

Smelt Working Group
January 3, 2017

Meeting Summary

The Working Group reviewed current Delta conditions, survey data, and forecasted weather. With higher turbidity levels encroached into the south Delta and with the anticipated storms this week, members indicated that OMR flows should be reduced to -2,000 cfs immediately in an effort to minimize the high risk of entrainment and subsequent salvage expected this week.

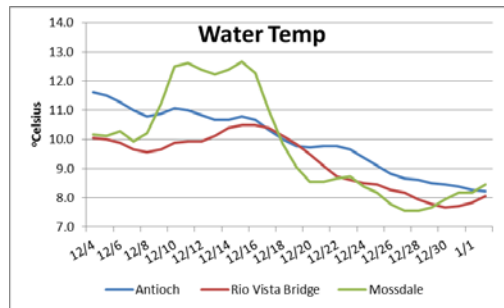
The Working Group is following guidance for entrainment protections from Action 1 (adult Delta Smelt). The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions, and will meet again on Monday, January 9, 2017 at 10 am.

Reported Data

1. Current environmental data

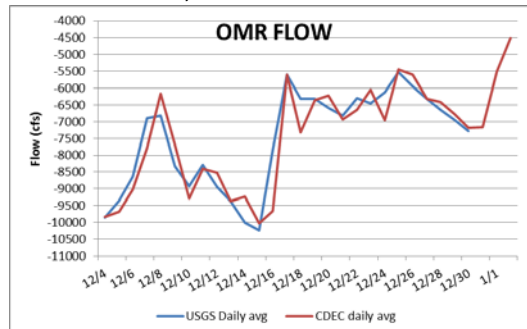
a. Temperature

Daily averages of the 3 Delta stations (Rio Vista, Antioch, and Mossdale) was 8.2°C as of January 2.



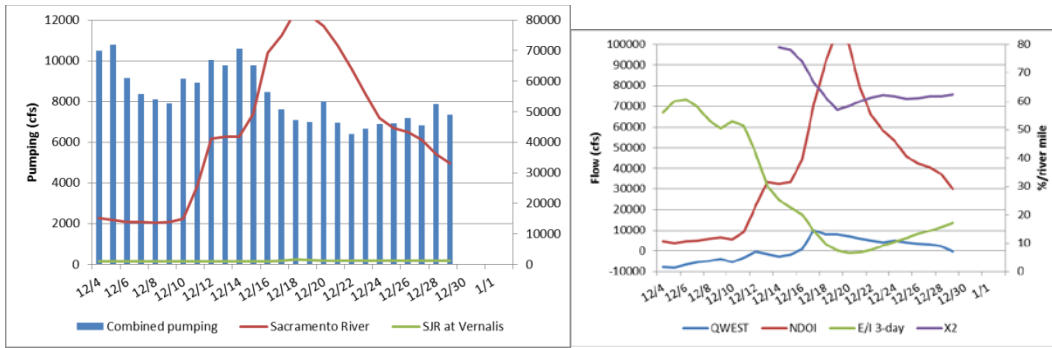
b. OMR flow

The CDEC daily average OMR flow for January 2 was -4,505 cfs. USGS daily average OMR flow for December 24 was -6,130 cfs.

