SMELT WORKING GROUP

Monday, March 2, 2015

Meeting Summary:
The Working Group described the risk of entrainment under the Service-provided advice framework. Under this framework the relative risk of entrainment for each of the three OMR flow ranges is discussed and assessed. For the current week the risk of entrainment for each of flow ranges is characterized as follows:

- **-1250 to -2000 cfs has a low risk of entrainment,**
- **-2000 to -3500 cfs has a low risk of entrainment, and**
- **-3500 to -5000 cfs has a medium risk of entrainment.**

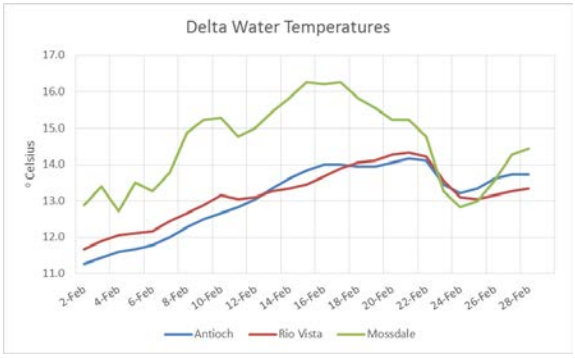
These relative risk levels are based upon a review of Delta Smelt relative abundance and distribution data, Delta Smelt salvage data, and Delta conditions data, including turbidity. The Working Group is following guidance for entrainment protections from both Action 2 (adult Delta Smelt) and Action 3 (juvenile Delta Smelt). The risk values provided for this week refer only to adult fish as there is currently no evidence of hatching.

The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions and will meet again Monday, March 9, 2015 at 10 am.

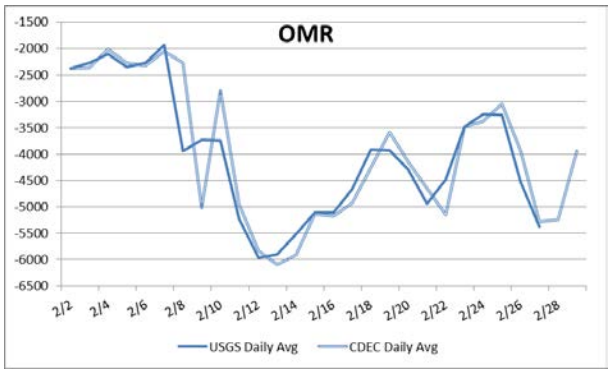
Reported Data:

1. **Current environmental data:**

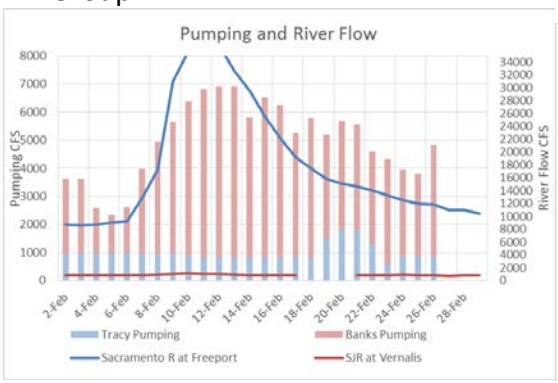
- Since February 3, it has been warm enough for Delta Smelt to spawn throughout much, or all of, the Delta. Water temperatures are as follows:

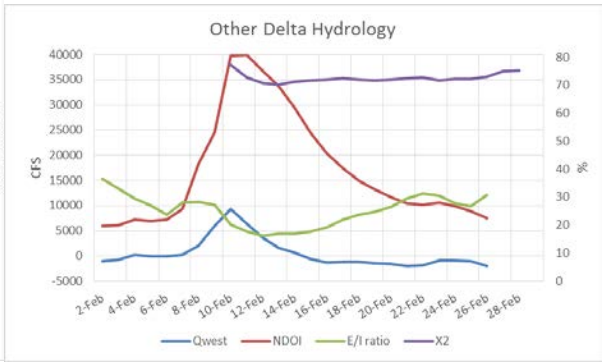


- OMR Flow: USGS tidally-averaged daily, 5-day, and 14-day average OMR flow for February 27 was -5370, -3978, and -4419 cfs, respectively. CDEC daily, 5-day average, and 14-day average OMR flow as of March 1 was –3946, -4293, and -4304 cfs, respectively.

