

A Review of
The Effects Analysis
Contained in
DWR and Reclamation Request for
Modifications and Extension of Temporary
Urgency Change Order

29 April 2014



10 May 2014

On 29 April 2014, the Department of Water Resources and U.S. Bureau of Reclamation requested a modification and extension of the 18 April 2014 State Water Resources Control Board order that approved a Temporary Urgency Change in License and Permit Terms and Conditions Requiring Compliance with Delta Water Quality Objectives in Response to Drought Conditions.¹ This review refutes the claims in the request and accompanying Effects Review that the proposed changes will have no unreasonable impact to fish and wildlife. We summarize the proposed changes, address the Effects Analysis and respond to the U.S. Fish and Wildlife Service Concurrence Memo.²

Summary of Proposed Changes

1. *“The minimum monthly Net Delta Outflow Index (NDOI) described in Figure 3 of D-1641 during the month of July shall be no less than 3,000 cfs.”*

Note: the existing requirement for May-July is 4000 cfs. August-September standard is 3000 cfs. The new request did not include a change in May-June. However the State Board issued an order that granted outflow standards of 3000 cfs for May.

2. *“Modify the critical year D-1641 Agricultural Western Delta Salinity Standard at Emmaton (14-day running average of 2.78 millimhos per centimeter through August 15) by moving the compliance point to Three Mile Slough.”*

Note: Three Mile Slough is roughly 2.5 miles upstream of Emmaton. The 2.78 millimhos EC is the equivalent of X2 – the location of 2 ppt salinity in the estuary, which is an important parameter in estuary ecology management as well as a Delta water quality standard. Placement of three salinity barriers is considered but is presently not requested but may be in the future.

3. *“The mean monthly Rio Vista flow standard in September, October, and November shall be no less than 2,000 cfs.”*

Note: the present standard varies from 3000-4000 cfs in critical years – 3000 in September, 4000 in October, and 3500 in Nov-Dec.

4. *“Vernalis: For June 1 through June 30, no specific minimum flows are required; flows will be maintained sufficient to meet D-1641 San Joaquin River EC requirements.”*

Note: standard is a minimum of 710 cfs except during Apr15-May15 flow pulse.

¹http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/20140429_petitioners_request.pdf

² http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/usfws050114.pdf

"Summary of Effects Analyses," with Comments

Department of Water Resources Cover Letter

- *"Delta water quality objectives protective of municipal/industrial and agricultural uses remain in place and the proposed combination of outflows and export levels are expected to continue to provide water quality adequate to meet the needs of beneficial uses."* (Page 3, Paragraph 1).

Contrary to the claim, resulting changes to water quality will be detrimental to beneficial uses. Salinity will increase, turbidity will decrease and water temperatures are likely to approach lethal levels for Delta smelt.

- *"This action should also not have an unreasonable impact to fish and wildlife. Reclamation has concurrence from National Marine Fisheries Service and U.S. Fish and Wildlife Service that these actions are consistent with the federal Endangered Species Act (see attached). DWR has also consulted with the California Department of Fish and Wildlife and has determined that the existing Consistency Determination would remain in effect."* (Page 3, Paragraph 2).

We find the attached analysis is seriously misleading, misuses available information and draws erroneous conclusions. We cannot fathom how a comprehensive review of DWR's analyses by the National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (DFW) or the U.S Fish & Wildlife Service (FWS) would lead to concurrence. It appears that these were administrative decision and not comprehensive analyses.

- *"severe consequences associated with depletion of reservoir capacity, the proposed changes are in the public interest."* (Page 3, Paragraph 3).

Recent winter-spring storms increased reservoir storage nearly two million acre-feet (AF). Present freshwater inflow levels and proposed further reductions will at best save somewhere in the vicinity of 200,000 AF. Spread across the entire 10-million AF reservoir system that is presently at or higher than 50% capacity, the savings are minimal and does not warrant or offset the negative effects to other beneficial uses.

