	11/17/2021	4	NA	NA	NA	Suisun Bay
2021	3	22-16-SBM02	11/17/2021	4	NA	NA	NA	Suisun Bay
2021	3	22-16-SBW01	11/17/2021	4	NA	NA	NA	Suisun Bay
2021	3	22-16-SBM03	11/18/2021	4	NA	NA	NA	Suisun Bay
2021	3	22-16-SBM04	11/18/2021	4	NA	NA	NA	Suisun Bay
2021	3	22-16-SM01	11/15/2021	4	NA	NA	NA	Suisun Marsh
2021	3	22-16-SM02	11/15/2021	4	NA	NA	NA	Suisun Marsh
2021	3	22-16-SM03	11/15/2021	4	NA	NA	NA	Suisun Marsh
2021	3	22-16-GB01	11/16/2021	4	LFS	68	1	Suisun Marsh
2021	3	22-16-SM05	11/16/2021	4	NA	NA	NA	Suisun Marsh
2021	3	22-16-SM06	11/16/2021	4	NA	NA	NA	Suisun Marsh
2021	3	22-16-LSR01	11/15/2021	4	NA	NA	NA	Lower Sac River
2021	3	22-16-RV04	11/15/2021	4	NA	NA	NA	Lower Sac River
2021	3	22-16-RV05	11/15/2021	4	NA	NA	NA	Lower Sac River

Year	Phase	Station Code	Date	# Tows	Species	Fork Length	Total Catch	Stratum
2021	3	22-16-RV01	11/16/2021	4	NA	NA	NA	Lower Sac River
2021	3	22-16-RV02	11/16/2021	4	NA	NA	NA	Lower Sac River
2021	3	22-16-RV03	11/16/2021	4	NA	NA	NA	Lower Sac River
2021	3	22-16-LSJ01	11/19/2021	4	NA	NA	NA	Lower San Joaquin River
2021	3	22-16-LSJ02	11/19/2021	4	NA	NA	NA	Lower San Joaquin River
2021	3	22-16-PP01	11/19/2021	4	NA	NA	NA	Lower San Joaquin River
2021	3	22-16-CS01	11/15/2021	4	NA	NA	NA	Cache Slough
2021	3	22-16-CS02	11/15/2021	4	NA	NA	NA	Cache Slough
2021	3	22-16-CS04	11/15/2021	4	NA	NA	NA	Cache Slough
2021	3	22-16-CS05	11/16/2021	4	NA	NA	NA	Cache Slough
2021	3	22-16-CS06	11/16/2021	4	NA	NA	NA	Cache Slough
2021	3	22-16-CS07	11/16/2021	4	NA	NA	NA	Cache Slough
2021	3	22-16-LSSC01	11/18/2021	4	NA	NA	NA	Sac Deep Water Ship Channel

Year	Phase	Station Code	Date	# Tows	Species	Fork Length	Total Catch	Stratum
2021	3	22-16-USSC01	11/18/2021	4	NA	NA	NA	Sac Deep Water Ship Channel
2021	3	22-16-USSC02	11/18/2021	4	NA	NA	NA	Sac Deep Water Ship Channel
2021	3	22-16-LSSC02	11/19/2021	4	NA	NA	NA	Sac Deep Water Ship Channel
2021	3	22-16-LSSC03	11/19/2021	4	NA	NA	NA	Sac Deep Water Ship Channel
2021	3	22-16-USSC03	11/19/2021	4	NA	NA	NA	Sac Deep Water Ship Channel

DSM collected during Phase 3 are transferred alive to FCCL to contribute to DSM brood stock if tow temperatures are below 17°C. If tow temperatures are above 17°C, DSM are flash frozen in liquid nitrogen and transferred to UC Davis. Processing is complete through 11/19/2021.

