

Smelt Working Group
May 9, 2016

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 OMR flow ranges is discussed and assessed. For the current week, the risk of entrainment of larval and juvenile Delta Smelt for each of the flow ranges is characterized as follows:

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

Should salvage occur prior to May 16 or if this week's 20 mm Survey detects Delta Smelt in the south or central Delta, the Working Group will need to reconvene to reassess the risk of entrainment.

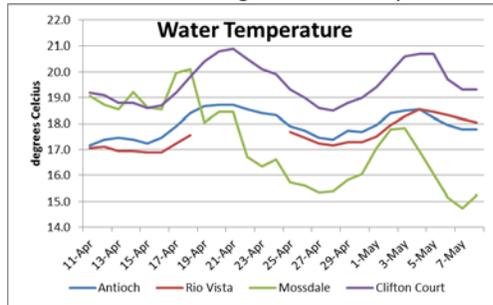
The Working Group is following guidance for entrainment protections from both Action 2 (adult Delta Smelt) and Action 3 (juvenile Delta Smelt). The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions, and will meet again on Monday, May 16, 2016 at 10 am.

Reported Data

1. Current environmental data

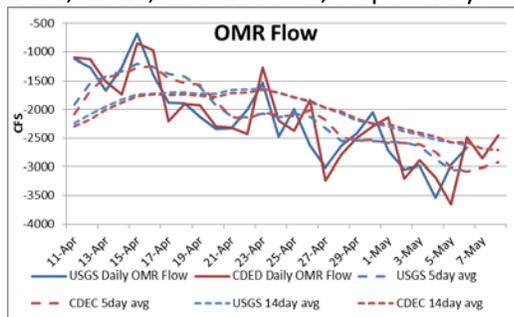
a. Temperature

The 3-station average water temperature for May 8 was 17°C.



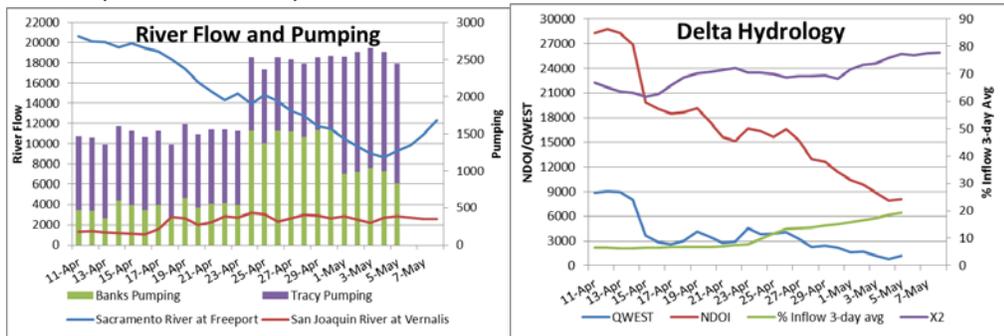
b. OMR flow

USGS OMR daily, 5-day, and 14-day average flows on May 6 are -2670, -3042, and -2620 cfs, respectively. The CDEC OMR daily, 5-day, and 14-day average flows for May 8 were -2451, -2923, and -2706 cfs, respectively.

