

Prospectus: Planning the Review of the Monitoring Enterprise in the Sacramento-San Joaquin Delta

Delta Independent Science Board

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Summary

The Delta Independent Science Board (Delta ISB), in conjunction with the Delta Science Program (DSP), will undertake a broad review of the monitoring enterprise in the Delta. The objective is to develop recommendations that may improve how: current and future monitoring programs meet informational needs of management agencies; individual and larger-scale monitoring programs can be better coordinated; and monitoring data can support implementation of adaptive management and assessments of performance measures. Inventories of physical-chemical, biological, and social science monitoring programs, which will be completed by a contractor following issuance of an RFP, will describe what is being monitored, how it is done, and for what purposes; calculate costs and describe program flexibility and linkages. The Delta ISB will use this information, other documents and reviews and input from managers and stakeholders in the Delta to identify the gaps in monitoring; determine whether an appropriate level of scientific rigor is being used in current programs to meet the needs of management and policy decisions; and recommend how/if the monitoring enterprise can be improved, consolidated, coordinated, and streamlined. The intended audience includes the Delta Stewardship Council, adaptive management practitioners, and entities that conduct, regulate, and use monitoring information from the Sacramento-San Joaquin Delta (the Delta).

Introduction

The Delta Reform Act of 2009 directs the Delta ISB to review the “the scientific research, monitoring, and assessment programs that support adaptive management of the Delta through periodic reviews of each of those programs.” The Delta ISB is carrying out these mandated reviews by theme rather than by evaluating individual research programs.

The ongoing and completed reviews by the Delta ISB all highlight the importance of monitoring in the Delta. These reviews provide recommendations about the need for maintaining or in some cases increasing the value of these monitoring efforts in terms of the specific themes covered. Therefore, the Delta ISB has decided to undertake a review of the overall monitoring enterprise in the Delta. The last major review covering water quality monitoring programs was in 2009, a “Summary of Current Water Quality Monitoring Programs in the Delta,” which was prepared for the Central Valley Regional Water Quality Control Board by staff of the Aquatic Science Center.

The Monitoring Enterprise

The monitoring enterprise in the Delta ranges across many disciplines in the natural and biological sciences, and extends into social science as well. The success of these, often expensive programs, is important to many regulatory and research activities in the Delta. The monitoring data, in some cases now collected over decades, have been used frequently for management and planning decisions. Perhaps of key interest to the Delta ISB (and consistent with the provisions of the Delta Reform Act of 2009), monitoring is also an essential component of adaptive management, a vital component of the Delta science enterprise.

Monitoring activities in the Delta have been broadly categorized as *compliance* monitoring and *environmental* monitoring. The Delta ISB notes that these categories form a continuum or spectrum that is reflective of the monitoring purpose, and the flexibility and specificity of legal criteria described for the programs. As such, our review will comprehensively cover monitoring spanning these broad categories.

Compliance monitoring can be described in multiple ways and the term comprises several descriptors of monitoring activities. Generally, however, compliance monitoring is intended to assess whether activities meet the specific requirements of regulations, permits, or licenses. Compliance monitoring is designed to deliver inputs, outputs, and sometimes outcomes regarding the consequences of actions that are prescribed.

Compliance monitoring may have varying degrees of legal flexibility and specificity. Along this continuum, “permit-driven monitoring” is not mutually exclusive from the “environmental monitoring” discussed below. Upcoming Adaptive Management Programs will include a major permit-driven component. In EcoRestore, for example, tidal wetland and floodplain restoration are required as part of the Reasonable and Prudent Alternatives (RPAs) in the current Biological Opinions. Moreover, WaterFix and Phase I of the update to the State Board’s Bay-Delta Water Quality Control Plan also call for Adaptive Management Programs. It is likely that all of these programs will contain monitoring components that may include not just administrative indicators of compliance but also output and outcome performance measures.

