



San Francisco
Estuary & Watershed Science:
Case Study



We Can Do Better: Longfin Smelt and a Case Study in Collaborative Science

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*Dedicated to
Mike Taugher,
an extraordinary
colleague and
friend.*

There should be no question that flows into, through, and out of California's Delta are biologically important. Equally true is that water is a limited resource. Competing demands for Delta water include flows for native fish, water supply for farms and cities, and cold water held back in large reservoirs to cool salmon streams.

With the Delta Reform Act of 2009, the California Legislature established as overarching state policy the co-equal goals of a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. Since water is limited, there are inevitable trade-offs. This is where science and policy intersect.

For too long, this tension has been handled one species at a time, one crisis at a time, and usually in court. This has fostered "combat science," where regulatory agencies, water contractors, and environmental advocates line up their own hypotheses, studies, and conclusions like artillery in the courtroom. It has fed distrust and stymied collaboration. This is a failed approach.

A growing number of species dependent on the Delta are listed pursuant to the federal or state endangered species acts. Absent a change in how we manage the Delta, there is no evidence to suggest the situation will improve. We can do better. We must do better.

The Bay Delta Conservation Plan (BDCP) (<http://baydeltaconservationplan.com/PlanningProcess/BDCP/BDCPPProcess.aspx>) takes a more comprehensive approach than the single-species management that has developed pursuant to Section 7 of the U.S. Endangered Species Act. In addition to providing a higher standard of protection for listed species, the plan proposes to develop a more robust and collaborative science program that engages the same parties who historically have met in court to resolve disputes. Of course, this plan is not yet final. More environmental review and public input is scheduled, and ultimately our two departments have different roles: the California Department of Water Resources will propose a plan and the California

Department of Fish and Wildlife (CDFW) will review and consider permitting such a plan. Yet, a commitment to a more robust and collaborative science program is also emerging between many of the long-term litigants and between several state and federal agencies involved in the Delta.

All of these positive developments involve a fundamental shift in the way water agencies and regulators interact. We seek a framework where science and policy can meet that has real buy-in from all parties. Disparate sides would develop and implement a consensus approach to identify areas of disagreement. It is essential that we all collectively understand the specific questions that need to be answered, and test them using hypotheses to generate results that all parties can understand. Different sides may have different policy overlays, but the science will be the science.

Longfin smelt offer a good case study for illustrating how we could deal with scientific uncertainty in a logical and collaborative way. The longfin smelt population has declined in abundance by about 95% from the 1967 to 1983 period, according to data from CDFW's Fall Midwater Trawl Survey. This species is listed as threatened under the California Endangered Species Act. The U.S. Fish and Wildlife Service made a determination that its listing is warranted, and there is no debate that the current status of the species is unacceptable.

As with other fish species in the Delta, the decline of longfin smelt is not easily explained, and recipes for recovery are not easy to write. Nevertheless, most, if not all, of the formerly court-room-warring parties understand we must help conserve longfin smelt. Indeed, to be successful, the BDCP must actually achieve that higher standard.

Here is where science enters. We know some important things, and we don't know other important things. For example, there is a positive correlation between winter-spring outflow and the abundance of longfin smelt observed in the subsequent fall season. Emerging hypotheses suggest that spring outflow drives this relationship, but the underlying mechanisms that support an increase in longfin smelt numbers are not as well understood as we would like. It may be that other changes in longfin smelt habitat, such as increased and improved rearing areas, increased food availability, and reduced entrainment, may contribute to longfin abundance. Other hypotheses posit that an increased population response that results from restored habitat or reduced entrainment may mean that spring outflow would be less influential. All of us would benefit from further scientific work to answer these questions and explain these relationships.

Given the positive correlation between spring outflow and longfin smelt abundance, the BDCP proposes to increase spring outflow in the wetter 50% of years. Such an increase in outflow would come at the expense of water supplies available to the State Water Project and the Central Valley Project. Though the water projects represent only a portion of the diversions made from the Delta watershed, the water users operating them are subject to and participating in the BDCP.

The BDCP posits that whatever additional benefits that longfin smelt may receive through additional flows also may be obtained through habitat restoration and reduction of other stressors. Less than 3% of the Delta's original tidal marsh remains, and there is evidence from the interdisciplinary Breach III studies is that habitat restoration would improve the food supply locally, thereby potentially benefiting pelagic fish.

Now, stakeholders may disagree about how much outflow is needed or will be needed or if restoration can adequately replace outflow. But, there is no debate that a scientific question exists. The scientific question, then, becomes: Can improvements in food production generated through habitat restoration and the reduction of other stressors have a sufficiently beneficial effect, so that lower spring outflows are necessary to achieve long-term conservation of the Delta's longfin smelt species? A primary focus of the BDCP's science component will be to test this hypothesis and address the uncertainty concerning the role of tidal habitat restoration in improving foodweb support in the Delta for pelagic fish, such as the longfin smelt.