Review of Analyses (attachment):

- *"The upstream relocation of the compliance point and reduction in outflows will result in salinity moving further upstream on the lower Sacramento and San Joaquin Rivers. Due to the potential for Sacramento River origin water to be transported through the Delta Cross Channel to the San Joaquin River, the upstream tidal excursion of higher salinity water is*

expected to be more pronounced on the Sacramento River than the San Joaquin." (Page 1, Paragraph 4)

Noting that Tidal flows dominate in the West Delta, we agree that salinity will move upstream on both the Sacramento and San Joaquin Rivers and throughout the Delta. The main effect of opening the Delta Cross Channel will be slightly lower salinity in the San Joaquin and slightly higher on the Sacramento side: i.e., a slightly better balance of freshwater flow in the two channels.

- *"This would cause an upstream relocation of X2 and given the general decrease in habitat with movement upstream of the low-salinity zone would result in a smaller area of abiotic habitat."* (Page 1, Paragraph 4)

The effect of reducing freshwater inflow will be higher salt concentrations in the West Delta. Therefore the 2 ppt (X2) average location will move upstream and the overall area of the low salinity mixing zone (LSZ) will be reduced. Not only will the LSZ comprise less area, but it will also be further east in both river channels. The concentration of salt in Delta exports will also increase.

- *"Although these changes will reduce the quantity of available habitat, conductivity within this habitat will be within the range of salinity generally occupied by Delta Smelt during the summer and fall."* (Page 1, Paragraph 4)

We agree that the LSZ habitat of smelt will be reduced in volume and area. However, it will be considerably warmer (perhaps approaching lethal levels), less turbid (leading to greater predation), less productive, and more subject to entrainment in exports and agricultural diversions. Greater numbers of smelt, salmon, and other pelagic fish will perish. To infer there is little effect of reduced habitat because salinity levels are still in the "range of salinity generally occupied by Delta Smelt" is simply nonsensical.

- *"Therefore we conclude that while changes in salinity in the lower Sacramento River are within the physiological tolerances of Delta Smelt, the proposed modifications are expected to shift the Delta Smelt population further upstream."* (Page 2, Paragraph 1)

Yes, the change the population of Delta Smelt upstream where habitat quantity and quality are less desirable and where smelt are at significantly at greater risk of exports drawing them further away from their LSZ habitat. Again, the fact that smelt can survive salinities at Benicia or Sacramento has nothing to do with the huge detrimental impacts resulting from degradation of their rearing habitat in the Delta.

- *"The upstream shift of Delta Smelt distribution on the Sacramento River will increase the potential for stochastic events to exacerbate mortality and density-dependent effects on the*

population (Feyrer et al. 2011). As an example of this type of event, there may be water temperature increases during prolonged heat waves that would pose risks to Delta Smelt. In general, summer temperatures are higher in landward channels (Wagner 2012), so reduced inflow is expected to shift the distribution of Delta Smelt into these warmer regions. In addition, with the constriction of X2 above the Sacramento-San Joaquin confluence, salinities may be too high downstream for juvenile Delta Smelt to move substantially seaward, where the maritime influence and larger water bodies maintain cooler water temperatures." (Page 2, Paragraph 2)

This is exactly what happened in July 2013 without changes in standards – smelt were shifted upstream when outflow suddenly dropped and experienced lethal water temperatures during the early July heat wave. Given these obviously ominous recognitions by the DWR in their own assessment rationale, it is difficult to comprehend FWS's concurrence: *"The Service, therefore, concurs with Reclamation's determination that the proposed modifications for June through November will have no additional adverse effects on delta smelt or its critical habitat." (FWS concurrence letter)*

- *"From this information it is inferred that there would be little physiological effect on Delta Smelt from changes in conductivity in the lower San Joaquin River, as the ranges are all well within the physiological tolerance ranges for salinity (Nobriga et al. 2008; Figure 6). However, the increase in salinity may alter the distribution of Delta Smelt into less favorable areas within the lower San Joaquin (e.g. Franks Tract). "(Page 2, Paragraph 3)*

Again, it is unfathomable that either DWR or FWS concludes there will be no effect. Once smelt reach Franks Tract there is little hope of their survival as habitat is poor and net transport is south to the export pumps.