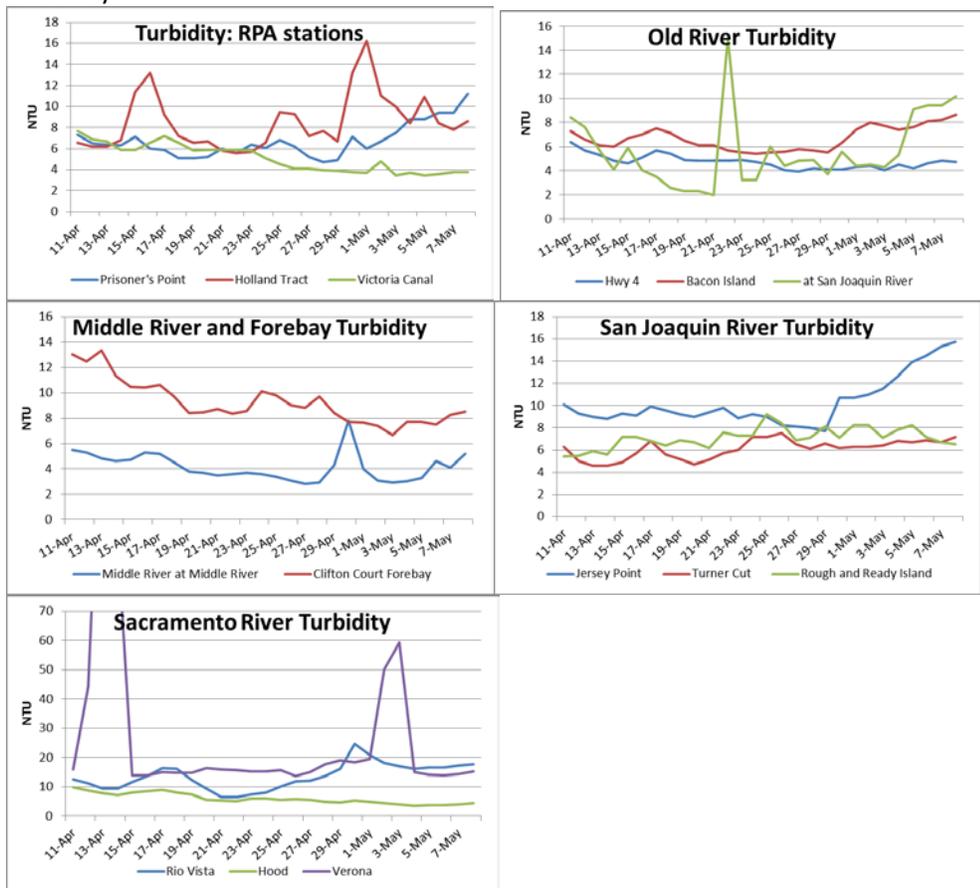


c. River flows and pumping

Sacramento River at Freeport flow for May 8 was 12,308 cfs. San Joaquin River at Vernalis river flow for May 8 was 2568 cfs. X2 is at 71.6km. Combined exports are 2600 cfs today. Qwest for May 8 was 2730 cfs.



d. Turbidity



2. Delta fish monitoring

The CDFW 2015 FMWT indices are:
 The 2015 Delta Smelt annual FMWT index is 7.
 The 2015 Longfin Smelt annual FMWT index is 4.
 Both indices are the lowest on record (i.e. since 1967).

Spring Kodiak Trawl #5 was in the field the week of May 2. No adult Delta Smelt adults were collected. Juvenile Delta Smelt were collected at three stations, although these fish are undergoing lab verification. This is the final SKT survey of the year.

20-mm Survey #4 was in the field the week of April 25 through 28. Sample processing is 79% complete. So far, a total of 12 juvenile Delta Smelt were collected, 10 from station 719. Sizes range in size from 16 to 32 mm. No Delta Smelt were collected in the central or south Delta. 20-mm Survey #5 is in the field this week.

The Early Warning Survey began November 30 and ended on March 30.

3. Modeling

No new PTM runs were distributed to the group this morning for discussion.

4. Salvage

No adult Delta Smelt salvage has occurred since February 22. The cumulative season total of salvaged adult Delta Smelt is 12, which represents 29% of the concern level of the WY 2016 adult Delta Smelt incidental take. Four juvenile Delta Smelt were salvaged on April 28, combined with the previous salvage, represents 3% of the concern level of the WY 2016 juvenile Delta Smelt incidental take.

No adult Longfin Smelt have been observed in salvage sampling at either the federal or state Delta facilities during the current water year. Two juvenile Longfin Smelt were salvaged on March 9 at the SWP; eight juvenile Longfin Smelt were salvaged on March 11 at the CVP. Combined salvage of >20 mm Longfin Smelt is ten for the season.

Larval sampling has been conducted since March 1st at both the SWP and CVP. No larval Delta Smelt has been detected in the samples processed so far this season. Larval Longfin Smelt were detected at the SWP on March 16.

5. Expected Project Operations

Jones pumping plant is pumping 1000 cfs today. The daily average intake to Clifton Court (CC) is 1600 cfs. Combined pumping is 2600 cfs today. Pumping is constrained to comply with both the NMFS RPA IV.2.1 and the May 3 Service Determination, which constrains OMR flow to no more negative than -3000 cfs.

6. Delta Conditions Team

The DCT team met on Friday, May 6. A brief update of the discussion was provided to the Working Group by FWS.

7. Assessment of Risk:

BiOp Background

RPA Component 1, Action 2 states, "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 specific OMR flows within this range are recommended by the Working Group from the onset of Action 2 through its termination..."

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).