Environmental monitoring in the 2009 Water Board Report was referred to as monitoring for “Environmental Management and Policy Support” and included several components, such as: establishing or understanding baseline conditions; trends and variability in topics of interest; aquatic resources assessment issues (e.g. Pelagic Organism Decline); processes (e.g. impacts of water export on Delta transport); model calibration and validation; and effectiveness of pollution prevention efforts, including regulatory requirements. This description likely will be expanded to include other activities covered in our review as well. In essence, we define environmental monitoring as being designed to assess the status and trends of biological, physical, and chemical parameters used in determining the health of the Delta.

There are numerous monitoring efforts ongoing in California that owe their genesis to permit conditions (e.g., Prof. Peter Moyle’s long-term monitoring and research tracking the populations of a number of fish species, or the long-term record on Lake Tahoe assembled by the Tahoe Research Group) and add information value beyond the permitting process. The Delta ISB review will consider the potential value of linkages and integration across monitoring programs currently labelled as compliance and environmental monitoring efforts.

A variety of concerns have been raised in past Delta ISB reviews that this review on the monitoring enterprise will address. For example, we found that in some cases monitoring efforts could be improved if they were better linked with each other. Moreover, the relationships of some monitoring programs to management objectives have not always been clear. Sometimes, monitoring designs have been idiosyncratic, often not incorporating data into a data-management system that would foster synthesis and facilitate their use in adaptive management. Although these monitoring efforts have enhanced our understanding of the Delta and have been used by management, the Delta ISB will evaluate whether a better coordinated and well-designed monitoring enterprise that includes both compliance and environmental monitoring could provide a more solid foundation for assessing the effectiveness of activities in the Delta in the context of adaptive management.

Purpose of Review

The Delta ISB, with support from the DSP plans to undertake a broad review of the monitoring enterprise in the Delta. The overall objective of the review is to make recommendations that could improve how current and future monitoring programs can serve both the present and expected informational needs of management agencies, how/if individual and larger-scale monitoring programs can be improved through better coordination, and how monitoring data can better support implementation of adaptive management and assessments of performance measures. We will examine both the broad array and the networking and coordination of monitoring programs in the Delta, and assess whether they provide the information needed to respond to the often-identified and overarching “wicked” problems present in the Delta. The study will also examine how the monitoring data are used by managers and agencies to provide accurate and best-available information to policy-makers, to identify any research gaps and future needs, and to identify duplicate monitoring.

The Review Process

This review will have two major components. *Component 1* will be a contract issued to gather and assess information about monitoring programs throughout the Delta. *Component 2* will be an evaluation of the above information, other documents and input from managers and stakeholders done by the Delta ISB as part of the overall program review mandate. Portions of the two components will run in parallel.

In *Component 1*, a Request for Proposals (RFP) will be issued by the Delta Science Program in consultation with the Delta ISB and management/monitoring agencies to commission a contractor (a consultant or consultant team) to compile and organize a comprehensive inventory of Delta monitoring activities, and of management and policy needs related to monitoring programs. Delta Science Program (DSP) staff will conduct scoping for and development of the RFP, with input from the Delta ISB. The successful contractor will compile an inventory for both physical-chemical and biological components of the Delta, and for social-science drivers of ecosystem function and processes.

Component 2 is the development of the Delta ISB’s evaluation and preparation of a report on the Delta monitoring enterprise through assessment and evaluation of the information prepared during and from the *Component 1* inventory and from interviews with personnel involved in the monitoring enterprise in the Delta. This may include convening a workshop(s) (coordinated by the DSP) focused on key issues to help make the review as relevant to the monitoring needs of the Delta as possible.

Component 1 of the review will focus on information gathering. Agencies and groups involved in the monitoring enterprise in the Delta will be contacted for a description of each of the monitoring programs in which they are engaged. Information and documentation to be requested by the consultant/contractor to the agencies in the RFP will include, but not be limited to:

- The goals and objectives of their monitoring program(s)
- Environmental management or compliance concerns being addressed
- Description and proportion of activities related to the administrative activities, legal requirements, and/or improvements in environmental management aspects of the program
- Geographic coverage, including current and past spatial extent