- *"The proposed modifications will result in lower outflows that may reduce survival of out-migrating larval smelt that are currently in the Interior Delta. For example, lower flows may expose them to loss at the CVP/SWP export facilities, and increasing their travel time and exposure to degraded habitats and predators. However, the projected OMR flows are less negative than -5000 cfs and therefore are not likely to result in substantial additional impacts over unmodified conditions. For smelt residing in the North Delta, reduced outflow, while limiting the available habitat, is not expected to result in any additional entrainment. There is a low level of uncertainty in this conclusion." (Page 5, Paragraph 1)*

Yes, there may be less than expected entrainment with lower drought-limited exports (although there is apparently no limit on exports of transferred water), but there will be devastating effects to habitat that will reduce the survival of smelt. Proposed changes in fall flows are exactly contrary to FWS recommended fall-X2 flows for smelt to improve their survival in normal and wet years. After six months of outflows of 3000 cfs (July-Dec), the

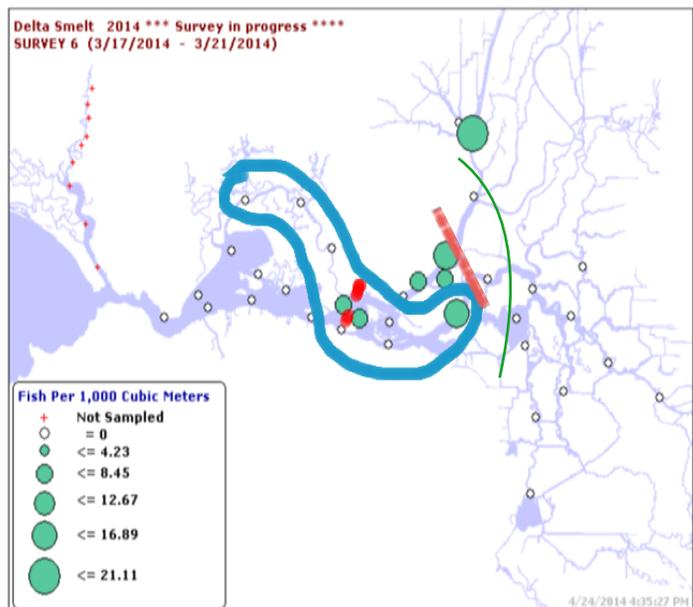
population of Delta Smelt, which has been at record low levels, will be further decimated. Again, the -5000 cfs FWS-BiOp OMR protection criteria only is through June, and even then provides little protection from exports in May and June with the LSZ in the western Delta. The FWS generally has concluded that smelt are not in the Delta in summer and thus do not need summer protections because they assume existing water quality standards are in place. Last year they were griveously wrong, and large number of smelt perished in lethal temperatures. With 3000 cfs outflows, most of the smelt will be in the Delta this summer.

- *"The variability of shallow and deep water habitat, and the resuspension of sediment due to wind and tidal action in the North Delta, may buffer the effects of the proposed modifications because much, if not most, of the habitat in this region would remain suitable. The expectations for the North Delta contrast with the lower San Joaquin River where the upstream relocation of X2 may result in a greater proportion of the available habitat encompassing areas of high SAV and associated low turbidities. This could result in lower prey catch efficiencies and also higher predation rates on juvenile Delta Smelt. There is moderate level of uncertainty in this conclusion."* (Page 5, para3).