The WY 2016 adult Delta Smelt incidental take (IT) is 56, as stated in the Service’s December 23, 2015 memo to the Bureau of Reclamation. The concern level is 42. The method to calculate the adult IT is described on p 386 of the 2008 BiOp, with the corrections described in both the February 22, 2013, and December 23, 2015 memos. The alternative approach that the Service presented to the 2015 independent review panel at the Long-term Operation Biological Opinions annual science review will be piloted this year.

The WY 2016 larval/juvenile Delta Smelt incidental take is 392, and the concern level is 261. The method to calculate the larval/juvenile IT is described on p 389, with revision provided in the February 22, 2013 Service memo to the Bureau of Reclamation.

2015 Delta Smelt abundance

The four primary 2015 annual abundance indices for all Delta Smelt life stages are the lowest on record.

	2014	2015
SKT	30.1	13.8
20-mm	1.1	0.3
TNS	0.5	0.0
FMWT	9	7

Discussion

As discussed in previous notes, the Working Group continues to conclude that overall risk of entrainment of adult Delta Smelt into the south Delta is low.

The Working Group assumes spawning occurred, and may still be occurring, in the lower San Joaquin River, as well as potentially in the Old River corridor. The Working Group has continuing concerns regarding larvae in the Old River corridor as well as the lower San Joaquin River, given the decline of catch in surveys this year. Delta Smelt catch data from the most recent field surveys (20-mm Survey #4 [week of April 25], and SKT #5 [week of May 2]) do not show a strong presence of Delta Smelt in the central and south Delta. However, four juvenile Delta Smelt were salvaged on April 15 as well as on April 28, indicating a presence of juvenile Delta Smelt in the south Delta. Members stressed the concern with very low abundance and associated challenges in survey detection, and that zero detection at a station does not indicate Delta Smelt are not present.

The SWG has stressed since early in the season, that Delta Smelt have been present not only in the lower San Joaquin, but also at times, in the south Delta. The confirmation of juvenile salvage on April 15, and April 28 is evidence of this. Members assume there are some number of fish in the south and central Delta. Even with detections in the 20-mm Survey #4 all in the Sacramento River system or downstream of the central Delta, members stressed their concern that the very low population abundance (as evidenced by SKT 5 having zero detections) affects probability of

detection, and, therefore, distribution cannot be determined with accuracy. Members indicated that a larger percentage of fish may be in the south and central Delta than would be assumed from field survey catch data.

The earlier life stages of Delta Smelt are at greater risk for entrainment, given that they behave more like a particle than older life stages. Older life stages have greater ability to control their position in the water column.

Members reiterated last week's possible explanation for the juvenile Delta Smelt salvage that occurred on April 28: it may have resulted from entrainment into the south Delta that occurred very early in the season and taken until recently to reach the export facilities. Last week's PTM runs indicated a long residence time for particles under several of the OMR flow ranges. In addition, there was discussion that there may be additional hatching in the central Delta (environmental conditions remain suitable for spawning and hatching, although adults have not been detected recently), and that reduced exports that result in less negative OMR flows can protect the early life history stages in this region. Some members indicated that should 20 mm Survey #5 (in the field this week) result in no catch in the central and southern Delta, then a lower percentage of this year's cohort from the lower San Joaquin River may be present in this area. However, members indicated a great deal of uncertainty in any conclusions drawn from survey efforts this year. Members tentatively agreed that the risk assessment for each of the three OMR flow bins could be decreased slightly. However, members agreed that should there be any salvage prior to May 16 or should any Delta Smelt be detected in the south or central Delta in the 20 mm Survey this week, the Working Group will need to reconvene to reassess the risk of entrainment.

The above discussion points influenced and contributed to all three flow ranges described below:
Advice Framework OMR Level Risk Ranking and Discussion—**Young of Year Delta Smelt**

- 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 larval Delta Smelt.
 - Risk factors: lowest annual indices on record, low likelihood of detection.
 - Salvage: four salvaged April 28, geographic influence of the pumps does not extend to central Delta under this OMR flow range
 - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes.
 - Persistence of risk: expected to continue until May 16. Will increase to low to medium if salvage occurs or if this week's 20 mm Survey detects Delta Smelt in the south or central Delta.
- OMR flow of -2000 to -3500 cfs: There is a *medium* risk of entrainment under this flow range.
 - Risk Factors: lowest annual indices on record, low likelihood of detection
 - Salvage: four salvaged April 28, geographic influence of the pumps extends to the Old River corridor
 - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes.