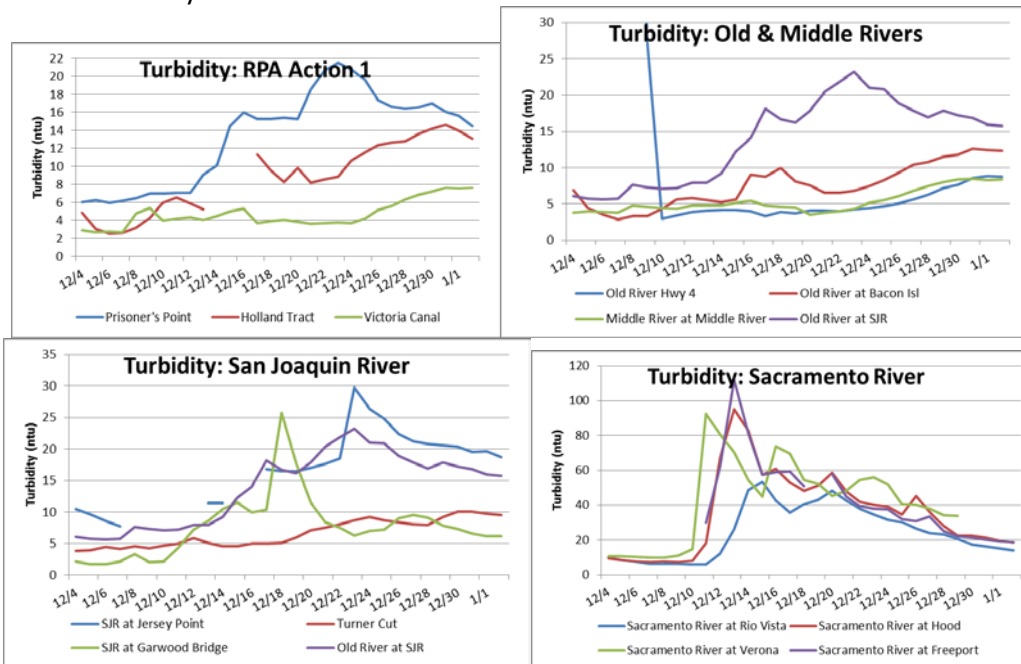


c. River flows and pumping

Sacramento River at Freeport flow for January 2 was 22,092 cfs. San Joaquin River at Vernalis river flow for January 2 was approximately 1,000 cfs. X2 was at approximately 64 km as of January 2.



d. Turbidity



2. Delta fish monitoring

The 2016 FMWT Index is 8. This is the 2nd lowest index on record.

SLS #1 is in the field this week. One adult Delta Smelt was caught at station 809 this morning (69 mm); SKT #1 is in the field next week.

EDSM was in the water last week. Survey locations were in the lower San Joaquin River, Sacramento River, confluence, and downstream of the confluence. A total of 24 Delta Smelt were caught, 14 from the lower San Joaquin River, 13 from the Sacramento River, and 6 from Suisun Bay. The EDSM was not able to conduct the full survey, so abundance estimates generated based on last week's catch may not represent the entire population. One Delta Smelt had been caught so far this morning, at a high density, low risk site.

Members discussed how they plan to utilize the EDSM results in their risk assessment. Only two abundance estimates have been generated to date by this new survey. This week's estimate indicated 471,225 fish, while the previous week the estimate was 91,930. The error estimate for this week's low risk/high density zone was 182,000 to 1,000,000. These very broad confidence intervals, the large departure from last week's estimate, and the discrepancy with low and near record low catches in 2016 FMWT and other surveys lead SWG members to have low confidence

in these early estimates. Members indicated at least a full year of survey efforts likely will be needed to reduce abundance estimate uncertainty.

Members indicated that although the abundance estimates varied widely, the proportion of population in the various EDSM sampling zones was similar between the two estimates. Members indicated it may not be appropriate to use the estimate results in deciding what percentage of population is in the high risk zone, but indicated that comparing catch distributions from one week to the next could prove useful in the assessment of risk for Delta Smelt caught in the high risk zone. Delta Smelt caught in the high risk zone, are at risk of being entrained into the South Delta, especially given the current and anticipated hydrology and turbidity conditions. These conditions during the spawning migration can lead to a greater risk of adult entrainment into the pumping facilities, and to increased larval densities in the zone of entrainment later in the year.

Members asked whether the abundance estimate provided for this week relied upon the previous week's estimate (i.e. as Bayesian priors). The SWG is requesting that the Service provide this information prior to the January 9 meeting.

Members also requested that the Service modify the EDSM survey protocols for this week (and possibly next week) to include sampling stations in the Old River corridor, since Delta Smelt presence and changes in density in the Old River are evidence of movement into the South Delta: a primary indicator of salvage risk, and a primary response variable targeted by SWG management recommendations.

3. Modeling

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

4. Salvage

No adult Delta Smelt or Longfin Smelt salvage has occurred so far this water year.

