



KENNETH GARDINER

Monitoring and Evaluation of Habitat Goals Accomplishments

The Need for Monitoring

Wetland restoration is a relatively new field, and the results are anything but certain. Studies conducted to determine the success rates of wetland restoration projects in California have indicated that end results often do not meet expectations. Sometimes, expectations for success are met by some performance criteria, but not by others. Because of a lack of consistent measurements and standards for wetland restoration, “success” is often ill-defined. Wetland systems are complex and can require decades to reach equilibrium as ecosystems. Because of this complexity, project goals and objective performance criteria need to be properly defined if the success of any restoration project is to be accurately measured.

Restoration of “historic” wetlands in the San Francisco Bay Estuary is often difficult to achieve. The difficulty is a direct result of the large-scale human disturbances that have altered the watersheds and baylands of the region. These changes have caused fragmentation among the Bay Area’s wetlands, leaving few if any historic wetland complexes intact. Present-day restoration projects commonly aim to create wetland systems that function within modern natural physical and biological processes, which practitioners recognize as different from pre-European conditions. In light of the

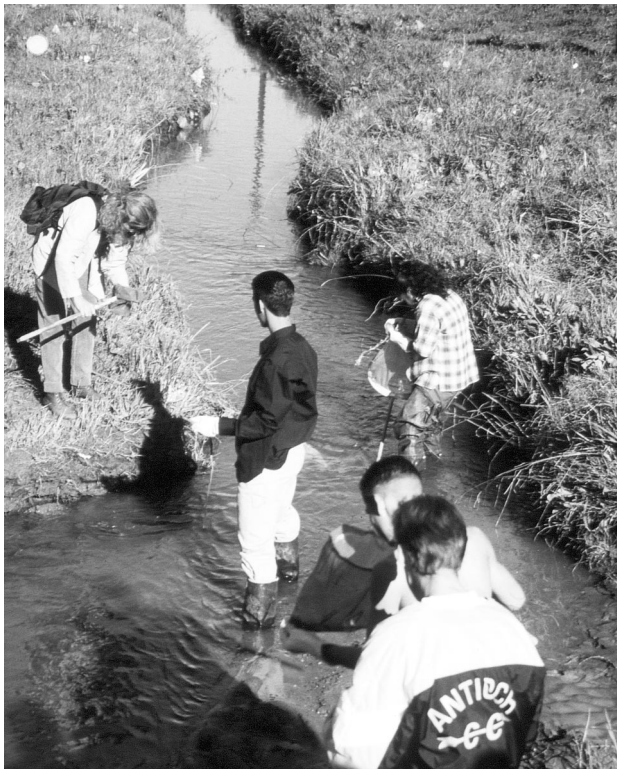
uncertainties surrounding wetland restoration outcomes, many restoration programs are recommending an adaptive management approach. The CALFED Ecosystem Restoration Program, for example, combines regular monitoring and review as a basis for modifying projects throughout the lengthy restoration process. The need for this kind of approach is particularly evident in developing a realistic waterfowl monitoring program, as outlined in the “Waterfowl Benefits” section of Chapter 3.

There are many ongoing and proposed tidal restoration projects throughout the San Francisco Bay Estuary. Perhaps the largest issue limiting the success of these projects is the inability to understand the various restoration techniques and their effects on wetland habitats and the species utilizing them. It is difficult to gauge the effectiveness of managing for special status and native species if one lacks basic knowledge of habitat functions, species requirements, and complex ecological interactions. Tidal wetland restorations can be difficult to design and there are few projects that can be used as models. In addition, intricate geomorphological and hydrological details must be properly addressed if success is to be attained.

Because most wetland restoration projects are complex, few are considered to be complete when construction has concluded. Documentation of how a wetland ecosystem is changing, in which direction, and by what magnitude, is necessary to

determine long-term success. Despite its vital role, monitoring has traditionally received little attention in pre- or post-project planning. Funding amounts for monitoring are often less than one to two percent of total project costs. This figure is much less than the 10–20 percent level of funding needed for comprehensive monitoring coverage through the life of a project. Monitoring, with sufficient funding to complete the task, will be a critical component of all Joint Venture restoration projects.