- Persistence of Risk: expected to continue until May 16. Will increase to medium to high if salvage occurs or if this week's 20 mm Survey detects Delta Smelt in the south or central Delta.
- OMR flow of -3500 to -5000 cfs. There is a *high* risk of entrainment under this flow range.
 - Risk Factors: lowest annual indices on record, low likelihood of detection
 - Salvage: four salvaged April 28, geographic influence of the pumps extends to the lower San Joaquin River.
 - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes.
 - Persistence of Risk: expected to continue until at least May 16

Advice Framework OMR Level Risk Ranking and Discussion—**Adult Delta Smelt**

- 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 indices on record.
 - Salvage: None since February 22, geographic influence of the pumps does not extend to central Delta under this flow range
 - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes; low Sacramento River catch densities (unable to assess percentage of population in the lower San Joaquin River).
 - Persistence of risk: expected to continue through remainder of the season
- 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 indices on record.
 - Salvage: none since February 22, geographic influence of the pumps not likely to extend to central Delta under this flow range
 - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes, low Sacramento River catch densities (unable to assess percentage of population in the lower San Joaquin River).
 - Persistence of risk: expected to continue through remainder of the season.
- OMR flow of -3500 to -5000 cfs: There is a medium risk of entrainment under this flow range. Some members indicated this flow range had a high risk of entrainment.
 - Risk factors: lowest annual indices on record, reduced turbidity in the south Delta.
 - Salvage: none since February 22, geographic influence of the pumps is likely to extend to central Delta under this flow range.
 - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes, low Sacramento River catch densities (unable to assess percentage of population in the lower San Joaquin River).
 - Persistence of risk: expected to continue until spawning has completed

The Working Group will continue to monitor conditions and smelt distribution and will meet again on Monday, May 16, 2016.

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

Advice for week of May 9, 2016:

The Smelt Working Group does not have any advice for Longfin Smelt based on recent information.

The period of potential Barker Slough operations restriction is over for 2016 (see #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 (≥ 80 mm) 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 20-mm 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. No Longfin Smelt were salvaged during the week of May 2-May 8. No Longfin Smelt have been salvaged since mid-March. On March 9, 2016, the first Longfin Smelt was salvaged for the water year, a young-of-the-year (≥ 20 mm); additional young-of-the-year were salvaged on March 11 for a total salvage of 10. Salvage of young-of-the-year does not count toward the adult salvage limit for advice. The **Longfin Smelt adult salvage threshold for advice is 20** based on a Fall Midwater Trawl abundance index of 4 for 2015 (see criterion in #1 above). No advice is warranted based on this criterion.
2. No adult Longfin Smelt were collected by the Bay Study during April in the Delta, Suisun or San Pablo bays. January Bay Study sampling detected no Longfin Smelt in the lower San Joaquin or Sacramento rivers. December Bay Study sampling collected no Longfin Smelt in the San Joaquin River. The December Fall Midwater Trawl sampled the region and did not detect Longfin Smelt in the San Joaquin River or the south Delta. Distribution information does not indicate advice is warranted based on this criterion.

3 & 4. The fourth 20-mm Survey was conducted during the week of April 25 and is partially processed (Table 1, Figure 1). No larvae were detected among the 12 criteria stations (Table 1, Figure 1). Neither the distribution (Basis for advice #3) nor the catch density (Basis for advice #4) criterion was achieved. Catches of Longfin Smelt larvae remain low, but have recently increased somewhat in Suisun Bay stations. The Bay Study collected 14 young of the year Longfin Smelt in the first half of their May survey: 1 at station 429 (Suisun Bay), 5 in at station 427 (Carquinez Strait) and 7 in San Pablo Bay. May sampling is continuing today in central San Francisco Bay.

5. The Barker Slough criterion terminated for the water year on March 31.

Current conditions: The Sacramento River flow were 12,308 cfs on May 8 and the San Joaquin River at Vernalis was 2,568 cfs. Also on May 8, Qwest was +2,730 cfs. On May 5, combined State and federal exports were at about 2,600 cfs and will remain at this level, resulting in a slightly more negative OMR than requested by the USFWS determination, -3,000 cfs as a 14-day average.

There is no new adult distribution information.

Summary of Risk: Risk of entrainment in the south Delta is very low due to consistent lack of detection in the central and south Delta criteria stations. Qwest remains slightly positive. There is very little likelihood of additional Longfin Smelt larvae hatching in the lower San Joaquin River, and larva numbers are likely to remain at zero (Table 1). April usually marks the end of the hatching season.