5. Expected Project Operations

Combined pumping today is 5,600 cfs. Pumping currently is restricted by NMFS RPA Action IV.2.3, which restricts OMR flows to no more negative than -5,000 cfs. Operators indicated the projected OMR Index is expected to be approximately -5,000 cfs this week.

A cold storm system is moving through the area today. A warmer, wetter system is expected to move through the area by late in the week and over the weekend. High sustained winds are expected throughout the Delta.

6. Delta Conditions Team

The DCT met last Friday. Turbidity modeling results were distributed to the SWG. Modeling results indicated a gradual decline in turbidity throughout the Delta. Members pointed out that the results for the Old River corridor do not match with actual conditions.

7. DWR Turbidity Transects

Surveys were completed last week on Tuesday and Thursday in the Old River corridor and data was distributed to the SWG. DWR staff indicated that the transects were done on the receding (ebb) tide.

8. Biological Opinion Background:

RPA, Action 1: Adult Migration and Entrainment

Objective: A fixed duration action to protect pre-spawning adult delta smelt from entrainment during the first flush, and to provide advantageous hydrodynamic conditions early in the migration period.

Action: Limit exports so that the average daily OMR flow is no more negative than -2,000 cfs for a total duration of 14 days, with a 5-day running average no more negative than -2,500 cfs (within 25 percent).

Timing:

Part A: December 1 to December 20 – Based upon an examination of turbidity data from Prisoner’s Point, Holland Cut, and Victoria Canal and salvage data from CVP/SWP (see below), and other parameters important to the protection of delta smelt including, but not limited to, preceding conditions of X2, FMWT, and river flows; the SWG may recommend a start date to the Service. The Service will make the final determination.

Part B: After December 20 – The action will begin if the 3 day average turbidity at Prisoner’s Point, Holland Cut, and Victoria Canal exceeds 12 NTU. However the SWG can recommend a delayed start or interruption based on other conditions such as Delta inflow that may affect vulnerability to entrainment. Part B has associated triggers involving turbidity and/or salvage.

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 (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...”

The timing of Action 2 is immediately after Action 1. Before this date (in time for operators to implement the flow requirement) the SWG will recommend specific requirement OMR flows based on salvage and on physical and biological data on an ongoing basis. If Action 1 is not implemented, the SWG may recommend a start date for the implementation of Action 2 to protect adult delta smelt. (BiOp page 352).

9. Assessment of Risk Discussion

The Service requested that the SWG provide guidance on the risk of entrainment using the OMR flow categories from the last couple of years.

As stated last week, members are basing their assessment of risk on entrainment into the south Delta, rather than into the facilities.

Turbidity

Members indicated that although First Flush conditions have subsided on the Sacramento River side, conditions in the San Joaquin River system remain elevated. Turbidity in the mainstem lower San Joaquin River is clearing up gradually, however, turbidity in the Old River corridor

appears to be encroaching further south toward the export facilities. The OH4 station turbidity is almost 9 NTU, while OBI station is 12 NTU. Additionally, the VCU station has increased over the last few days and is approaching 8 NTU. As PPT and HOL remain above 12 NTU, members are concerned that VCU station could increase to 12 NTU, thus surpassing the turbidity conditions called out in Action 1, Part B of the Biological Opinion. Members thought that a triggering of Action 1, Part B, based on the 3 station turbidity triggers, could be likely this week or next depending on storm conditions.

Last week, members were concerned about maintaining lower turbidity (< 10 NTU) in as much of the Old River corridor extending from the export facilities as possible. As higher turbidity has encroached well into the Old River corridor, members indicated their advice objective for this week is to prevent a continuous band of turbidity (≥ 10 NTU) from forming in the Old River (i.e. a turbidity bridge). With additional turbidity sources expected this week from winds (resuspension) and higher flows, members suspect that turbidity may continue to increase such that a turbidity bridge will form regardless of management efforts, thus putting Delta Smelt in the Old River corridor at high risk of facility entrainment, and of being detected in salvage operations. The SWG recommends management efforts should then target minimizing the duration of the turbidity bridge, and elevated Old River turbidity in general. Members noted that during turbidity bridge conditions, pumping levels directly affect facility entrainment and salvage rates.