Considering the process required, how do we evaluate this question so that interested and relevant parties are involved in formulating the study—and trust the resulting science and subsequent decisions based on that science? Common sense dictates that we seek a way to reduce uncertainty. There has to be a better way than arguing about science while species continue to decline and water supply reliability is jeopardized.

This better way starts with applying state-of-the-art scientific approaches, models, and tools. The BDCP sets forth a three-step "decision tree" process to help resolve the disagreement over whether the recovery of longfin smelt requires higher spring flows. A decision tree is nothing new: In simplest terms, it is a chart that maps successive decision points over time. Any of the emerging nodes of collaborative science could use a decision tree as an analytical tool to help identify the best means to achieve a goal, whether in the Interagency Ecological Program or the Delta Science Plan.

Here are the three steps proposed in the BDCP. First, the scientific hypotheses to be tested will be clearly described, along with the underlying assumptions. Second, a science plan will be developed and implemented to collect and synthesize the data needed to test the hypotheses. The science plan would be integrated, as appropriate, with the comprehensive monitoring framework developed under the Second Draft Delta Science Plan (DSP 2013). Development of the science plan would include stakeholder input, integration with other ongoing scientific research, and independent scientific review. Third, this science would be done over a defined time period. If the BDCP is permitted, the federal and state fisheries agencies would determine operating rules for the state and federal water projects based on our current understanding.

Since it would take at least 10 years to build the new Sacramento River intakes and tunnels proposed in the plan, the plan also proposes to use this decision tree process in the interim to test the hypotheses. Depending on the results, the operating rules set in place now might change in the future within the time frames analyzed in the decision

tree. Those rules would mandate flows sufficient to meet the biological objectives for longfin smelt in light of and in combination with the other components of the BDCP, including restoration, reduced entrainment, and other changes in the Delta.

Whatever the initial operating rules become, they would not necessarily be static. Once a flow regime has been determined based upon the best available science at the time and the operation of a new water conveyance system begins, the decision tree process would end, and the adaptive management process, supported by ongoing monitoring and research, would continue. This decision tree process would function as a focused component of the larger adaptive management framework needed to ensure that the BDCP succeeds.

The BDCP's adaptive management framework was shaped by independent science advisors and closely mirrors that of the Delta Plan (DSC 2013). As currently proposed, the Adaptive Management Team would include representatives from the California Department of Water Resources, U.S. Bureau of Reclamation, California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and the National Marine Fisheries Service, as well as the Interagency Ecological Program Lead Scientist, the Delta Science Program Lead Scientist or designee (as an advisory non-voting member), the State and Federal Water Contractor Agency Science Manager, and the Director of the National Oceanic and Atmospheric Administration's Southwest Fisheries Science Center. It would operate by consensus. If consensus could not be reached, decisions would be elevated for resolution by two separate entities—the Authorized Entity Group (its members represent water project agencies) and the Permit Oversight Group (its members work for state and federal fish and wildlife agencies).

Here is where trust comes in to play—significantly. Success in the long run will require transparency, fairness, and objectivity in science and decision-making. We know that many may not trust such a process, based on their individual experiences with each other in the past on these tough issues. As the BDCP and its environmental documents go out for public review, we anticipate receiving further input on how we can best ensure a collaborative, adaptive management program that meets the trust test.

This collaborative approach is already underway. In April 2013, federal judge Lawrence J. O'Neill granted the agencies time to conduct the Collaborative Science and Adaptive Management Program. The judge gave the U.S. Fish and Wildlife Service, Bureau of Reclamation, CDWR, and NOAA Fisheries a year to establish a diverse, skilled team to formulate a new approach to develop a science program that will test and evaluate alternative operational strategies and other management actions to improve water project performance for both ecological and water supply needs. That group—the Collaborative Adaptive Management Team—is meeting to develop this program. Representatives from water agencies and environmental groups have joined representatives from federal and state fish and wildlife agencies and water project operators to form this new team. Members have the education, training, or expertise that enables them to develop and evaluate hypotheses about water project operations

and native fish populations that will be tested to provide the basis for new biological opinions for existing water project operations. This process is designed to test the kind of scientific research needed on a larger, longer scale for the BDCP.

In all, we will learn by doing, and evaluate our progress in a structured way. We will measure success by assessing how well stakeholders are meaningfully engaged and committed to the process; by generating science that all agree is sound; by making progress toward achieving the biological objectives; and, by determining how well results from the science research are used to adjust and improve management decisions. If we can achieve these measures of success, we may be able to avoid the courts and use our best available science to give ourselves a firmer footing for balancing and managing the Delta's co-equal goals.

REFERENCES

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