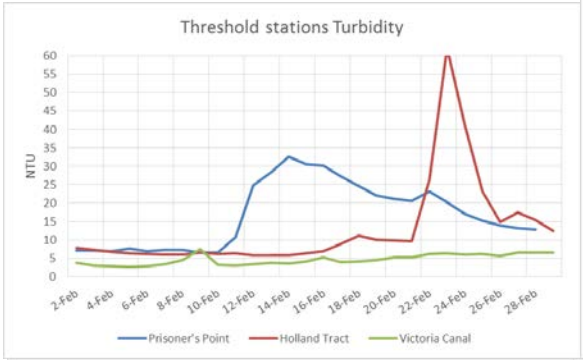


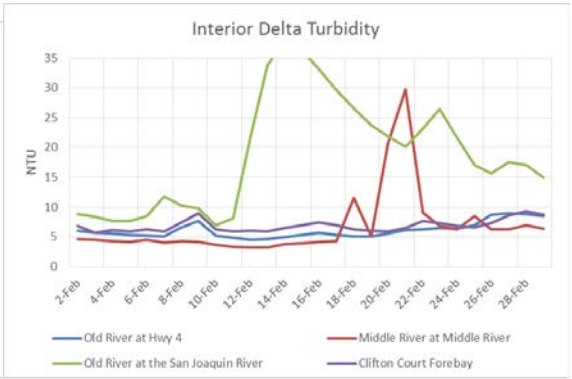
- River Flows: Sacramento River inflow is 10,444 cfs and San Joaquin River is 814 cfs. X2 calculation from CDEC for February 28 is 75.2 km. The graphs below show the most recent trends in Delta hydrology and water quality that were evaluated by the Working Group

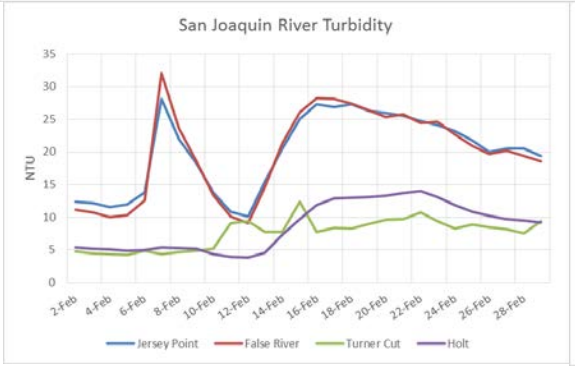


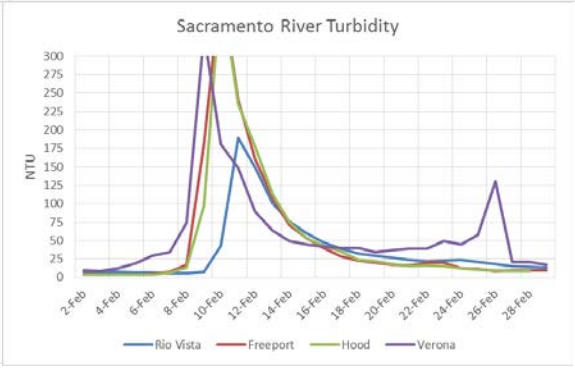


- Turbidity:









2. **Delta Fish Monitoring:**

The 2014 Fall Midwater Trawl Annual Index for Delta Smelt 2014 is 9. This is the lowest reported fall index since the beginning of this survey in 1967, and approximately one half of the previous lowest indices of 17 (2009) and 18 (2013).

Smelt Larva Survey #4 was in the field February 17 through 19. Processing is ongoing with 35 out of 44 stations completed as of late Friday. A total of 208 Longfin Smelt ranging in size from 5 to 16 mm have been reported from samples that have been processed so far. Larvae were detected in low numbers in the central and southern Delta, and also in the Sacramento River system, with slightly larger numbers further downstream. Stations in the Napa River have not been processed yet. No young-of-the-year Delta Smelt have been observed in the samples processed so far. SLS #5 starts today and SLS #6 starts on March 23.