- Linkages for species and processes that are appropriate for monitoring throughout the interconnected Delta, Bay, and Pacific Ocean system, and the upstream Sacramento and San Joaquin rivers
- Length of time (temporal longevity) of the program and timetable of changes to it
- Group doing data collection (e.g. agency personnel, contractors)
- Time, space, and parameter scales of the monitoring program
- Program costs
- Description of specificity of requirements and flexibility available in conducting monitoring programs
- Quality assurance and control procedures
- Degree of coordination with other agencies and groups doing related monitoring, and description of groups
- Extent of data availability and sharing of data with other agencies and groups doing monitoring, and description of groups
- Level of integration of data with other agencies and groups doing monitoring, and description of groups
- Description of biological components of Delta communities or physical-chemical parameters being measured and how they relate to the purpose of the monitoring program, or for social sciences that can be considered drivers, how parameters being measured relate to management decisions about ecosystem functions and processes
- Descriptions of potential redundancies in information obtained among monitoring programs
- Description of possible ways, if any, to increase efficiencies in information obtained among monitoring programs
- Description of approaches used to achieve a high level of scientific rigor (sampling design, statistical power, etc.) to meet the needs of management and policy decisions
- Description of gaps in monitoring programs needed to meet the needs of management and policy decisions

Scope

A thematic review of the monitoring enterprise will require input from managers, stakeholders, the public and personnel working in the Delta in order for the review to be useful and broadly applicable. Therefore, the Delta ISB, working closely with the DSP, will initially gather information about the appropriate scope of this review from meetings with managers involved in the Delta and a review of monitoring programs both within and outside the Delta. The planning efforts therefore include examining prior reviews of Delta monitoring programs (e.g. the 2009 Water Board report on [“Summary of Current Water Quality Monitoring Programs in the Delta”](#)). In addition, we will consult reviews by several other programs for the methodologies developed during their reviews. These include the [“Healthy Waterways Initiative monitoring and communication program in SE Queensland, Australia”](#), [The Kissimmee River Restoration Project](#), [The Chesapeake Bay Monitoring Program](#), and other ongoing programs in Washington, Louisiana, and other Delta areas.

The Delta Reform Act requires review of the Delta Plan at least once every 4 years. Given the breadth of this topic and the current composition of the Delta ISB, it would be difficult to give equal emphasis to the review of social, economic, and hazard monitoring programs underway in the Delta, compared to those dealing with ecosystem services in the biodiversity and ecosystem function categories. But at a minimum, the consultant team will gather information on these programs, which could result in review recommendations about what might be required to track

performance measures in the Delta Plan that relate to recreational, agricultural, flood protection, economics, and other “Delta as an evolving place” topics.

Audience

The intended audience for this review includes the Delta Stewardship Council, those involved in adaptive management, and the personnel and entities that conduct, regulate, and use information from regional and specific monitoring programs, status and trend data-collection efforts, agencies managing pertinent ecosystem services in the Delta (i.e., information generators and information users, and the various stakeholders and the public). All information obtained will follow the intent of the “Open and Transparent Data Act (AB1755)” and will be archived on the California Water Quality Monitoring Council website and other appropriate locations.

Anticipated Outcomes

The review report (which is *Component 2*, described above) will include providing information and recommendations intended to:

- Describe what is being monitored, how, and for what purpose(s)
- Identify potential gaps in monitoring, especially information needed to assess long-term status and trends
- Describe whether an appropriate level of scientific rigor (sampling design, statistical power, etc.) is being used in current programs to meet the needs of management and policy decisions, and how this could be met where needed
- Recommend, where possible, how the monitoring enterprise (including data management) can be improved, consolidated, coordinated, and streamlined

To accomplish these goals, the Delta ISB will consider ways to

- Effectively “network” monitoring programs in the Delta to respond to current and future management challenges
- Increase the effectiveness of the monitoring enterprise in the Delta and the capacity of monitoring efforts to characterize changes in environmental stressors and ecosystem responses to the implementation of the Delta Plan
- Enhance the capacity of environmental and water-resource status and trends monitoring data to inform management decisions, including the utility of different types of data and whether the data are sufficient to support any updates to, and maintenance of, performance measures associated with the Delta Plan
- Improve the applicability of monitoring data to adaptive management in the Delta

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