Table 2: November Bay Study Catch. Net1 = Midwater Trawl, Net 2 = Otter Trawl

Year	Survey	Station	Net	AlphaCode	Length	Frequency
2021	11	101	2	LONSME	74	1
2021	11	103	1	LONSME	57	1
2021	11	103	1	LONSME	55	1
2021	11	107	1	LONSME	57	1
2021	11	107	1	LONSME	60	1
2021	11	107	1	LONSME	53	2
2021	11	107	1	LONSME	61	1
2021	11	107	1	LONSME	69	1

Year	Survey	Station	Net	AlphaCode	Length	Frequency
2021	11	107	1	LONSME	52	1
2021	11	107	1	LONSME	54	1
2021	11	107	2	LONSME	55	1
2021	11	108	2	LONSME	76	1
2021	11	108	2	LONSME	72	1
2021	11	108	2	LONSME	59	1
2021	11	108	2	LONSME	65	1
2021	11	108	2	LONSME	56	1
2021	11	108	2	LONSME	53	1
2021	11	108	2	LONSME	60	1
2021	11	108	2	LONSME	62	1
2021	11	108	2	LONSME	58	1
2021	11	140	2	LONSME	78	1
2021	11	140	2	LONSME	56	1
2021	11	140	1	LONSME	93	1
2021	11	211	2	LONSME	52	1
2021	11	211	2	LONSME	60	3
2021	11	211	2	LONSME	57	3
2021	11	211	2	LONSME	54	2
2021	11	211	2	LONSME	62	1
2021	11	211	2	LONSME	55	2
2021	11	214	2	LONSME	63	1
2021	11	214	2	LONSME	60	2
2021	11	214	2	LONSME	96	1
2021	11	214	2	LONSME	67	1
2021	11	214	2	LONSME	53	1
2021	11	214	2	LONSME	104	1
2021	11	243	2	LONSME	63	1
2021	11	244	2	LONSME	58	1
2021	11	317	2	LONSME	67	1
2021	11	318	1	LONSME	60	1
2021	11	318	1	LONSME	61	1
2021	11	318	1	LONSME	57	1
2021	11	318	1	LONSME	62	1
2021	11	318	1	LONSME	53	1
2021	11	318	1	LONSME	68	1
2021	11	318	2	LONSME	53	2
2021	11	318	2	LONSME	56	1
2021	11	318	2	LONSME	61	1

Year	Survey	Station	Net	AlphaCode	Length	Frequency
2021	11	320	1	LONSME	75	1
2021	11	320	1	LONSME	74	1
2021	11	320	1	LONSME	70	1
2021	11	320	2	LONSME	74	1
2021	11	321	1	LONSME	69	1
2021	11	322	1	LONSME	58	1
2021	11	322	2	LONSME	57	2
2021	11	322	2	LONSME	63	1
2021	11	322	2	LONSME	62	1
2021	11	322	2	LONSME	54	1
2021	11	322	2	LONSME	61	1
2021	11	322	2	LONSME	48	1
2021	11	323	2	LONSME	59	1
2021	11	323	2	LONSME	57	2
2021	11	323	1	LONSME	NA[1]	6
2021	11	323	1	LONSME	52	1
2021	11	323	1	LONSME	53	3
2021	11	323	1	LONSME	54	1
2021	11	323	1	LONSME	55	4
2021	11	323	1	LONSME	56	5
2021	11	323	1	LONSME	58	7
2021	11	323	1	LONSME	59	1
2021	11	323	1	LONSME	60	2
2021	11	323	1	LONSME	61	2
2021	11	323	1	LONSME	62	1
2021	11	323	1	LONSME	63	2
2021	11	323	1	LONSME	64	3
2021	11	323	1	LONSME	66	3
2021	11	323	1	LONSME	67	4
2021	11	323	1	LONSME	68	2
2021	11	323	1	LONSME	69	1
2021	11	323	1	LONSME	70	2
2021	11	323	1	LONSME	71	1
2021	11	323	1	LONSME	73	1
2021	11	323	1	LONSME	75	1
2021	11	323	1	LONSME	79	1
2021	11	323	1	LONSME	80	1

[1] Six plus count juveniles

Year	Survey	Station	Net	AlphaCode	Length	Frequency
2021	11	323	1	LONSME	98	1
2021	11	325	1	LONSME	54	1
2021	11	325	1	LONSME	60	1
2021	11	325	1	LONSME	74	1
2021	11	325	2	LONSME	68	1
2021	11	325	2	LONSME	60	1
2021	11	325	2	LONSME	77	1
2021	11	325	2	LONSME	61	1
2021	11	346	1	LONSME	72	1
2021	11	346	1	LONSME	63	1
2021	11	346	2	LONSME	72	1
2021	11	346	2	LONSME	63	1
2021	11	346	2	LONSME	65	1
2021	11	346	2	LONSME	68	1
2021	11	427	1	LONSME	104	1
2021	11	427	2	LONSME	94	1
2021	11	427	2	LONSME	67	1
2021	11	427	2	LONSME	74	1
2021	11	427	2	LONSME	69	1
2021	11	433	1	LONSME	93	1
2021	11	433	1	LONSME	70	1
2021	11	433	1	LONSME	58	1