Spring Kodiak Survey #2 was in the field February 9 through 12. Results indicate a total of 72 adult Delta Smelt were caught, 10 from station 809 (near Jersey Pt., one ripe female), one from 902 (Old R. south of Franks Tract), with the remaining catch at stations in the Sacramento River system and downstream.

CDFW conducted additional SKT sampling in the Old River corridor on February 25. Stations 902, 915, and just south of the Hwy 4 bridge were sampled. A total of 6 tows were made at each station. No Delta Smelt or Longfin Smelt were observed.

20 mm Survey #1 begins March 16.

The Service's Early Warning Survey increased sampling to daily beginning on February 2nd. Results for the previous six days are as follows:

2-23 (Prisoner's Point): no catch
2-24 (Jersey Point): 1 Delta Smelt (south lane)
2-25 (Prisoner's Point): no catch
2-26 (Jersey Point): 14 Delta Smelt (all lanes, 1 w/milt and 1 w/eggs)
2-27 (Prisoner's Point): no catch
2-28 (Jersey Point): no catch
3-1 (Prisoner's Point): no catch

3. **Salvage:**

No salvage of Delta Smelt has occurred since February 21. The estimated cumulative seasonal total (CVP and SWP combined) for adult Delta Smelt salvage is still 68. No Longfin Smelt have been observed in salvage counts during WY 2015. Both the SWP and CVP operated their fish facilities with normal 30 min counts this past week. Both facilities had started larval fish monitoring. No larval Delta Smelt have been reported and one 14 mm Longfin Smelt larva was observed at the CVP on February 27. Discussion occurred over how fish mortalities handled in salvage fish counts. There appears to be some uncertainty if dead fish have been counted in the salvage at the CVP. Service and Reclamation staff will look into this issue and report back to the group.

4. **Expected Project Operations:**

Combined SWP/CVP exports today are approximately 5400 cfs. Operators indicated that they expect the

OMR flow to be slightly more positive than -5000 cfs for the week. It was reported that combined exports currently are restricted by salinity encroachment into the Delta. The official OMR target for the remainder of the week will be determined daily on the regional director's conference call at 8 am.

5. **Delta Conditions Team:**

There was no official advice for the Working Group or Delta Operations for Salmonids and Sturgeon team. Turbidity modeling was circulated to the group prior to the call.

6. **Assessment of Risk:**

Background:
RPA Component 1: "Beginning in December of each year, the Service shall review data on flow, turbidity, salvage, and other parameters that have historically predicted the timing of Delta Smelt migration into the Delta. On an ongoing basis, and consistent with the parameters outlined… [in the BO]…the SWG shall recommend to the Service OMR flows that are expected to minimize entrainment of adult Delta Smelt" (page 280).

RPA Component 1, Action 2: "An action implemented using an adaptive process to tailor protection to changing environmental conditions after Action 1. As in Action 1, the intent is to protect pre-spawning adults from entrainment and, to the extent possible, from adverse hydrodynamic conditions."

"The range of net daily OMR flows will be no more negative than -1,250 to -5,000 cfs. Depending on extant conditions (and the general guidelines below) specific OMR flows within this range are recommended by the Working Group from the onset of Action 2 through its termination…" (page 352).

RPA Component 2, Action 3: "The objective of this RPA component (which corresponds to Action 3 in Attachment B), is to improve flow conditions in the Central and South Delta so that larval and juvenile delta smelt can successfully rear in the Central Delta and move downstream when appropriate" (page 282).

"Upon completion of RPA Component 1 or when Delta water temperatures reach 12°C (based on a 3-station average of daily average water temperature at Mossdale, Antioch, and Rio Vista) or when a spent female delta smelt is detected in the trawls or at the salvage facilities, the projects shall operate to maintain OMR flows no more negative than -1,250 to -5000 cfs based on a 14-day running average with a simultaneous 5-day running average within 25 percent of the applicable 14-day OMR flow requirement. Depending on the extant conditions, the SWG shall make recommendations for the specific OMR flows within this range from the onset of implementing RPA Component 2 through its termination. The Service shall make the final determination regarding specific OMR flows. This action shall end June 30 or when the 3-day mean water temperature at Clifton Court Forebay reaches 25° C, whichever occurs earlier" (page 282).