The San Francisco Bay Regional Monitoring Program for Wetlands (WRMP) is being designed to provide the framework necessary to monitor the success of the Joint Venture habitat projects. The WRMP is a cooperative undertaking by the U.S. Environmental Protection Agency, the San Francisco Estuary Institute, the California Coastal Conservancy, and several regulatory and resource agencies and nongovernmental organizations. The WRMP represents the next step, following the *Baylands Ecosystem Habitat Goals*, in implementing the 1993 Comprehensive Conservation and Management Plan for the San Francisco Estuary. The WRMP will provide a comprehensive set of protocols for field data collection and quality assurance/quality control, as well as the management, interpretation, and dissemination



Volunteers monitor invertebrates in a streambed.

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of monitoring data. The WRMP will prepare two components, one for monitoring “ambient” conditions in existing wetlands and the other for monitoring restoration projects.

Monitoring Objectives and Strategies

o b j e c t i v e s

Apply general guidelines for monitoring as defined by the Regional Monitoring Program for Wetlands and promote their use at a project level throughout the region.

Include monitoring as part of all habitat restoration and enhancement projects.

Evaluate the effects on waterfowl of implementing the SFBJV habitat goals and make recommendations to ensure viable populations.

Provide for regional coordination and communication of monitoring and evaluation of results to enable adaptive management of existing projects and to foster improved design for future projects.

Wherever feasible, include monitoring costs in construction budgets for habitat projects through monitoring endowments or other means.

There are many participants in the various projects currently taking place throughout the Estuary. Various governmental agencies, nongovernmental organizations, businesses, and individuals are involved in design, construction, and monitoring of wetland restoration, creation, or enhancement projects. Because each project is unique, the problems encountered and successes achieved vary greatly. Biophysical monitoring is a way to measure the progress of a project towards achieving its intended goals. But many different approaches to monitoring and project evaluation exist, as does a wide variety of project goals. Criteria for which parameters to monitor, how to monitor them, and how frequently or how long they should be monitored also vary widely. Consequently, there are no standard guidelines for monitoring parameters and protocols, both of which are needed to measure project success.

Two of the most important roles of the SFBJV will be to promote goals and to standardize guide-

lines for biophysical monitoring in wetland restoration. Neither area has received sufficient emphasis in past restoration projects. Success will require 1) funding, 2) preconstruction monitoring to determine existing natural resource values, and 3) carefully designed, repeatable postconstruction monitoring that reveals trends from construction through the completion of the restoration process, decades later. The SFBJV will serve both as a focus for wetland restoration in the local community and as a resource for sharing information about problems encountered and results achieved in wetland projects.

The following are strategies to accomplish the monitoring and evaluation objectives.

Monitoring and Evaluation of Restoration Projects

1. Establish and maintain a list of projects, agencies, or individuals in charge of projects, monitoring techniques used, and the source for monitoring results for wetland projects within the Joint Venture region.
2. Determine and evaluate past or existing monitoring programs or guidance documents for proposed Joint Venture projects, and ensure that sufficient monitoring and evaluation funding is included in all funding requests for all Joint Venture projects.
3. Work with the wetland restoration community to establish standardized wetland monitoring recommendations. Include cost estimates for each step of the monitoring process.
4. Support an annual meeting of restoration practitioners and wetland researchers to present monitoring results and evaluation of individual projects.
5. Establish and maintain a list of universities, schools, and other groups interested in adopt-



In-stream water quality monitoring

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ing projects or portions of projects for long-term monitoring.

Research

6. Develop a summary of information on wetland restoration topics within different disciplines (e.g., hydrology, wildlife, fisheries) relevant for understanding regional wetland diversity and for individual restoration projects.
7. Create a list of research needs to support a better understanding of the function of wetlands of the region and to support individual restoration projects. Review annually.
8. Prioritize research projects, estimate costs for funding by Joint Venture partners, and encourage funding support.
9. Support pilot restoration projects to develop monitoring techniques and evaluate such wetland design features as size, salinity, habitat elements, and minimizing human disruption.