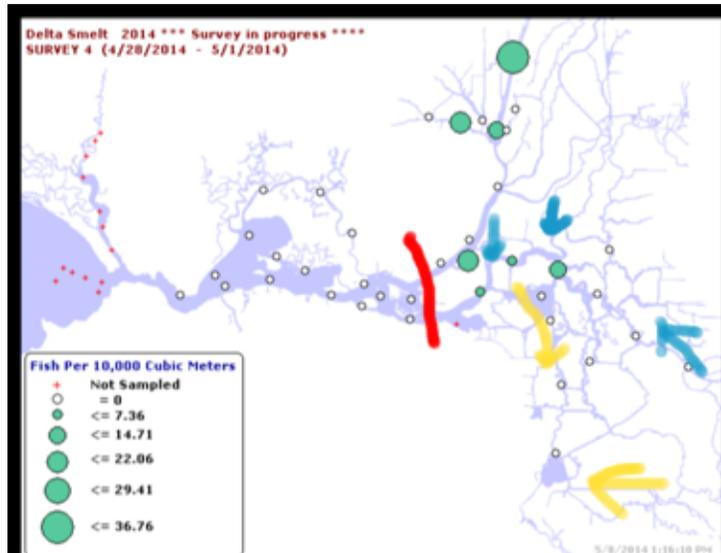
Again, with such a negative assessment how could the FWS and DFW conclude “no significant effects?” Most of the smelt will concentrate in a triangular area from Rio Vista, to Jersey Point, to Prisoners Point, an area where lethal water temperatures occurred in early July 2013 when outflow was 5000 cfs.

- *"In addition, one of the most recent 20-mm survey, conducted April 14-17, detected juvenile Delta Smelt in the San Joaquin River at Jersey Point (Figure 11b). Larvae and juveniles in the lower San Joaquin River are potentially susceptible to the effects of South Delta exports."* (Page 7, Paragraph 2).

The adjacent chart shows conditions in March when outflows were 5-7000 cfs and X2 was at left red line. Reducing outflow to 3000 cfs will move X2 to right red line and the LSZ to the green line from blue boundary. Large tidal flows will "pump" smelt into the Central Delta where they will be more vulnerable to exports, predation, lethal water temperatures, and poor food supply.



The changes are already happening in early May. The chart at right shows the most recent survey of smelt with outflow falling to 5000 cfs and exports rising (in conjunction with San Joaquin 3000 cfs flow pulse). Exports are pulling from north and east (yellow arrows). Inflows of 9000 cfs (split amongst the three blue arrows). X2 has moved to upstream to Emmatton (red line) with the lower outflow.



As the San Joaquin pulse soon ends, most of the export water will be drawn from the north where smelt are concentrated. Dropping outflow to 4000 cfs per the standard through the end of June will exacerbate the problem. Adopting the Order's allowed 3000 cfs in May and June would be disastrous. (Note: Although DWR did not request this in their recent request, the State Board established a 3000 cfs outflow standard in May.) Relaxing the standard in July to 3000 cfs (per DWR's request) will further exacerbate the problem by moving X2 to Three Mile Slough (left blue arrow), which is the area of Low Salinity Zone toward which Delta Smelt will gradually gravitate.

- *"In addition to turbidity effects, changes in flow may affect residence time, which in turn may influence planktonic production. Lower flows are expected to reduce hydraulic residence times, potentially resulting in improved planktonic production (Lucas et al. 2009). However, the specific effect is difficult to predict because benthic grazing can offset these benefits. Hence, the response of the food web to the changes in flow are unclear. There is a moderate level of uncertainty about this conclusion."* (Page 6, Paragraph 1).

The response in the food web is well understood. When the LSZ moves upstream of the broad flats of Suisun Bay and the West Delta for the confined channels of the Central Delta, food productivity declines sharply. Residence time in the LSZ goes down because of its lower volume and because it is the direct path of north Delta flow to the south Delta export pumps. Less residence time will also reduce planktonic productivity.