Discussion:
The Working Group reviewed and discussed all relevant data from Delta flow and water quality monitoring, salvage, field surveys, and planned Project operations. On January 12, 2014, the Service introduced a proposed "Framework for Providing Advice to the Service" (advice framework). This proposed framework was updated based on specific SWG feedback and has been in use by SWG since

January 12, 2015. Under the advice framework, the Working Group is to evaluate the risk of entrainment relative to three ranges of OMR flow (-1250 to -2000 cfs, -2000 to -3500 cfs, and -3500 to -5000 cfs). Specific guidelines were provided to the Working Group regarding how to structure the discussion of entrainment risk under each flow range. Refer to the January 12, 2015 notes to view the draft advice framework.

The Service presented its updated WY2015 adult Delta Smelt ITL (196 fish) and early warning level (78 fish) at the January 12 SWG meeting. The January 9, 2015 reinitiation memo regarding these updated levels has been posted to the Bay-Delta FWO website (http://www.fws.gov/sfbaydelta/).

Three station average water temperature surpassed 12^{O}C as of February 3, 2015. The Working Group is now looking to Action 3 of the Biological Opinion as well as Action 2 in framing their advice to the Service.

Turbidity spiked to higher levels (~20 ntu) on February 26 and 27 throughout the southern Delta, due to high winds. Combined with higher turbidity levels in the central Delta, this created contiguous high-turbidity conditions from the lower San Joaquin River to the export facilities. Over the weekend, southern Delta turbidity values decreased. DWR currently is conducting daily continuous turbidity transects covering the Old River corridor. These data are provided to the SWG, and should allow for a near real time assessment of the distribution of turbidity from the Sacramento River and localized sources.

Catch at Jersey Point (Early Warning Survey) has been varied between zero and 14 Delta Smelt since February 23. On days when catch occurred, Delta Smelt were caught in the south lane as well (water in the south lane is believe to move into the south Delta on flood tides, and is more likely to be diverted toward the export pumps). Some Delta Smelt were reported to have expressed eggs and milt suggesting that spawning is imminent or occurring.

The Working Group noted the current early warning level (concern level), as described in the Service's January 9, 2015 memo (see Service Memo: Subject: Reinitiation of Consultation on the 2008 FWS OCAP Biological Opinion and Conveyance of Revised Incidental Take for the 2015 Water Year), is 78 salvaged fish. This number also reflects the former ITL for this water year using the original calculation for adult ITL described in the 2008 BiOp.

Most members indicated some surprise at the lack of salvage since February 21, especially given the higher turbidity levels late last week. Some discussion ensued regarding the possibility of unreported dead Delta Smelt in salvage counts. The Working Group had assumed that salvage operations were counting all fish on salvage sheets, even if they were deceased. Service and Reclamation staff will investigate this issue and will be reporting back to the group.

The Working Group noted that recent export pumping has occurred primarily through the SWP facilities, reducing overall salvage due to high pre-screen losses in Clifton Court Forebay. The low sensitivity of salvage as an index of entrainment risk for the SWP was reiterated again and a recent unusually high striped bass collection in the SWP's weekly predator flushes (see figure 1) was cited by some members as evidence of a failure of current salvage monitoring to detect Delta Smelt entrainment. SWP salvage Additionally noted, was that the CVP fish facility does not conduct predatory flushes. Some members expressed their opinion that salvage may have become an unsuitable parameter in assessing risk to the

species, since overall population numbers appear to be so low that salvage events have become very rare. Similarly, some members pointed out that Delta Smelt densities were so low in central and south Delta stations that multiple SKT tows also failed to detect adult Delta Smelt presence. Some members also pointed out the lack of any increase in salvage at the SWP after this unusually large predator removal event. Low sampling sensitivity could be particularly challenging given the record low FMWT index in 2014 and the lack of a more sensitive entrainment metric. There was no consensus on this issue. The Working Group will monitor salvage closely this week.