Members indicated that Delta Smelt are likely to continue to move into Old River and be entrained until turbidity levels drop consistently below 10 NTU, irrespective of the level of OMR. Members stressed the importance of decreasing the level and spatial extent of elevated turbidity in Old River as soon as possible, to minimize the proportion of the population moving into the Old River. Once fish move into the Old River they likely will spawn there, and a large proportion of larvae and juveniles subsequently hatched in the Old River would be expected to be entrained into the facilities. With the very low anticipated ITL for juveniles this year, the SWG would anticipate that the ITL easily could be exceeded early in the year.

Delta Smelt Detections

The EDSM continues to confirm the presence of the species in the lower San Joaquin River, especially at Twitchell Island and Prisoners Point. Fish at Prisoners Point are considered to be at greater risk of entrainment into the Old and Middle River corridors than those detected at Jersey Point or further downstream, especially when OMR is at or more negative than -5,000 cfs. Members suspect that Delta Smelt have moved into the south Delta, and throughout the Old River corridor as far south as the extent of 10 NTU water. Members also anticipate that there are sufficient numbers of Delta Smelt already in these areas to meet or exceed the likely WY2017 ITL, if the turbidity bridge forms and they are detected in salvage.

Spawning Migration

The SWG agrees that the first flush conditions for Action 1 in the Biological Opinion likely have passed with the previous storms. However, members suspect that another period of flushing conditions will occur in the Delta with the anticipated storms this week. Last week, members believed it was appropriate to look to Action 2. However, this week, the group indicated that the increased flows, low pressure, and increased turbidity that are expected with these storms will encourage the population to make further migratory movements, even though this system is not the first flushing system to hit the Delta since December 1.

Migration is anticipated to continue until spawning begins, or approximately March. Individuals are anticipated to move upstream with the turbidity field, and then to remain in position with the receding tide.

SWG members stressed the importance of providing immediate additional protections beyond those currently in place. Members emphasize that anticipated OMR levels (approximately -5,000 cfs) put too large a percentage of the population at increased risk of entrainment. The SWG emphasized that the species has decreased in abundance to such an extent that it can no longer sustain entrainment losses as in previous years. The SWG is concerned with any proportion of the population in high risk of entrainment areas. Members stress that OMR flow should be set at -2,000 cfs for the week, in an effort to minimize the high turbidity distribution (and corresponding fish distribution) and to minimize the length of time that Old River stations have elevated turbidity once a turbidity bridge forms. Members stressed that Delta Smelt are moving into the south Delta now, and even moderate OMR levels that increase the level and extent of turbidity in the Old River put an elevated risk on the species. Members are greatly concerned with the immediate potential for salvage over the next week following likely formation of a turbidity bridge.

The SWG indicated that once turbidity levels subside consistently below 10 NTU between OBI and the facilities, with a corresponding absence of salvage, OMR flow restrictions can be relaxed. Should any salvage occur, the SWG will need to meet again to reassess the risk of entrainment. If a turbidity bridge forms (independent of salvage), members indicated the most positive OMR flow possible would be necessary to minimize the risk of salvage (more positive than -2,000 cfs).

Advice Framework OMR Level Risk Ranking and Discussion

The above discussion points influenced and contributed to all three flow ranges described below:

OMR Flow of -1,250 to -2,000 cfs: moderate risk of entrainment (some members indicated a high risk of entrainment)

- Risk factors: 2nd lowest FMWT index on record, confirmed Delta Smelt presence in central Delta based upon Jersey Point, Prisoner's Point, and Twitchell Island catch data (EDSM)
- Salvage: Zero salvage this water year, geographic influence of the pumps reaches partly into Old River, where Delta Smelt are present
- Unknowns: detection probability in salvage and trawl surveys has been severely reduced, given the record low abundance
- Turbidity at OH4 station has increased and may continue to increase. After anticipated storms move through the system, turbidity is expected to decrease in Old River.
- Persistence of risk: unlikely to change prior to January 9