- *"Juveniles and adults in the Northern Delta have a greater area of suitable habitat than populations in the lower San Joaquin. For example, the North Delta includes several potential refuges, such as the Sacramento Deep Water Ship Channel and Liberty Island."* (Page 9, Paragraph 2).

These statements are unfounded. The suggested refuges are more like deep-water traps surrounded by lethally warm, shallow waters from which there is no escape. Smelt need brackish estuarine waters, not freshwater "refuges" like these. There is clear evidence from September Midwater Trawl surveys that smelt do not survive hot summers like 2013 in these "refuges". Lower Sacramento River inflows to the Delta will further aggravate young smelt movement from the Cache Slough area to the Delta.

- *"Any Delta Smelt southeast of Jersey Point in the Central/South Delta may well be entrained at the south Delta export facilities even if the proposed modifications are not instituted. There is a low level of uncertainty about this conclusion."* (Page 10, Paragraph 2).

Given this fact, why would the water agencies want to make the situation worse by bringing more fish to Franks Tract via Three Mile Slough (and Jersey Pt) by moving X2 upstream to Three Mile Slough?

- *"Salvage of juvenile Delta Smelt during the summer and fall months is virtually non-existent (Table 1, CDFW Salvage data), as Delta Smelt do not use the South Delta as habitat during these months."* (Page 10, Paragraph 3).

Smelt are located in the low salinity zone especially near X2 in summer. In most years, this habitat is to the west and not in the influence of the pumps. But in dry or drought years, outflow is reduced to 4000-5000 cfs and these habitats extend upstream into the Central Delta where smelt are more readily drawn to the pumps. Any smelt siphoned off to the south Delta have virtually zero chance of reaching the south Delta in summer of drought years for many reasons, but mostly because of lethal water temperatures. However, in dry years smelt, have frequently made it to the south Delta to be salvaged in July. Decades ago, when smelt were considerably more abundant; they were common in south Delta salvage in August under high exports.

- *"Juvenile Delta Smelt during the summer period typically reside in the low salinity zone around X2, with a substantial portion of the population remaining in the North Delta (Sommer and Mejia, 2013). The CDFW Summer Townet Survey (TNS) samples the distribution of Delta Smelt throughout the summer and early fall period, and in the summer of 2013 consistently detected Delta Smelt in both of these areas (Figure 15)."* (Page 11, Paragraph 1).

This statement is misleading and ignores DFW's 20 mm Surveys that also sampled both postlarval and juvenile Delta smelt through July. The 20 mm Survey demonstrates that the majority (64.52%) of Delta smelt in June 2013 was in Suisun Bay and only about 29% were in the western Delta (20 mm Survey 8, 17 June – 20 June 2013). However, as outflow was reduced, the LSZ (and smelt) was drawn eastward and by early July 60.22% were in the western Delta (20mm Survey 9, 1 July – 3 July 2013).

Note that figure 15 (reproduced to the right) from the Effects Analysis depicts a period in late July 2013 with approximately 5000+ cfs outflows and the larger catch at station 519 in Suisun Bay occurred in higher salinity water (13000 EC) west of the low salinity zone. Those smelt were among those who avoided being drawn eastward when outflow was dramatically reduced in early July (from 8000-9000 cfs to 5000 cfs). The other identified smelt to the north were in the Sacramento Deepwater Ship Channel, or to a lesser extent, in deep pockets in Cache Slough where water had also been cooler.

However, the majority (60.22%) of Delta smelt that were in the LSZ and drawn eastward in early July (20 mm Survey 9, depicted to the right) likely succumbed to lethal water temperatures (> 23C). As noted above, before outflow was substantially reduced at the beginning of July, the majority of Delta smelt (64.52%) were in Suisun Bay in late June and only 29% were in the Western Delta (20 mm Survey 8).

This loss of Delta smelt from reduced outflow and high temperatures in July was likely a major contributing reason the 2013 Fall Midwater Trawl's Delta smelt abundance index of 18 was the second lowest in history (since 1967). Delta smelt losses are likely to be greater this year, given the larger reductions in outflow.

