

Adaptive Management Narrative

One of the three objectives of the Dutch Slough Project is to implement it within an adaptive management framework. In 2003, an Adaptive Management Working Group was convened, and the Dutch Slough Adaptive Management Plan (attached), which closely follows the three-phase and nine-step adaptive management framework described in Delta Plan documents, was released in 2008. A brief summary of the Dutch Slough Adaptive Management Plan's goal, objectives, purpose, strategic focus, and approach are as follows:

Goal

The goal of the Dutch Slough Adaptive Management Plan (DSAMP) is to generate scientific information that can be used to guide future tidal marsh restoration projects elsewhere in the Delta. The DSAMP focuses on generating information regarding native fish and water quality, but the DSAMP is only one component of the larger Dutch Slough restoration project. The Dutch Slough project is also designed to provide numerous ecological benefits as well as provide public access to the Delta shoreline.

Objectives

- Generate information that will guide the design and effectiveness of future wetland restoration projects in the Delta.
- Generate information regarding the ecological function of different elevations and sizes of freshwater tidal marsh habitats and their value to native fish species, particularly Sacramento splittail and juvenile salmon.
- Generate information regarding the processes that control the production and dispersal of both methylmercury and dissolved organic carbon in different types of wetlands.
- Provide the opportunity to establish field scale research projects at Dutch Slough to measure ecological processes and test the efficacy of management interventions for a variety of reasons including exotic species control, avian habitat enhancement, wetland species restoration, control of mercury methylation and subsidence reversal.

Purpose of Plan

The purpose of this plan is to document the process used to design the Dutch Slough Adaptive Management Restoration Project and to provide a framework for future monitoring and design of the project. This plan should not be viewed as a rigid prescription, but rather should be viewed as a framework for future monitoring and design. The plan should evolve and grow in detail as information is generated or new opportunities arise.

Strategic Focus

The DSAMP strategically focuses on the effects of various types of tidal marsh on water quality parameters and native fish growth and survival. Specifically, the plan focuses on the role of tidal marsh elevation and size in growth and survival of juvenile Chinook salmon and Sacramento splittail as well as the production of methylmercury and dissolved organic carbon. Despite this focus, the Dutch Slough project will be designed

and managed to facilitate research on other subjects such as subsidence reversal, marsh plain evolution, and wildlife habitat relationships.

Approach

The Dutch Slough management team worked with a group of scientists to design largescale project features to test specific hypotheses regarding fish and water quality responses to different tidal wetland types. The scientists also identified a number of smaller scale features that could be incorporated into the project to evaluate environmental factors that influence subsidence reversal, avian habitat, invasive species, and production of methylmercury and dissolved organic carbon.

The DSAMP is primarily designed to generate information that can guide the design of future restoration projects elsewhere in the Delta. The plan does not anticipate reconstruction of the project to maximize fishery benefits or other ecological values if the original project does not perform optimally. In many cases, adaptive management implies that a management or restoration treatment will be iteratively revised based on monitoring data to maximize benefits. Restoration at Dutch Slough, however, involves millions of dollars of earthmoving to create tidal wetlands. This plan assumes that the financial costs and permitting challenges associated with regrading or reconstructing a restored tidal wetland would be prohibitive. The plan does, however, provide for smaller changes in management practices to improve the ecological performance of the project over time. For example, the plan anticipates testing and refining management techniques for controlling invasive plant species.

The Adaptive Management Working Group was comprised of a group of scientific experts with experience in ecology, biology, botany, hydrology, restoration, wetlands, and invasive plants:

Bruce Herbold, Ph.D., US EPA (Chair)
Peter Baye, Ph.D., Private Consultant
Joan Florsheim, Ph.D., UC Davis
Roger Fujii, Ph.D., USGS
David Sedlak, Ph.D., UC Berkeley
Stuart Siegel, Ph.D., Private Consultant
Mark Stacey, Ph.D., UC Berkeley
John Takekawa, Ph.D., USGS
Lars Anderson, Ph.D., USDA

The Working Group consulted with other scientific experts on an as-needed basis.

2014-15 Update of 2008 DSAMP

Since completion of the DSAMP in 2008, the project design has undergone significant changes, so the adaptive management experiments must be adjusted to fit with the new design. Successful implementation of the DSAMP requires that it be updated to fit with the applicable design changes, and that monitoring methods be described. For instance, one of the primary assumptions of the DSAMP was that all three project parcels would be breached at the same time, allowing for contemporaneous replicates of the adaptive management experiments. However, due to significant implementation hurdles (especially funding), the Project will now be implemented one parcel at a time, so this aspect of the DSAMP requires updating. The Technical Advisory Team for the project has also refined the assumptions and hypotheses for the project. In

addition, several other restoration projects have developed since the DSAMP was completed and it is important to evaluate how other projects may interact with and help to further Dutch Slough's adaptive management efforts by providing areas of comparison. Thus, Dutch Slough will be incorporated into the evolving landscape of restoration sites.

Dr. Bruce Herbold, who chaired the original AMWG, was hired in Oct 2014 to update the DSAMP based on the current design, hypotheses, recent research, and implementation schedule for the Project. Dr. Herbold is also currently working with the California Department of Fish and Wildlife to develop a broad monitoring framework for tidal wetland restoration in the Delta. As part of that work a Tidal Wetland Monitoring Project Work Team (PWT) was formed within the Interagency Ecological Program. The PWT expects to have a first report done by December 2014. The update of the DSAMP is an opportunity to apply the developing fruits of that monitoring framework to the specific conditions on Dutch Slough. This is exactly appropriate for the Dutch Slough Project, as the knowledge gained at Dutch Slough was always meant to be applied to and benefit subsequent projects in the Delta, rather than within the project site itself.

The primary objective of the plan will remain the same, which is to generate information regarding the ecological function of different elevations and sizes of freshwater tidal marsh habitats and their value to native fish species.

The team assembled to assist Dr. Herbold will utilize updated conceptual models and recent research, reconsider management questions, and contact regulatory and agency staff to assess which questions are most important to address. The team will assess the questions addressed in the original plan and their pertinence to current issues. In particular, the role of exported primary productivity to adjacent areas and to the low salinity zone will be addressed.

Dr. Herbold was very active in the development of the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP) conceptual models. Those models summarized all current relevant science and several were published in an online journal. Applicable DRERIP models will be used in the DSAMP update. In addition, the PWT has used new research to develop a suite of new conceptual models to update the tidal wetlands DRERIP models. The new models also draw much of their structure and information from the upcoming MAST model which should be released imminently. This DSAMP update will draw primarily from those models and the monitoring framework that the PWT is currently developing.

Dr. Herbold will also outline a monitoring plan for implementing the Adaptive Management Plan. Work on this update is expected to be completed in the spring of 2015.

Funding for adaptive management will come from DWR and its funding partners, Department of Fish and Wildlife and State Coastal Conservancy, as funding is available. All three agencies are committed to achieving the stated goals and objectives of the Project, including those of adaptive management.