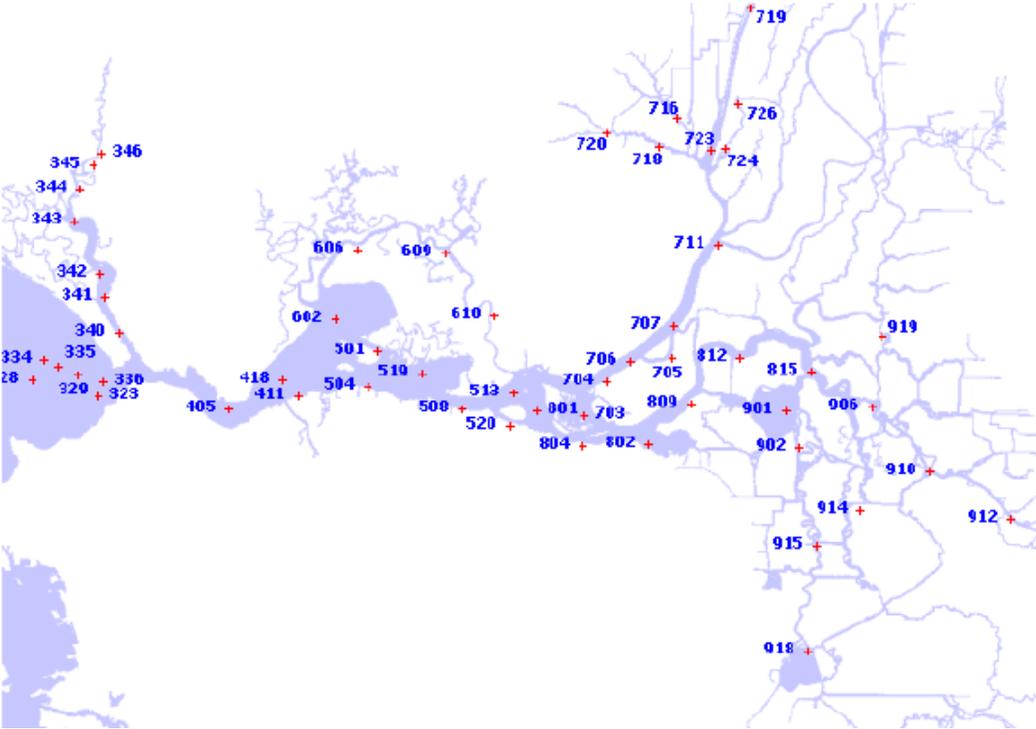
The Barker Slough concern period ended March 31.

Table 1. Longfin Smelt catch by station in the 20-mm Survey, #4. Sample processing is incomplete.