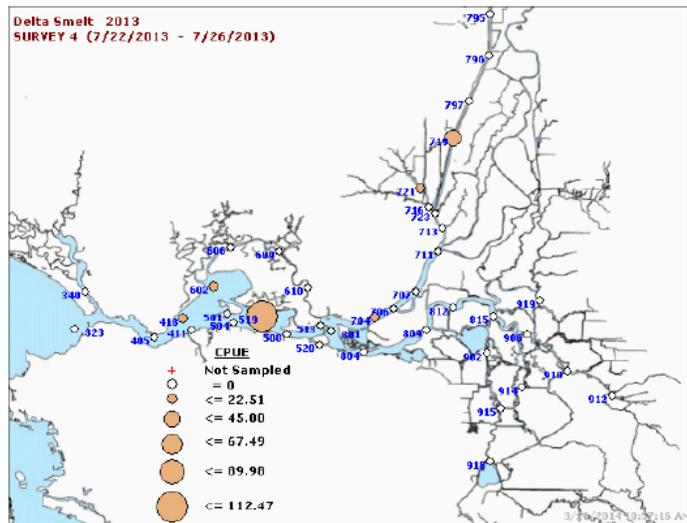
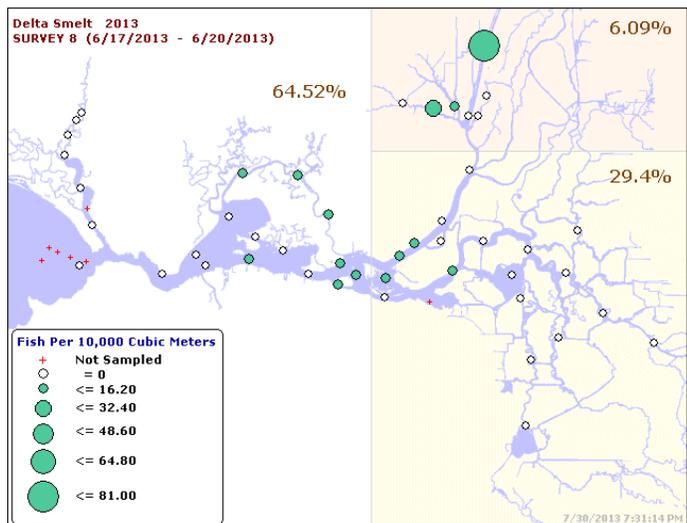
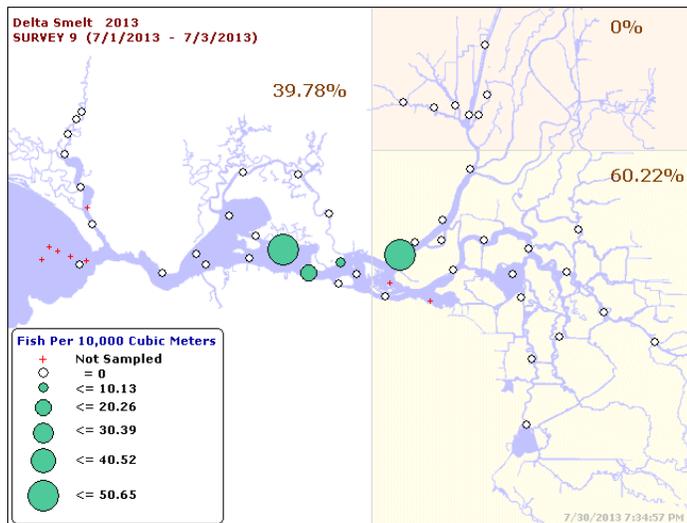