OMR Flow of -2,000 to -3,500 cfs: high risk of entrainment

- Risk factors: 2nd lowest FMWT index on record, confirmed Delta Smelt presence in central Delta based upon Jersey Point, Prisoner's Point, and Twitchell Island catch data (EDSM)

- Salvage: Zero salvage this water year, geographic influence of the pumps reaches into Old River, where Delta Smelt are present
- Unknowns: detection probability in salvage and trawl surveys has been severely reduced, given the record low abundance
- Turbidity at OH4 station is expected to increase to greater than 10NTU. After anticipated storms move through the system, turbidity is expected to decrease in Old River corridor.
- Persistence of risk: unlikely to change prior to January 9

OMR Flow of -3,500 to -5,000 cfs: high risk of entrainment

- Risk factors: 2nd lowest FMWT index on record, confirmed Delta Smelt presence in central Delta based upon Jersey Point, Prisoner's Point, and Twitchell Island catch data (EDSM)
- Salvage: Zero salvage this water year, geographic influence of the pumps expected to reach to the lower San Joaquin River closer to -5,000 cfs OMR flow, influencing the distribution of Delta Smelt in Old River and the lower San Joaquin River.
- Unknowns: detection probability in salvage and trawl surveys has been severely reduced, given the record low abundance, no new survey data from the Sacramento River system
- Turbidity at OH4 station is expected to increase to greater than 12NTU.
- Persistence of risk: unlikely to change prior to January 9.

The Working Group will continue to monitor conditions and smelt distribution and will meet again on Monday, January 9, 2016.

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

Advice for week of January 3, 2017:

The Smelt Working Group has no advice for Longfin Smelt: Advice is not warranted at this time given current conditions.

No Barker Slough operations advice. The Smelt Work Group meeting occurred prior to concern period beginning January 15 (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 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 January 1st, no Longfin Smelt have been salvaged during the current water year. The 2016 Fall Midwater Trawl annual abundance index for Longfin Smelt is 7 and will be used to set the salvage threshold for advice described above in the first criterion. Advice is not warranted based on this criterion.

2. Chipps Island Trawl caught 13 Longfin Smelt on December 19 (n=4) and 21st (n=9). No additional survey data are available that would indicate the presence of adult Longfin Smelt in the San Joaquin River or south Delta. However, adult Longfin Smelt collected earlier in December by Fall Midwater Trawl and more recently by USFWS Chipps Island survey indicates that fish have entered the Delta and are present in the Sacramento River. Sacramento River flow at Rio Vista is no longer above the 55,000 cfs off-ramp outlined in the Incidental Take Permit, but X₂ remains downstream (about 64 km). At such levels, fewer adults will venture into the central Delta. Qwest dropped to negative December 29 and was about neutral on January 2. Any larvae produced in the San Joaquin River have a low risk of entrainment into the south Delta so long as Qwest remains neutral or positive.

3&4. The first Smelt Larva Survey (SLS) of 2017 will be conducted beginning January 3rd. On January 2, Qwest measured about neutral (+100 cfs). Any larvae recently hatched in the San Joaquin River have a low risk of entrainment into the south Delta so long as Qwest remains neutral or positive.

5. These criteria do not begin until January 15th, and given current flow conditions, will not be implemented this water year.

Current conditions: As of January 2nd, Sacramento River flow at Freeport had decreased to 22,092 cfs; the San Joaquin at Vernalis was at 1000 cfs. X₂ was judged to be about 64 km. Combined State and Federal operations are targeting an OMR of -5000 cfs based on the NMFS B.O.

USFWS Chipps Island survey collected 13 Longfin Smelt (85-128 mm fork length) on December 19th and 21st. No CDFW surveys have been conducted since the last Smelt Working Group meeting. Continued collection of adult Longfin Smelt indicates that the spawning migration is underway and that spawning has likely began in early December (which will result in hatching in late December or early January. The number of adults migrating to spawn is expected to increase through January and into February, but as long as X₂ remains downstream, proportionally fewer will enter the central Delta to spawn.

Summary of Risk: Risk of entrainment is low due to high outflow moving X_2 downstream and a neutral Qwest.