

Proposed Action Text:

Delta Smelt Summer-Fall Habitat: Reclamation and DWR propose to use structured decision making to identify and use a variety of actions to achieve the environmental and biological goals below, as described further in Appendix C. The Delta Smelt Habitat Action shall take actions to meet these environmental and biological goals in the summer and fall (June through October) of below normal, above normal, and wet water years. The Delta Smelt Habitat Action may improve Delta Smelt habitat while contributing to the recruitment of Delta Smelt, providing enhancement of food supply and expansion of low salinity habitat.

The environmental and biological goals of the Delta Smelt Habitat Action are to: Maintain a 14-day average low salinity habitat of between 0 ppt to 6 ppt in Suisun Marsh and Grizzly Bay based on data from Belden's Landing (or other station(s) and averaging periods, as appropriate) from June to October of below normal, above normal, and wet year years, when water temperatures are suitable; manage the low salinity zone to overlap with turbid water (12 NTU) and available food supplies; establish contiguous low salinity habitat from Cache Slough Complex to the Suisun Marsh; and contribute to the recruitment of Delta Smelt.

The current conceptual model is that Delta Smelt habitat should include low salinity conditions of 0-6 ppt, turbidity of approximately 12 NTU, temperatures below 25°C, food availability, and littoral or open water physical habitats (FLaSH Synthesis, pp. 15-23). The goal of the Delta Smelt Habitat Action is to provide these habitat components in the same geographic area through a range of actions to improve water quality and food supplies.

The actions available to meet this biological goal are Suisun Marsh Salinity Control Gate (SMSCG) operations, flow up to the quantity that would have been required to meet a 2 ppt isohaline at 80 km from the Golden Gate Bridge in above normal and wet water years in September and October, and enhancement actions, to include but not limited to, those included in the Delta Smelt Resiliency Plan to enhance food supply, North Delta food-web project, Sacramento River Deepwater Ship Channel lock reoperation, and Roaring River distribution system reoperation.

In below normal water year types, actions would be focused on non-flow measures, such as operation of the SMSCG from June through October without additional Delta outflow augmentation above that which is necessary to comply with D-1641. In above normal years, Reclamation and DWR propose to operate the SMSCG more extensively from June through October. In above normal years, if necessary and helpful to meet the environmental and biological goals described above, Reclamation and DWR propose to augment Delta outflow up to the flow volume that would have supported a 2 ppt isohaline at 80 kilometers from the Golden Gate Bridge, and the water cost of operating the SMSCG would be subtracted from this volume. In wet years, if necessary and helpful to meet the environmental and biological goals described above, Reclamation and DWR will augment Delta outflow up to the flow volume that would have supported a 2 ppt isohaline at 80 kilometers from the Golden Gate Bridge. If structured decision making metrics show the recruitment of Delta Smelt is good, meeting the environmental and biological goals may not require additional Delta outflow.

Appendix C: Conservation Measure: Delta Smelt Summer-Fall Habitat

Reclamation and DWR shall initiate a program for the management of Delta Smelt summer-fall habitat based on how the long-term operations of the CVP and SWP impact the abiotic and biotic elements of critical habitat. Abiotic elements of habitat include: salinity, water temperature, turbidity, depth, and velocity. The biotic elements are non-flow features like predators and food. The interaction of these abiotic and biotic elements influence the habitat experienced by Delta Smelt along with the physical features. Current scientific understanding suggests that the interactions of these multiple habitat factors are important for the survival and viability of Delta Smelt. The preliminary draft 2017 FLOAT-MAST, p. 2, concluded in regard to Delta Smelt fall habitat that, “Our interpretation is that multiple stressors became important in determining the health of Delta Smelt...” The LTO Delta Smelt summer-fall habitat plan herein (“LTO Delta Smelt Habitat Action”) shall take actions to mitigate adverse impacts of the long-term operation of the CVP and SWP on Delta Smelt habitat in the summer and fall of below normal, above normal and wet water years.

The LTO Delta Smelt Habitat Action includes summer in direct response to recent studies that identified summer as a potential period of concern for Delta Smelt. For example, the Fall Low-Salinity Zone (FLaSH) Synthesis observed at p. 12¹ that, “The reduced size of spawning adults along with reduced fecundity in smaller fish affects egg supply; this was thought to be at least partially associated with warm water temperatures and reduced food in the low salinity zone during the summer.” It was further observed that the favorable conditions in 2011 resulted from a combination of favorable conditions in the prior summer as well as fall. (FLaSH Synthesis, p. 64.) The FLOAT-MAST similarly found summer water temperatures were likely a major factor contributing to the lack of recruitment of Delta Smelt in 2017. (Preliminary draft FLOAT-MAST, p. 101-102.) In response to the current status of Delta Smelt and the desire to implement actions to improve Delta Smelt habitat, the Delta Smelt Resiliency strategy² was adopted in 2016. The LTO Delta Smelt Habitat Action shall facilitate implementation of summer-fall Delta Smelt Resiliency actions in a structured decision-making framework.

The LTO Delta Smelt Habitat Action shall include habitat actions in the summer (June-August and fall (September-October). The LTO Delta Smelt Habitat Action shall include habitat actions in below normal, above-normal, and wet water-year types.