Year	Survey	Station	Date	# Tows Processed	Species	Total Catch	Min Length	Max Length	Avg Length	
2016	4	323	27-Apr-16	1	No Longfin Catch	0				Suisun Bay & West
2016	4	340	27-Apr-16	1	No Longfin Catch	0				
2016	4	342		0	Not Yet Processed	0				
2016	4	343	27-Apr-16	1	No Longfin Catch	0				
2016	4	344		0	Not Yet Processed	0				
2016	4	345	27-Apr-16	1	Longfin Smelt	12	17	26	21.4167	
2016	4	346		0	Not Yet Processed	0				
2016	4	405	28-Apr-16	1	No Longfin Catch	0				
2016	4	411	28-Apr-16	2	No Longfin Catch	0				
2016	4	418	28-Apr-16	2	No Longfin Catch	0				
2016	4	501		0	Not Yet Processed	0				
2016	4	504	28-Apr-16	3	Longfin Smelt	59	14	31	22.6271	
2016	4	519	28-Apr-16	3	Longfin Smelt	3	12	27	17.6667	
2016	4	602	28-Apr-16	1	Longfin Smelt	5	15	27	21.8	
2016	4	606	28-Apr-16	3	Longfin Smelt	7	16	26	19.4286	
2016	4	609		0	Not Yet Processed	0				
2016	4	610	28-Apr-16	3	No Longfin Catch	0				
2016	4	508	26-Apr-16	3	Longfin Smelt	99	12	33	25.0404	
2016	4	513	25-Apr-16	3	Longfin Smelt	48	14	27	20.6875	
2016	4	520	26-Apr-16	3	Longfin Smelt	81	13	26	18.4444	
2016	4	801	25-Apr-16	3	Longfin Smelt	22	12	24	16.4081	
2016	4	804	26-Apr-16	3	No Longfin Catch	0				
2016	4	703	26-Apr-16	3	No Longfin Catch	0				
2016	4	704	25-Apr-16	3	Longfin Smelt	1	18	18	18	
2016	4	705	25-Apr-16	3	No Longfin Catch	0				
2016	4	706	25-Apr-16	3	No Longfin Catch	0				
2016	4	707	25-Apr-16	3	No Longfin Catch	0				
2016	4	711	25-Apr-16	3	No Longfin Catch	0				
2016	4	716	27-Apr-16	3	No Longfin Catch	0				
2016	4	718	27-Apr-16	3	No Longfin Catch	0				
2016	4	719	27-Apr-16	3	No Longfin Catch	0				
2016	4	720	27-Apr-16	3	No Longfin Catch	0				
2016	4	723	27-Apr-16	3	No Longfin Catch	0				
2016	4	724	27-Apr-16	3	No Longfin Catch	0				
2016	4	726	27-Apr-16	3	No Longfin Catch	0				
2016	4	809	26-Apr-16	3	No Longfin Catch	0				
2016	4	812	26-Apr-16	3	No Longfin Catch	0				
2016	4	815	26-Apr-16	3	No Longfin Catch	0				
2016	4	901	25-Apr-16	3	No Longfin Catch	0				
2016	4	902	25-Apr-16	3	No Longfin Catch	0				
2016	4	906	25-Apr-16	3	No Longfin Catch	0				
2016	4	910	25-Apr-16	3	No Longfin Catch	0				
2016	4	912	25-Apr-16	3	No Longfin Catch	0				
2016	4	914	25-Apr-16	3	No Longfin Catch	0				
2016	4	915	25-Apr-16	3	No Longfin Catch	0				
2016	4	918*	25-Apr-16	2	No Longfin Catch	0				
2016	4	919	26-Apr-16	3	No Longfin Catch	0				

*Reduced tow time
Processing is complete through 5/6/2016

Figure 1. DFW's Smelt Larva Survey/20-mm Survey station locations.



SWG Weekly Salvage Update
Reporting Period: May 2-8, 2016
Prepared by Bob Fujimura on May 9, 2016: 9:00
Preliminary Results -Subject to Revision

Species/Life Stage	Daily Salvage							Trend	
	2-May	3-May	4-May	5-May	6-May	7-May	8-May		
Juvenile Delta Smelt									
SWP	0	0	0	0	0	0	0		0
CVP	0	0	0	0	0	0	0		0
TOTAL	0	0	0	0	0	0	0	↘	0.0
CUM TAKE	8	8	8	8	8	8	8		
% of 2016 CL	3%	3%	3%	3%	3%	3%	3%		0
Juvenile Longfin Smelt									
SWP	0	0	0	0	0	0	0		0
CVP	0	0	0	0	0	0	0		0
TOTAL	0	0	0	0	0	0	0	→	0
SWP daily export	1,960	2,053	1,973	1,638	1,729	1,911	3,058	↘	2,046
CVP daily export	3,195	3,206	3,182	3,201	3,176	3,178	1,972	↘	3,016
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%
CVP reduced counts	0%	0%	0%	0%	0%	0%	0%	↘	0%
SWP larval samples	100%	100%	100%	100%	100%	67%	100%	↘	95%
CVP larval samples	100%	100%	100%	NA	NA	NA	NA	→	100%
DS larvae present - SWP	N	N	N	NA	NA	NA	NA	→	
DS larvae present - CVP	N	N	N	NA	NA	NA	NA	→	
LFS larvae present - SWP	N	N	N	NA	NA	NA	NA	→	
LFS larvae present - CVP	N	N	N	NA	NA	NA	NA	→	

TOTAL = combine daily salvages for CVP+SWP; daily water export = AF; Trend = compared to previous week

NA = not available at the time of this report; NS = not sampled

Reduced counts = percentage of time that routine salvage sample time were less than 30 min per 2 hours of salvage and export operations

Larval samples = percentage of daily scheduled samples taken during periods of water export

Yellow highlighted dates indicate fish salvage facility outage occurred.

Larvae present = whether Delta Smelt (DS) or Longfin Smelt < 20 mm was observed from daily fish larva collections at the SWP or CVP fish facilities