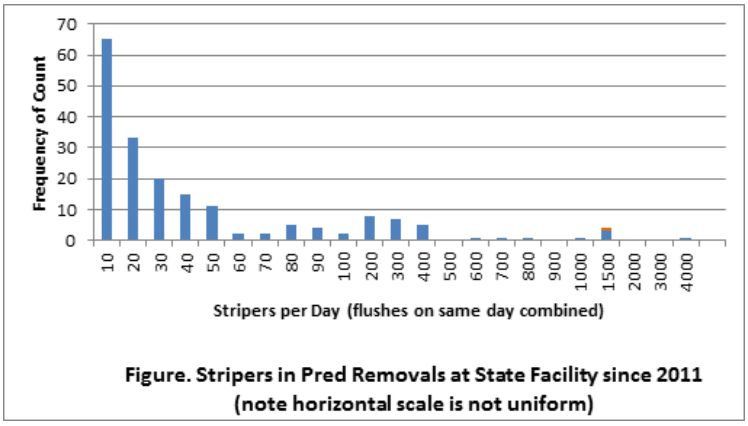


Figure 1

Most members agreed with the assessment of risk for each flow range described below, and for some of these the absence of Delta Smelt in last week's special sampling in Old River was a key consideration. Other members indicated the highest flow range should still have a high risk of entrainment, while the medium flow range should have a medium risk of entrainment. These concerns were partly based on the low detection sensitivities of salvage operations.

The Working Group discussed the potential for PTM runs to be generated for future discussion of larval entrainment risk. The Working Group agreed that no modeling runs were needed for the next meeting, but that runs might be requested for the following meeting. At this time, members agreed it was unlikely there are many hatched Delta Smelt larvae in the system.

The above discussion points are reflected in the entrainment risk descriptions below:

Advice Framework OMR Level Risk Ranking and Discussion

- OMR flow of -1250 to -2000 cfs: There is a low risk of entrainment under this flow range. This is the most protective range for Delta Smelt.
    - Risk factors: lowest annual index on record, confirmed Delta Smelt presence in central Delta based upon field studies; proportional distribution in the San Joaquin River appears higher than in other recent years (based on SKT results).
    - Salvage: geographic influence of the pumps is reduced to southern Delta under this flow range
    - Unknowns: N/A
    - Persistence of risk: N/A
- OMR flow of -2000 to -3500 cfs: There is a low risk of entrainment under this flow range, given conditions listed below:
    - Risk factors: lowest annual index on record, confirmed Delta Smelt presence in central

Delta based upon field studies; proportional distribution in the San Joaquin River appears higher than in other recent years (based on SKT results).
    - Salvage: No reported Delta Smelt salvage since February 21
    - Unknowns: question regarding how dead Delta Smelt are reported (or if they are reported) at salvage facilities
    - Persistence of risk: level of risk for this flow range would be anticipated to remain at low this week as long as the current hydrology and operational conditions persist. An increase in catch of Delta Smelt at Prisoner's Point or salvage would indicate an increase of relative risk for this flow range.
- OMR flow of -3500 to -5000 cfs: There is a medium risk of entrainment under this flow range:
    - Risk factors: lowest annual index on record, confirmed Delta Smelt presence in central Delta based upon field studies; proportional distribution in the San Joaquin River appears higher than in other recent years (based on SKT results).
    - Salvage: No reported Delta Smelt salvage since February 21
    - Unknowns: question regarding how dead Delta Smelt are reported (or if they are reported) at salvage facilities
    - Persistence of risk: level of risk for this flow range would be anticipated to remain medium this week as long as the current hydrology and operational conditions persist. An increase in catch of Delta Smelt at Prisoner's Point or salvage would indicate an increase of relative risk for this flow range.

The Working Group will continue to monitor conditions and smelt distribution and will meet again on Monday, March 9, 2015.

WEEKLY ADVICE FOR THE DEPARTMENT OF FISH AND WILDLIFE FOR LONGFIN SMELT

Advice for week of March 2, 2015:
The Smelt Working Group does not have any Longfin Smelt-related advice based on recent information.