LTO Delta Smelt Habitat Action

Potential Actions include:

Enhancement of Food Supply:

- North Delta Food-web Project
- Sacramento River Deepwater Ship Channel Lock Reoperation
- Roaring River Distribution System Reoperation

¹ Brown, L.R., Baxter, R., Castillo, G., Conrad, L., Culberson, S., Erickson, G., Feyrer, F., Fong, S., Gehrts, K., Grimaldo, L., Herbold, B., Kirsch, J., Mueller-Solger, A., Slater, S., Souza, K., and Van Nieuwenhuyse, E., 2014, Synthesis of studies in the fall low-salinity zone of the San Francisco Estuary, September–December 2011: U.S. Geological Survey Scientific Investigations Report 2014–5041, 136 p., <http://dx.doi.org/10.3133/sir20145041>

² Delta Smelt Resiliency Strategy, July 2016, California Natural Resources Agency.

Expansion of Low Salinity Habitat

- Suisun Marsh Salinity Control Gate Operation
 - Wet Years: May achieve habitat conditions in the summer with uncontrolled hydrology and use the SMSCG in the fall through October. In warmer wet years, the SMSCG could be operated in the summer to support habitat conditions.
 - Above Normal Years: Operate the SMSCG more extensively throughout the season (through October).
 - Below Normal: Operate the SMSCG during the summer only.
- Outflow Augmentation for up to 80 km Fall X2: Delta outflow augmentation could be used in Above Normal or Wet years up to the flow volume that would have supported a 2 ppt isohaline position of 80 km in September and October, if necessary.
 - Wet Years: Natural hydrology would likely maintain salinity more westward than 80 km. Additional outflow may prolong low saline periods and contribute to meeting goals if it provides for overlapping of low salinity, water temperature, turbidity and food supplies.
 - Above Normal: Maintain and prolong the low salinity periods. Additional water used to continue to meet D-1641 while operating the SMSCG would be subtracted from the Delta outflow augmentation flow volume.

Through the LTO Delta Smelt Habitat Action, the CVP-SWP may investigate areas where lower water temperatures already exist and can investigate actions that can create temperature refuges or provide greater access for Delta Smelt to existing temperature refuges. The LTO Delta Smelt Habitat Action will also seek to overlay low salinity habitat where there is pre-existing turbidity and temperatures within acceptable ranges.

Implementation of LTO Delta Smelt Habitat Action

The LTO Delta Smelt Habitat Action shall use a scientific approach of hypothesis identification, testing, and synthesis using a Structured Decision-Making framework to support the evaluation of summer-fall habitat actions.

The Delta Coordination Group will utilize one of the existing structured decision-making models, or adopt a new model, to analyze proposed summer-fall habitat actions. Reclamation, DWR and the USFWS shall develop a science and monitoring plan through the Delta Coordination Group. The Delta Coordination Group is comprised of the 5 state and federal water and fish agencies, as well as representatives from state and federal water contractors. The Delta Coordination Group will provide the results of the structured decision making regarding a summer-fall Action to Reclamation, and DWR by March 31. The agencies may use the IEP or CSAMP (or similar entity) to review project design and the science and monitoring plan. The process for LTO Delta Smelt Habitat Action development and approval is as follows:

- January: Reclamation and DWR will provide a synthesis of potential updates to the Science and Monitoring Plan annually based on the available data and analysis from prior years.
- March: The Delta Coordination Group will provide an initial proposal accounting for varying forecasted hydrology and temperatures. The water year designation is not fully known until approximately May 1. However, planning for a summer-fall action requires

several weeks. The proposal will include the hypotheses to be tested, the suite of actions and operations to test the hypotheses, potential off-ramps, and expected outcomes.

- April: Reclamation and DWR will select an Action and refine the experimental design and monitoring plan, as needed. The preliminary Action shall be selected and fully described by April 30.
- May: FWS will confirm that the effects of the action are within what was analyzed for the BO.

Analysis for the Biological Opinion

The analysis for the LTO Delta Smelt Habitat Action would be focused on the potential habitat created under a range of likely actions that may be considered such as CVP-SWP operations under D-1641, Delta Smelt Resiliency Plan, the operation of the Suisun Marsh Salinity Gates and Delta outflow augmentation. The analysis would be completed for the June-October period. The analysis would provide examples of the types of habitat outcomes that likely summer-fall delta smelt habitat actions could achieve. These example actions were chosen because they can be defined with sufficient specificity for modeling purposes based on the recent scientific studies and can bookend the potential effects of these likely actions. Actual implementation of these actions may require less operation of the SMSCG or less outflow to achieve sufficient Delta Smelt habitat conditions. The scenarios do not capture all possible experiments. The analysis can use existing modeling, or be based on the existing modeling, of scenarios such as:

June through October 2017:

- i. Historic conditions
- ii. D-1641 flows
- iii. Fall X2 action
- iv. SMSCG Operations
- v. Combination of SMSCG operations and flow augmentation

Analyze the following habitat attributes (spatially and temporally):

- a. Low salinity habitat volume/area (UNTRIM)
- b. Turbidity (UNTRIM)
- c. Temperature (UNTRIM)
- d. Hydrodynamics-based station index (UNTRIM)
- e. Zooplankton