

October 31, 2005

TO: Project Management Team, Science Team, and National Science Panel
FROM: Lynne Trulio, Lead Scientist
RE: **Initiating Adaptive Management Studies at the Island Ponds**

Data collection to characterize initial physical changes at the Island Ponds and to support the NOAA proposal to develop a landscape scale modeling for ecological forecasting

This memo proposes an approach to begin adaptive management studies at the Island Ponds. It is based input from a number of PMT and Science Team members, but is not a final document. Further input from the Science Team and National Science Panel is expected.

Introduction

The Science Team, the Project Management Team (PMT), and the National Science Panel have recognized the importance of the Island Ponds as an opportunity to begin implementation of adaptive management studies during the initial planning phase of the project. Adaptive management studies will allow the project to address scientific uncertainties associated with the restoration effort and will be incorporated into the overall adaptive management program for the Project.

The three Island Ponds, A19, 20, and 21, are in the Alviso Complex of the South Bay Salt Pond Restoration Project. They are bounded by Coyote and Mud Sloughs and are relatively near Artesian Slough, the outfall for the San Jose POTW. They are inaccessible to the public. The three ponds total 485 acres, divided up as follows: A19 = 276 ac, A20 = 67 ac, and A21 = 142 ac. The restoration of the Island Ponds is part of the Initial Stewardship Plan of the South Bay Salt Ponds Restoration Project effort. The ISP was developed in 2003, and the EIS/EIR was finalized in early 2004. Lead agencies for this EIS/EIR are US Fish and Wildlife Service (USFWS) and California Department of Fish and Game. Island Pond restoration work has received all necessary permits under the ISP. Implementation is a joint initiative by USFWS and Santa Clara Valley Water District (SCVWD). The two agencies are collaborating on this effort to fulfill mitigation compensatory mitigation requirements for impacts to tidal wetland habitat, as follows: USFWS, 9 acres; and SCVWD, 66 acres. Since the total acreage to be restored is an estimated at 485 acres, this is substantially more than the acreage required to fulfill both agencies' mitigation requirements. SCVWD is funding detailed design and construction. Breaching the Island Ponds to begin restoration is expected in March 2006.

At present, the South Bay Salt Pond Restoration Project has about \$100,000 for Island Pond adaptive management studies. The PMT would like to use this money in the most efficient way possible to supplement baseline data, study the immediate effects of breaching and support the development of a landscape scale model for integrating data to predict ecosystem response. Because there will be immediate physical changes in response to Island Pond breaching, important restoration uncertainties to study include sediment flux, sediment accretion/erosion, water quality effects, and changes to plant species composition (including invasive plant species colonization). These issues are the focus of this RFP.

The sediment study is designed to provide specific information on how breaching three ponds affects the elevation of local tidal flats. These data will be compiled with sediment flux data and data on changes in pond elevation to develop a local sediment budget. The study

proposed here will go beyond baseline characterization to collect data on pond and tidal flat elevation changes in the first year after breaching. The vegetation study is designed to assess whether breaching three ponds causes changes to native vegetation, which is important habitat to South Bay species. The water quality study focuses only on collecting baseline data on dissolved oxygen and salinity conditions in Coyote Slough, the Bay and the ponds. These two parameters are key indicators of aquatic habitat quality and are likely to be significantly affected by the breaching.

In addition, collecting data on sedimentation, water quality and vegetation change at the Island Ponds will be directly useful in landscape scale model development. A team of modelers and physical process experts have written a proposal for NOAA to initiate development of a landscape scale model for the South Bay that would be used for ecological prediction. The PIs for this team are Mark Stacey, UC Berkeley, Jessica Lacy, USGS, Ed Gross, consultant, John Callaway, University of San Francisco, Oliver Fringer, Stanford University, and Jeff Koseff, Stanford University. Mark Stacey and Ed Gross have identified the study questions proposed here as important to developing and validating the model.

These applied studies for physical changes correspond closely with Island Pond adaptive management studies recommended in the Draft Adaptive Management Plan (Trulio and Clark, 2005). While the best methods for addressing these questions will be up to the researchers, using standard data collection protocols such as those developed for the Regional Wetland Monitoring Program (<http://www.wrmp.org/documents.html#protocols>) may be most useful to the Project.

There are other important issues that could be studied at the Island Ponds, but are not part of this RFP. These uncertainties and the reasons they are not included are as follows:

Bird response: Bird diversity and abundance is monitored once a month by the USGS as part of the Project's basic monitoring, which will capture bird response to the new tidal habitat. Collecting invertebrates would characterize the prey base for many species. The USGS has collected invertebrates between 2003 and 2005 in the Island Ponds, providing adequate baseline data for at these sites. Invertebrate collection after breaching can be done later when more funds are available.

Fish response: Data on fish diversity and abundance are collected by the USGS in the Island Ponds and Coyote Creek as part of the Project's basic monitoring. This monitoring will capture fish response to the changing aquatic conditions in the ponds and adjacent sloughs.