Figure 15, TNS #4 Delta Smelt Distribution in Late July¹³



- *"Juvenile Delta Smelt have the potential to be substantially affected by the proposed actions. The effects of changes in water quality in areas such as Liberty Island, Sacramento Deep Water Ship Channel, Lindsey and Cache Sloughs, are uncertain because the hydrology of this region is strongly driven by tidal effects during the months of the proposed action. However it is relatively likely that reduced inflow will result in a more upstream distribution of Delta Smelt, increasing the risk that they will be exposed to relatively high water temperatures (e.g. >25C). It is hypothesized the Deep Water Ship Channel and Cache Slough may provide key thermal refuges that allow Delta Smelt to persist in the North Delta. Nonetheless, it is not known how long these refuges will persist under conditions of a sustained heat wave."* (Page 11, Paragraph 2).

We agree that smelt did not persist after the July 2013 heat wave except in the ship channel. However, the north Delta's (ship channel) freshwater does not provide the normal summer habitat conditions for smelt. Again, how could the FWS and DFW concur that this action would not likely lead to significant adverse effects?

- *"Delta Smelt have a strong positive association with the position of X2, with more downstream positions providing higher quality habitat (Feyrer et al. 2011). Under the proposed action, it is likely that summer Delta Smelt distributions will not be in areas optimal for growth and survival (Nobriga et al. 2008). In previous low-flow years, when water quality conditions became less tolerable for Delta Smelt in the Cache Slough Complex, the North Delta population appeared to have the capability to move downstream quickly towards the low salinity zone. It is likely, given the strongly tidal nature of the Cache Slough Complex, that Delta Smelt are able to ride these tidal flows and would be capable of quickly escaping unfavorable habitat conditions in the North Delta should they arise. Under the current proposal, X2 would move further upstream, limiting this potential downstream movement, although conditions without the modifications would also limit this potential downstream movement. The proportion of the total population of Delta Smelt utilizing the North Delta in summer appears to be highly variable (e.g. Dr. James Hobbs, UC Davis, unpublished data), but it can be substantial. There is a moderate level of uncertainty about the expected effects in the North Delta."* (Page 11, Paragraph 3).

A reduction in outflow under the Order, combined with the regular opening of the Delta Cross Channel in summer, will reduce the tidal circulation of freshwater inflow from the Sacramento River to the Cache Slough area. This reduction, in conjunction with water diversions in that area, causes negative or upstream net transfer of water, thus reducing the net downstream transport of smelt from the area to the LSZ.

Longfin Smelt

- "The majority of juvenile Longfin Smelt appear to be distributed in the lower Sacramento and San Joaquin rivers, and the confluence of these rivers, with smaller densities distributed in Suisun Bay, the Cache Slough Complex, and in the South Delta (Figure 16)." (Page 12, Paragraph 2)

