Biological Goals and Objectives for the Bay Delta Conservation Plan: Balancing Theoretical, Practical, and Institutional Factors

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Biological goals and objectives are the principal metric by which a habitat conservation plan can demonstrate its progress in conserving protected species. Biological goals represent desired species- or population-level outcomes such as increased abundance, while the biological objectives represent quantitative metrics such as a population index or average growth measure. Despite their theoretical simplicity, the challenge in designing biological objectives comes in establishing quantitative metrics that are scientifically valid, practical and feasible to implement (e.g., cost-effective and minimize harm to the sampled species), responsive to the predicted effects of the conservation actions, and sensitive to the concerns of the many stakeholders. We review potential solutions to this conundrum for the 11 species of fish covered in the Bay-Delta Conservation Plan, illustrating how the process uses existing data and input from multiple stakeholders to craft suitable metrics.

Keywords: goals, objectives, policy, endangered, BDCP

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Tastes Great, Less Filling: Delta Smelt in a Pelagic Food Web, Past, Present, and Future

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There are multiple lines of evidence that delta smelt *Hypomesus transpacificus* growth rate is food limited. Similar evidence for food limitation of growth rate has also been reported for zooplankton, overbite clam, largemouth bass, Chinook salmon, and other fishes that use the estuary's low-salinity zone as a rearing habitat. Thus, food limitation seems to be a ubiquitous feature of life in the Bay-Delta that of itself, does not explain ecological success or failure. Rather, for a particular species, the ecological outcome of food limitation depends on its severity and context. For delta smelt, food limitation is occurring in a system that (1) is near the species' thermal tolerance limits for up to several months each year, and (2) has shown other signs of habitat degradation. Nonetheless, food limitation is an issue that should be addressed as part of a comprehensive conservation plan for delta smelt. To do so, we must learn how to improve delta smelt's feeding environment, and then take actions that maximally enhance its supporting food web. This presentation will review the current scientific understanding of what limits fish production in the Bay-Delta and explore the likelihood that several proposed actions will improve the food web that supports delta smelt.

Keywords: delta smelt, *Hypomesus transpacificus*, food limitation, zooplankton

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Department of Fish and Game Perspectives on Adaptive Management in achieving the goals and objectives of the Bay Delta Conservation Plan

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Role of Adaptive Management: Addressing uncertainty, building understanding, and improving management to assure restoration of a healthy ecosystem and species conservation that can provide water supply reliability as part of the Co-equal goals.

The Department and associated Federal Fish and Wildlife Agencies have a long history of recognizing the importance of adaptive management in providing for the effective conservation of natural communities and associated species. The Natural Community Conservation Planning Act specifically requires inclusion of an adaptive management plan for a Natural Community Conservation Plan (NCCP) approved by the Department. Effective adaptive management is dependent on having clear and measurable goals and objectives. Additionally a clear and transparent process for evaluating and synthesizing new information developed through monitoring and research and for making management decisions is required. This process needs to incorporate the use of conceptual models which summarize our current state of knowledge about the communities, processes, stressors, and species being managed and conserved under an approved plan.

The Department and partners through the Ecosystem Restoration Program, (formerly CALFED), have developed the DRERIP conceptual models for evaluating proposed actions to identify how they should be pursued based on the certainty of the science supporting the action in addressing a stressor(s) affecting the ecosystem and the potential magnitude of effect it will have on that stressor(s). These models allow for the development of hypotheses to be tested as part of implementing an action or through research to improve our level of understanding and guide future decision making about plan implementation. These models coupled with the Logic Chain process serve to provide a framework for adaptive management decision making.

This presentation will review examples of adaptive management processes, both NCCP's and other plans, which can guide development and implementation of the adaptive management process for the Bay Delta Conservation Plan.

Keywords: Adaptive management, conceptual models, BDCP, Fish and Game, logic chain

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DWR Perspective on Collaborative Science Process for BDCP Implementation and Adaptive Management Program

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The BDCP will require a collaborative effort to advance science to meet ecological goals. While DWR is the primary applicant for the BDCP and has taken an active role in developing the conservation strategy, many other entities will need to engage in the development of information to address uncertainties, improve results, and correct our path during implementation. As part of the implementation of BDCP, the adaptive management program and collaborative science process provide opportunities for federal, state, academic and other partners to work together in the Delta to solve our collective ecological problems. In this presentation, DWR will explore potential partnership and approaches for collaborative science and how it can benefit all Delta interests in BDCP implementation. Additionally, this presentation will highlight some of the work already progressing towards better collaboration.

Keywords: collaborative science, adaptive management, BDCP

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