Hg response: Significant mercury research is currently being funded to study how management changes to a pond with high mercury levels, pond A8, may affect mercury in the food chain. Whether the Island Ponds are the best places to supplement the A8 study is not clear. Given the limited funding associated with this RFP, it seems those funds are more usefully directed toward other high priority studies.

RFP Process and Eligibility

Although a full RFP process is preferred, it is not feasible at this time due to the short timeline (ponds will be breached in March 2006) and limited funding. Instead, the PMT and the Science Team will undertake a "directed studies" approach to identifying researchers who would do the initial adaptive management studies (see Appendix 1). For this process, the PMT and Science Team will contact specific individuals or entities, because of recognized expertise, accomplishment, and past responsiveness, and ask them to submit proposals by December 7, 2005. Only researchers able to mobilize their team for data collection by early January should submit proposals. Science Team members are eligible to develop a proposal for this directed

study RFP. Researchers proposing on this RFP will be required to work with other research teams to efficiently collect the pertinent data and will be required to meet with the Science Team and PMT to interpret the findings of their studies and translate them into information that is useful to the Project managers.

Study Area

The study area for these initial studies should include ponds 19, 20, and 21, the adjacent Coyote and Mud Sloughs, and the Bay at the mouth of the sloughs. However, the exact study area may vary based on methods used by researchers to address the study questions.

Proposed Studies

I. Track vegetation change

Questions Addressed by this Applied Study: What is the rate of change in vegetative cover and what species spread or colonize the restoration area and where? What is the relationship of vegetation colonization to tidal flat elevations?

Background: Researchers will evaluate/collect data on the composition and spatial extent of vegetation before and after the ponds are breached in the sloughs adjacent to the Island Ponds, in the Bay at the mouth of the sloughs, and within the ponds. While substantial vegetation change may not occur in a year, it is important to document which species first colonize the area and at what elevations. In addition, the colonization of invasive species needs to be determined.

The City of San Jose and H.T. Harvey & Associates have done extensive vegetation monitoring in the study area and little additional baseline data collection may be needed. This work requires tying into topography and bathymetry data that have been collected using LiDAR and other mapping methods. This team will work with the team addressing the sediment questions below, to collect additional bathymetry/topography information, if existing data are not adequate. For example, survey transects may be needed to document the exact starting topography, especially under dense vegetation stands such as *Spartina foliosa* and *Scirpus/Typha* stands, if LiDAR or other mapping did not capture the topography beneath stands. Additional vegetation data will be needed to accurately characterize any changes that may occur.

Tasks:

- A. Determine what vegetation mapping has already been done for the Study Area. Map extent and locations of vegetation stands and tidal flats in the study area. Link to existing bathymetric/topographic data.
- B. If necessary, coordinate with the sediment team to collect topography data for dense vegetation stands, perhaps using standard topographic survey methods. Cross sections through the marsh, cutting across the marsh from the levee to the mudflat, may be most useful.
- C. If necessary, collect data to fill the gaps in vegetation mapping prior to pond breaching.
- D. Collect data on changes to vegetation cover and composition in the year after breaching in the ponds, sloughs and Bay adjacent to the Island Ponds. Tie into bathymetry data collected by the sediment team. Collect data on elevations where new vegetation establishes following breaching.

- E. Analyze the data in light of the literature, other data collected by the Project, and other inputs especially the effects of the City of San Jose POTW (discharging to Artesian Slough) to characterize the change in vegetation and develop predictive capabilities.

Value to the Project:

- Tidal flat and vegetated habitat are used by a number of indicator and rare species. Findings will be used to determine if these species lost or gained mud flat and vegetated habitat, in the short term, as a result of breaching.
- Vegetation data will be used to track the presence and establishment of the non-native *Spartina* hybrid and other invasive, non-native salt marsh species
- Data on current and new plant distributions will identify more specifically the threshold elevations for plant establishment in newly restored ponds.
- Data will be valuable as baseline information for long-term studies of habitat change at the Island Ponds.

II. *Characterize baseline conditions and track initial physical responses*

Questions Addressed by this Applied Study:

Sediment Questions: 1) What is the sedimentation flux at the pond breaches? 2) What is the rate and relative land surface change for the Island Ponds and adjacent slough after pond breaching?

Hydrology/Water Quality Questions: What are the dissolved oxygen and salinity conditions upstream and downstream of the Island Ponds in Coyote Creek prior to breaching?

Summary: This work entails characterizing initial changes to physical conditions at the Island Ponds as a result of their breaching, focusing on sediment and water quality changes. The sediment research will require data evaluation/collection prior to and after pond breaching to assess how pond and slough surface elevations change as a result of pond breaching. The gypsum layers in the Island Ponds add an additional factor that requires analysis. In particular, do those layers erode or in some way influence sedimentation in the ponds? This research will require using an appropriate method to measure sediment change in the ponds and the sloughs, including tying into survey markers prior to pond breaching. Cross-sections at the pond breaches may be used to assess changes to the slough channel. In addition, the team will measure sediment flux at the Island Pond breaches (including velocity and suspended sediment concentrations) to determine how much sediment imported on each tidal cycle is retained in the pond. These data are critical for modeling pond accretion and tidal flat change. This may require measuring suspended sediment concentrations in Coyote Creek prior to breaching.