Barker Slough operations advice is not warranted at this time. The Smelt Work Group did not discuss the February 1 change in water year 2015 classified to "critical"; nonetheless, few Longfin Smelt larvae were detected at criteria stations and Barker Slough exports have been well below the potential limit of 50 cfs (see Basis for advice and Discussion of Criteria for #5 below).

Basis for advice:
The 2009 State Water Project 2081 for Longfin Smelt states that advice to WOMT and the DFW Director shall be based on:

1. Adult Salvage – total adult (>=80mm) Longfin Smelt salvage (SWP+CVP) for December through February > 5 times the Fall Midwater Trawl Longfin Smelt annual abundance index.

2. Adult abundance, distribution or other information indicates that OMR flow advice is warranted.

3. Larva distribution in the Smelt Larva Survey or the 20mm Survey finds Longfin Smelt larvae present at 8 of 12 central and south Delta sampling stations in 1 survey (809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, 919; see Figure 1).

4. Larva catch per tow exceeds 15 Longfin Smelt larvae or juveniles in 4 or more of the 12 survey stations listed.

5. During the period January 15 through March 31 of a dry or critically dry water year only, advice for Barker Slough pumping plant operations may be warranted if larval Longfin Smelt are detected at station 716 and other information indicates risk of entrainment.

Discussion of Criteria

1. As of March 1, 2015, no Longfin Smelt have been observed in salvage sampling for the water year. The interim Longfin Smelt adult salvage threshold for advice is > 80 (see criterion in #1 above), which is based on a combined September through December Fall Midwater Trawl Longfin Smelt index of 16. No advice is warranted based on this criterion.

2. No new information. Early February sampling by Bay Study detected no adult Longfin Smelt in the San Joaquin River and very few in the Sacramento River (n= 2). Kodiak Trawl sampling tends to be inefficient for Longfin Smelt, but in January the USFWS detected two adult Longfin Smelt at Jersey Point; otherwise, none have been caught at Jersey Point or Prisoner's Point. No other detections were made in the San Joaquin River or south Delta in January. In early January Bay Study detected Longfin Smelt adults in the Sacramento River at Rio Vista (station 761), a juvenile and adult in the Sacramento River at Sherman Lake (station 736), none in the San Joaquin River, and juveniles (<80 mm) and adults throughout Suisun Bay December. Previously, Fall Midwater Trawl sampled the Bay-Delta region during the first half of the month and the supplemental Spring Kodiak Trawl survey during last week, and neither detected any Longfin Smelt in the central or south Delta. Late December catches by the Chipps Island trawl suggested that spawning movement into the western Delta happened. Current distribution information does not indicate advice is warranted based on this criterion.

3 & 4. The fourth Smelt Larva Survey (SLS) completed sampling at all stations, but some sample processing remains. Longfin Smelt larvae were detected at 4 of the 12 criteria stations at densities of 2 or less per tow; thus, neither criterion was met for concern (Table 1, Figure 1). During survey 3, larvae were detected at 5 of 12 central and south Delta stations at densities of 3 or less; during survey 2, larvae were detected at only two stations in the central and south Delta: a single larvae at station 906 on the San Joaquin River at Medford Island and three larvae at station 809, Jersey Point. In SLS 1, most larvae were distributed from the confluence downstream. Hatching for the season should be close to a peak. Catches are not yet sufficient to reach concern levels based on density or distribution.

5. SLS 4 continued to detect larvae at station 716. Based on the February 1, 2015 Bulletin 120 Water Supply Forecast the water year type changed to "Critical" in the Sacramento River. This triggers one of the criteria for consideration regarding the operations of the North Bay Aqueduct (NBA). The second is the presence of Longfin Smelt larvae in the vicinity (i.e., station 716). During SLS 4, a single larva was detected at station 716 and none at 723, so criteria remain in effect. SLS 3 sampling collected four larvae at station 716 and two more at 723 indicating presence but not substantial numbers. NBA has been exporting about 30 cfs as a daily average in early February, but exports declined to about 20 cfs beginning February 12 and have remained at

this level since that date. This level is well below the 50 cfs ceiling established for this component of the Longfin Smelt Incidental Take Permit. Based on low larval densities and current export levels well below the potential limit of 50 cfs, no change in current operations is warranted based on this criterion.