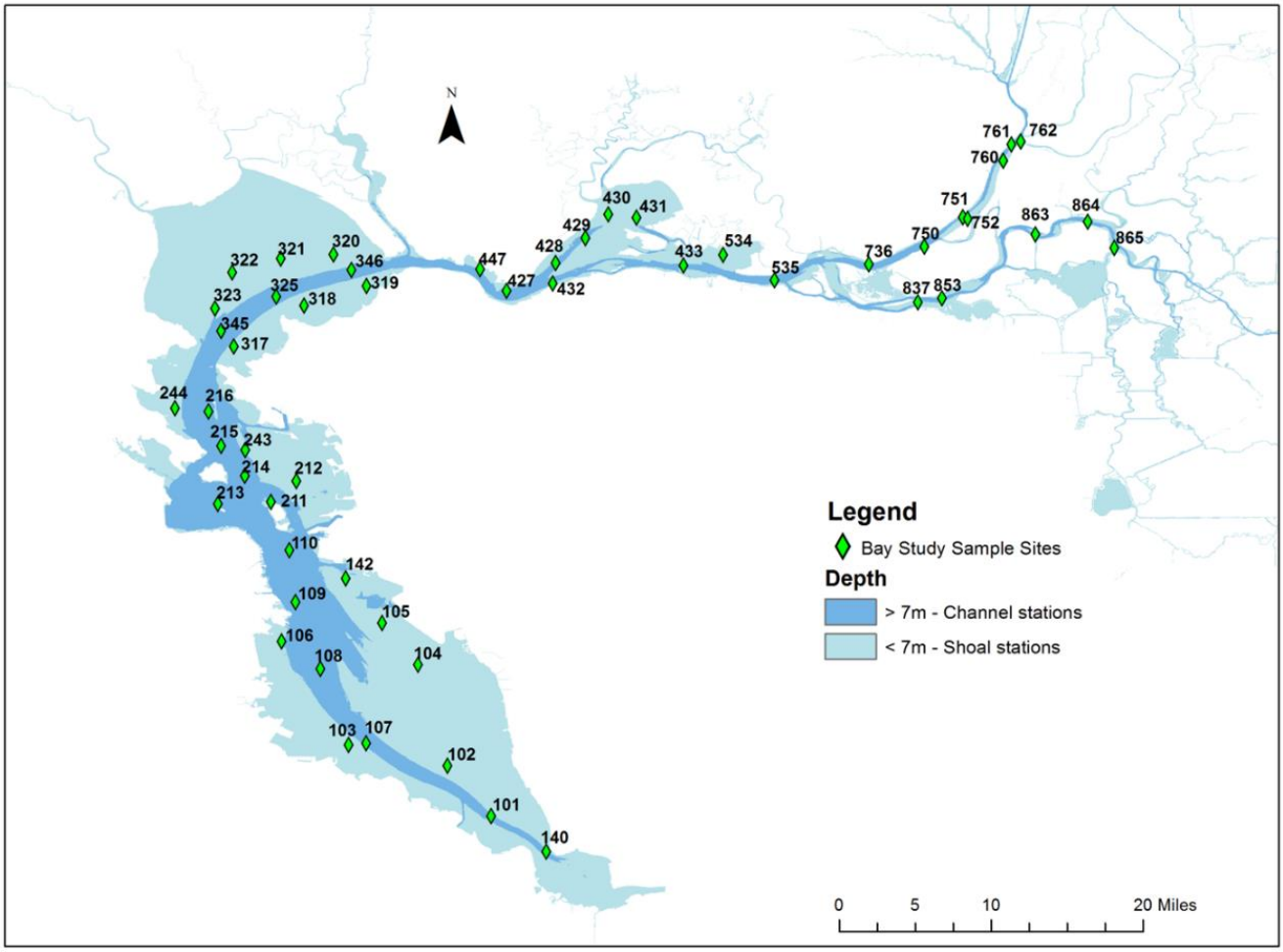

Figure 1: Bay Study sample locations