Water quality data to characterize baseline dissolved oxygen and salinity conditions will also be collected. Restoration will have short and long-term effects on local water quality, especially salinity and dissolved oxygen (DO) levels. In ponds, water quality is expected to match Bay levels; however, the gypsum layer in the ponds may have in-pond effects. Breaching the Island Ponds is expected to bring higher salinity water further back into Coyote Slough than before breaching. Baseline data collected here will be later be compared to monitoring data to determine how breaching changes DO and salinity conditions in Coyote Slough and the ponds.

Sediment Question Tasks:

- A. Coordinate with USGS on the bathymetry data collected and tying into benchmarks.
- B. Collect data on the net sedimentation/erosion in the Island Ponds and adjacent sloughs after breaching for a year using an appropriate sediment measurement method, such as sediment plates, surveying, and/or Surface Elevation Tables (SETs). Use cross-sections to characterize bathymetric changes at the breaches.
- C. Measure sediment flux at the pond breaches to determine sediment movement into and out of the ponds.
- D. Analyze the data in light of the literature, other data collected by the Project, and for use in local and landscape scale models to characterize the change and develop predictive capabilities.

Water Quality Question Tasks:

- A. Coordinate with USGS to determine what water quality data have been collected.
- B. Collect salinity and dissolved oxygen in the ponds and the sloughs that characterize the pre-breach DO and salinity conditions in the water column, along the sloughs, and with respect to daily and seasonal cycles.
- C. Analyze the data in light of the literature, other data collected by the Project, and for use in local and landscape scale models to characterize the change and develop predictive capabilities.

Value to the Project:

- Results will be used to develop a sediment budget for the immediate area around the Island Ponds and to estimate rates of deposition for different areas within the restoring ponds. Data should be able to evaluate spatial and temporal variability in deposition. The rate of accretion in the ponds relates directly to how quickly marsh vegetation can colonize.
- Documenting/evaluating changes to local tidal dynamics and salinity will be important data sets for the NOAA modeling effort. They will provide a nice test of the model's ability to accurately capture the changes in the local circulation following restoration activities. These data are also important input to understanding the changes observed in Study Question I.
- Sediment and water quality data will be valuable as baseline information for long-term studies of habitat change at the Island Ponds.
- Documenting water quality changes is important to understanding how breaching ponds affects habitat quality in the ponds, sloughs, and potentially the Bay.

Appendix 1. DIRECTED STUDIES PROGRAM

In the course of developing the focused research questions, it will probably become apparent that a specific, sustained research effort may be necessary to resolve one or more of the areas of uncertainty regarding the important resources of the bay-delta-watershed critical to the Restoration Project's goals and objectives. Examples of such needs might include the following:

- Developing an understanding of a specific ecological phenomenon over long temporal and/or large spatial scales
- Conducting major synthetic and theoretical efforts
- Providing information for the identification and solution of specific salt pond management or restoration problems
- Quantifying the linkages between potential stressors and the abundance of species populations

Addressing such needs may require interdisciplinary research coordinated among investigators, experimental studies across a range of appropriate spatial and temporal scales, and development of analytical and numerical models of critical ecosystem functions and responses to management actions.

Given the scope and complexity of some of the issues facing the Restoration Project, it may be necessary to support such sustained commitments of effort irrespective of the responses of scientists/engineers to the annual requests for proposals. In such cases, the PMT may wish to contract with specific individuals or entities, because of recognized expertise, accomplishment, and past responsiveness, to carry out a program of directed research that is not well accommodated in the year-to-year RFP process.

Such questions, identified by the AMT and PMT, will become the subject of contractual arrangements with specific individuals or entities. In each case, the individual/entity will develop a research proposal, using the RFP format described above, that will be subject to review and concurrence (or rejection) by the Science Team and other additional subject-matter referees as necessary, with revisions being made accordingly.

In recognition of the need in these instances for sustained study effort, funding will be provided to successful proponents for specified periods up to six years. It is expected, therefore that the Directed Research Program proposals will incorporate a detailed multi-year strategy and budget. It will also be understood that the Principal Investigator(s) will be expected to make a long-term commitment to meeting the critical South Bay Salt Pond Restoration Project research need(s) described in the contract.

The sustained research efforts under the Directed Research Program will be subject to frequent, vigorous peer review, i.e., at the proposal stage, during the conduct of the research, and upon the conclusion of the study. Written progress reports will be required at the end of each year, or sooner if needed, with a full review of project progress and accomplishment by the Science Review Board at least every three years. Contract renewals will be contingent upon the successful demonstration of progress toward meeting project goals and Restoration Project needs and the submittal of meritorious renewal proposals.