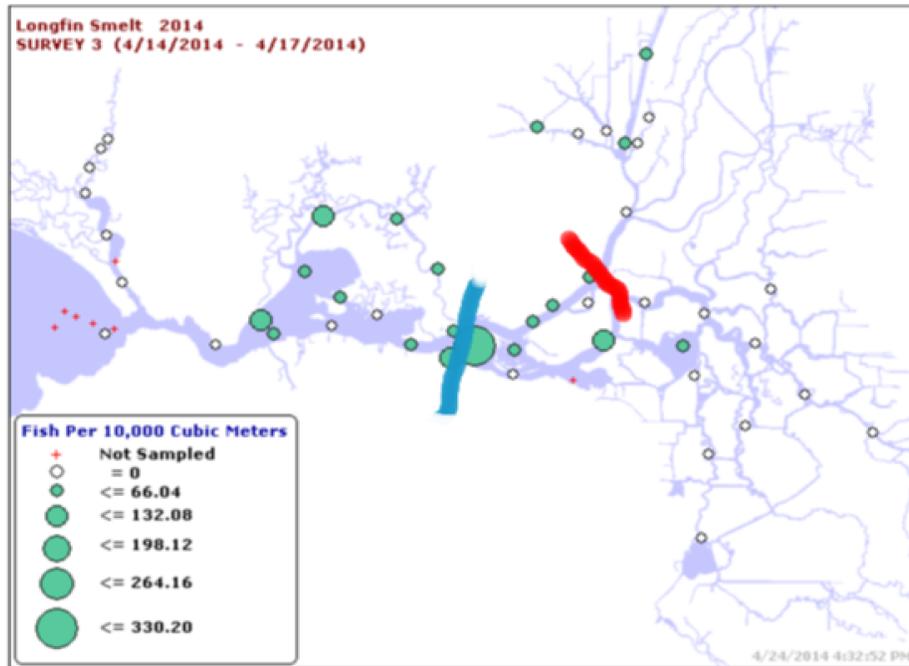


Figure 16, Longfin age-0 distribution from 20 mm survey #3¹⁴

Figure 16 from the Effects Analysis is reproduced above. Note that during the depicted survey, outflow had been high after earlier storms and was about 6,000 cfs. The X2 location was to the west in Suisun Bay (blue line). If the outflow were to be reduced to 3000 cfs this summer, X2 and the concentration of Longfin Smelt would move upstream to Three Mile Slough (red line). The use of this survey data to portray the expected distribution of Longfin Smelt under the Order is inappropriate.

- "Given the limited distribution of larvae and juveniles in the Central and South Delta, the proposed action will likely not substantially affect entrainment risk of the Longfin Smelt population. Additionally, larval Longfin Smelt salvage decreases as water temperatures rise in the spring months, so salvage is likely to continue declining through the action period regardless of operations. Overall, potential increased entrainment effects on Longfin Smelt resulting from the proposed actions will be limited, although a demonstrated positive relationship between Longfin Smelt abundance and winter-spring Delta outflow (Kimmerer

2002; Rosenfeld and Baxter 2007) suggests reduced outflow in April under the proposed action will result in some reduction in overall abundance. The modifications proposed are not likely to result in a substantial degradation of rearing habitat for Longfin Smelt over conditions that would be experienced in a dry year. There is a low level of uncertainty about this conclusion." (Page 13, Paragraph 2)

First, salvage is a poor indicator of risk or effect. Second, movement of X2 upstream, as in Figure 16, is clearly a substantial degradation of Longfin Smelt rearing habitat.

USFWS Concurrence Letter

"Although the proposed departure from D-1641 was not anticipated in the Project Description of the BiOp, or the modeling in the biological assessment, the proposed relaxations, based on the provisions provided in the TUC Order, as amended, and existing hydrologic and biological conditions for June through November appear to be within the range of effects previously analyzed in the 2008 BiOp. The Service, therefore, concurs with Reclamation's determination that the proposed modifications for June through November will have no additional adverse effects on delta smelt or its critical habitat."

This statement simply contradicts the conclusion in the FWS biological opinion that includes the following specific objective for summer rearing of young delta smelt:

"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."

FWS believes their OMR requirements through June will protect smelt, and that they are not found in the Delta in summer and do not need protection from exports; when in fact, with 3000 cfs outflow, most of the Delta Smelt (and Longfin Smelt) will be in the Central Delta and subject to Delta exports (especially enhanced exports from water transfers allowed under the Order). The FWS BiOp does describe the following further goal:

"3. Implementation of the proposed action (i.e., projects operations) is expected to perpetuate the very limited co-occurrence of PCEs at appropriate places and times by: (a) altering hydrologic conditions in a manner that adversely affects the distribution of abiotic factors such as turbidity and contaminants; (b) altering river flows to an extent that increases delta smelt entrainment at Banks and Jones, as well as reduces habitat suitability in the Central and South Delta; and (c) altering the natural pattern of seasonal upstream movement of the LSZ

to an extent that is likely to reduce available habitat for the delta smelt within areas designated as critical habitat.”

The proposed changes in flows will further reduce the smelt populations by increasing risk to exports and reducing habitat quantity and quality.