Current conditions: Sacramento River flow peaked at a little over 36,000 cfs on February 13 and declined to 10,444 on the March 1st. X2 has been slowly moving upstream and is about 75 on March 1st. Combined State and federal exports are currently targeting -5,000 OMR, but E:I ratio limit is at 35% starting March 1, potentially limiting exports. Qwest was -2869 on March 1. Qwest will become more negative for the start of this week as tides cycle toward spring. Projected OMR index will target -5,000, but this actual OMR will likely be marginally less.

Summary of Risk:
Risk of entrainment remains low in both the south Delta and Barker Slough. This results from both low densities of larvae and moderate to low exports. Although this could change with an influx of adult Longfin Smelt in the south Delta or with substantial hatching in either region, spawning should have peaked by now and possibly hatching as well. Risks of additional adult influx continue to diminish. Larva densities could continue to increase through mid-March resulting in increased risk of entrainment to those close to export facilities.

The limited number of Longfin Smelt larvae detected in the central and south Delta in SLSs 3-4, the few adults collected in the San Joaquin River or central Delta fish surveys and the absence of adult Longfin Smelt in salvage samples to date suggests few fish have moved into the central or south Delta for spawning. Current conditions, particularly OMR targeted at -5,000 cfs and only weakly negative Qwest, provide some risk for fish that do move into or hatch into the central Delta. The overall risk of entrainment remains low, but could increase if adult fish migrate into the central or south Delta or if larvae hatch in the region. Less than half the spawning season remains. Currently X2 remains near Chipps Island, well outside the Delta.

Table 1. Longfin Smelt catches by station in Smelt Larva Survey 4, 2015. Sample processing is incomplete.

Year	Survey #	SLS Station	Sample Status	Species	Smelt Catch
2015	4	340	Not yet processed		
2015	4	342	Not yet processed		
2015	4	343	Not yet processed		
2015	4	344	Not yet processed		
2015	4	345	Not yet processed		
2015	4	346	Not yet processed		
2015	4	347	Not yet processed		
2015	4	348	Not yet processed		
2015	4	349	Not yet processed		
2015	4	405	Processed	Longfin Smelt	25
2015	4	411	Processed	Longfin Smelt	7
2015	4	418	Processed		No Smelt Catch
2015	4	501	Processed	Longfin Smelt	40
2015	4	504	Processed	Longfin Smelt	26
2015	4	508	Processed	Longfin Smelt	2
2015	4	513	Processed	Longfin Smelt	1
2015	4	519	Processed	Longfin Smelt	13
2015	4	520	Processed	Longfin Smelt	3
2015	4	602	Processed	Longfin Smelt	8
2015	4	606	Processed	Longfin Smelt	12
2015	4	609	Processed	Longfin Smelt	29
2015	4	610	Processed	Longfin Smelt	1
2015	4	703	Processed	Longfin Smelt	4
2015	4	704	Processed	Longfin Smelt	9
2015	4	705	Processed	Longfin Smelt	1
2015	4	706	Processed	Longfin Smelt	10
2015	4	707	Processed	Longfin Smelt	4
2015	4	711	Processed		No Smelt Catch
2015	4	716	Processed	Longfin Smelt	1
2015	4	723	Processed		No Smelt Catch
2015	4	801	Processed	Longfin Smelt	3
2015	4	804	Processed	Longfin Smelt	4
2015	4	809	Processed	Longfin Smelt	2
2015	4	812	Processed		No Smelt Catch
2015	4	815	Processed		No Smelt Catch
2015	4	901	Processed	Longfin Smelt	1
2015	4	902	Processed		No Smelt Catch
2015	4	906	Processed	Longfin Smelt	1
2015	4	910	Processed		No Smelt Catch
2015	4	912	Processed		No Smelt Catch
2015	4	914	Processed		No Smelt Catch
2015	4	915	Processed	Longfin Smelt	1
2015	4	918	Processed		No Smelt Catch
2015	4	919	Processed		No Smelt Catch

SWP ITP Criteria Stations

Processing is complete through 2/27/15.

Figure 1. CDFW's Smelt Larva Survey station locations.