

# Report: Actions to protect fish in California Bay-Delta 'scientifically justified'

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Most of the actions proposed by two federal agencies to reduce water diversions in the California Bay-Delta in order to protect endangered and threatened fish species are "scientifically justified," but the basis for the specific environmental triggers that would indicate when water diversions should be reduced is less well-supported by scientific analyses, says a new report from the National Research Council that was requested by Congress and the U.S. Department of the Interior.

The California Bay-Delta region receives its fresh water from the Sacramento and San Joaquin rivers and their tributaries, and the delta's water ultimately flows into the San Francisco Bay and the Pacific Ocean. Tidal mixing from the Pacific Ocean also occurs, resulting in a brackish water ecosystem in many regions of the delta. In addition, pumping stations divert water from the delta, primarily for Central Valley agriculture and southern California metropolitan areas. The effects of an increasing population and the operation of the engineered water-control system have substantially altered the delta ecosystem, including its [fish species](#).

In 2008 and 2009 respectively, the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) issued biological opinions under the [Endangered Species Act](#) that contained "Reasonable and Prudent Alternatives" requiring actions to reduce the adverse effects of water diversions on delta smelt, Chinook salmon, Central Valley steelhead, and green sturgeon. Those actions included restrictions in diverting water during certain periods, depending on environmental

conditions. Congress and the Interior Department asked the Research Council to provide a scientific evaluation of the actions in the biological opinions.

For its study, the committee that wrote the report reviewed an action in the FWS alternative to protect delta smelt by limiting how much water is pumped from the delta to reduce reverse flows in the Old and Middle rivers, two branches of the San Joaquin River. The committee concluded that in winter, high reverse river flows from high levels of pumping probably adversely affect smelt. Therefore, reducing the high reverse flows to decrease mortality of smelt is scientifically justified. However, the data do not permit confident identification of when to limit reverse flows of the rivers or a confident assessment of the benefits fish receive by reducing reverse flows, the committee found. As a result, the implementation of this action needs to be accompanied by careful monitoring, adaptive management, and additional analyses.

How the action in the FWS alternative to manage the contour line of 2 parts per thousand salinity, called X2, is beneficial to smelt needs further clarification, the committee said. The action is intended to increase outflows of water during the fall by maintaining the average position of X2 no farther upstream (east) of the Golden Gate Bridge than 74 kilometers in wet years and 81 kilometers in moderately wet years. The FWS's argument for the action is that the average position of X2 is an indicator of suitable and available habitat for delta smelt. Preventing X2 from moving farther east on average requires the use of additional freshwater releases from reservoirs under some conditions.

The action is conceptually sound to the degree that the amount of habitat available for smelt limits their abundance, but the derivation of the details lacks rigor, the committee said. The committee emphasized that the adaptive management requirements in the action should be implemented in light of the uncertainty about the biological

effectiveness of the action and its possibly high water requirements.

In addition, the FWS requirement for creation or restoration of 8,000 acres of intertidal and subtidal habitat in the delta is weakly justified, because the relationship between tidal habitats and food availability for smelt is poorly understood. Because the details of implementation are not fully justified in the biological opinion, the committee recommended that this action be carried out in phases, with the first to include developing an implementation and adaptive management plan. The committee also recommended considering the sustainability of the resulting habitats.

Regarding the NMFS biological opinion, which applies to the Chinook salmon, steelhead, and green sturgeon in the delta and farther upstream, the committee concluded that on balance the actions are scientifically justified. However, as with the FWS opinion, specific environmental triggers, thresholds, and flows should receive additional evaluation that is integrated with the analyses of similar actions for delta smelt. In particular, the NMFS alternative contains an action similar to the FWS action to limit pumping in order to reduce high reverse flows in the Old and Middle rivers, and the committee likewise judged that high reverse river flows probably adversely affect the fish, but that the scientific support for specific flow targets is less certain. The committee also found it difficult to ascertain the extent to which the collective watershed and tributary actions will appreciably reduce risks to the fishes within the watershed or throughout the entire river system and recommended a quantitative framework be created to assess survival.

The committee also considered whether any additional actions not included in the biological opinions might have the potential to provide equal or greater protection for the fishes than the current requirements, while costing less in terms of water availability for other uses. The committee found none that had received sufficient documentation or

evaluation to be confident that any action had the potential to meet this objective, but will consider alternatives in more detail in its second report.

Adverse effects of all other stressors on the listed fish -- such as contaminants in the delta and structures on rivers that block fishes from access to their spawning habitat -- are potentially large, concluded the committee, which was asked to consider the effects of other stressors if time allowed. The limited timeframe to complete the first report did not permit full exploration of the issue, but the committee will review it more thoroughly in its second report, scheduled to be released next year.

Moreover, the committee found that its evaluations and the agencies' evaluations were hampered by the lack of an integrated analysis that took all aspects of the fishes' life cycles into account, considered the effects of all the actions and fish species together, and included clear and well-documented considerations of the water needed to implement the actions. However, such an analysis likely goes beyond the agencies' legal obligations under the Endangered Species Act.

Provided by National Academy of Sciences

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