

IEP Lead Scientist's Report

Summary: The Interagency Ecological Program (IEP) has completed a progress report containing the 2010 Pelagic Organism Decline (POD) Work Plan and Synthesis of Results (2010 IEP POD Report). The report tells the POD story from three different perspectives presented in “conceptual models” linking the POD species with environmental drivers (stressors). Conclusions are that the POD was caused by multiple and often interacting drivers, that the effects of drivers differed among the four POD species, and that the POD may represent a rapid ecosystem “regime shift” that followed a longer-term erosion of ecological resilience. These results can inform management strategies ranging from individual species to ecosystem management.

2010 IEP POD Report

Abundance indices for four pelagic fishes in the Delta and Suisun Bay rapidly declined to record low levels starting in 2002. These fishes include native delta smelt (listed under state and federal Endangered Species Acts) and longfin smelt (listed under the California Endangered Species Act in 2010) as well as introduced threadfin shad and juvenile (age-0) striped bass. Three of these species have also experienced more gradual long-term declines, but the recent rapid collapse of all four species to persistently low levels was unexpected given the relatively moderate hydrological conditions in the first half of this decade. In 2005, the IEP formed a Pelagic Organism Decline Management Team (POD-MT) to evaluate the potential causes of the declines.

The 2010 POD report summarizes information collected by the POD investigation through approximately August 2010, presents the current POD work plan, and provides a basis for future syntheses and work plans. This progress report is a team effort by members of the IEP POD-MT. It has been reviewed by the IEP Agency Coordinators, but has not undergone any external, independent peer review. We intend to publish a fully peer reviewed, final POD synthesis report in 2012-13.

The POD-MT has developed several conceptual models to guide POD work plan development and synthesize results. Conceptual models help tell the “POD story” from different perspectives. The 2010 POD report contains three conceptual models.

1. The “basic POD conceptual model” was introduced in 2006 and groups the effects of potential drivers of the POD into four categories (*previous abundance, habitat, top-down effects, and bottom-up effects*). The emerging conclusion is that the POD was caused by multiple and often interacting drivers.
2. “Species-specific conceptual models” were introduced in 2008. They show how the major drivers differ for each of the four POD fish species, and how they differ in relative importance during different life history stages or seasons. The results can inform management actions for individual POD species.

3. A new conceptual model posits that the POD represents a rapid ecological “regime shift” that followed a longer-term erosion of ecological resilience. We present this conceptual model as a working hypothesis for future investigations. The POD regime shift story may inform management strategies aimed at shifting the ecosystem into a more desirable state and improving long-term ecosystem resilience.

For more information about the IEP, see <http://www.water.ca.gov/iep/>
For more information about the POD investigations, see http://www.science.calwater.ca.gov/pod/pod_index.html

The IEP and Science and Adaptive Management in the Delta Plan

The IEP, through its Lead Scientist, is closely collaborating with the Delta Science Program on the development of the science and adaptive management component for the Delta Plan. This collaboration will help draw from lessons learned through 40 years of cooperative, interagency monitoring and research conducted by the IEP in the San Francisco Estuary as well as from the recent POD investigations. One lesson is the importance of sustained research, analysis, and synthesis efforts along with long-term monitoring of environmental drivers and biological communities. Other lessons derive from the results of the POD investigation summarized in the 2010 POD report. The POD conceptual models offer insights into potential adaptive management strategies aimed at multiple drivers and their effects on specific species, communities, and the whole ecosystem.

An important new idea in the 2010 POD report is that a slow loss of ecological resilience can result in an abrupt, surprising change such as the POD. Ecological resilience is the capacity of an ecosystem to recover from a disturbance and essentially look and function the same as before the disturbance. This does not mean that a resilient ecosystem does not change, but that it slowly adapts to new conditions and largely continues to look and function as before rather than going through a rapid, catastrophic shift to a new and very different system. A resilient ecosystem has options to adapt to change – it has “adaptive capacity.” At the ecosystem level, an important goal of adaptive management is to maintain ecological resilience and improve adaptive capacity. This is particularly important in the face of potentially large future changes associated with climate change and with meeting the needs of a continually growing human population in California.

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