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San Francisco Bay Wetlands Regional Monitoring Program

Mission Statement

The mission of the Wetlands RMP is to provide the scientific understanding necessary to protect, create, restore, and enhance wetlands of the San Francisco Bay Region, through objective and cost-effective monitoring, research, and communication.

Geographic Scope

The geographic scope of the Wetlands RMP is the San Francisco Bay Region, defined as the San Francisco Estuary and its watersheds between the Golden Gate and the Sacramento-San Joaquin Delta at Broad Slough. *The initial focus of the Wetlands RMP will be the baylands of the Region, defined as the lands between the maximum and minimum elevations of the tides. The baylands are transitional environments between the deeper reaches of the Estuary and the surrounding watersheds. The Wetlands RMP will consider physical and biological processes that link the baylands to their adjacent environments. The geographic scope of the program should be broadened in the future to include all the different kinds of wetlands in the Region. The Wetlands RMP should be coordinated with other monitoring programs for comprehensive and consistent monitoring of wetlands throughout the San Francisco Estuary and all of its watersheds.*

Background

In 1993, the Governor of California and the Administrator of the US Environmental Protection Agency signed the Comprehensive Conservation and Management Plan (CCMP) for the San Francisco Estuary. The CCMP called for a Regional Wetlands Plan based upon habitat goals. As an appendix to the CCMP, the Regional Monitoring Strategy called for comprehensive environmental monitoring programs. The CCMP also called for the creation of the San Francisco Estuary Institute (SFEI) to help coordinate environmental monitoring. In 1994, SFEI and the Regional Water Quality Control Board initiated the Wetlands Ecosystem Goals Project to establish wetland habitat goals. In 1999, after goals had been set, many of the same agencies and SFEI began planning the Wetlands RMP as part of the Regional Wetlands Plan. A multi-agency Steering Committee was created that directed SFEI to draft this prospectus.

Statement of Need

Large amounts of public funds and human resources are being invested in the protection, creation, restoration, and enhancement of wetlands in the Region. The Regional Wetlands Plan calls for tens of thousands of acres of wetlands projects. Both the number and size of wetlands projects are increasing each year, and the overall ecological and economic importance of wetlands is therefore also increasing.

A monitoring program is needed to evaluate wetland policies, programs, and projects in the Region. Wetlands need to be compared to each other and over time to assess the status and trends of the wetlands ecosystem, measure the progress of wetlands projects, assess the efficacy of management decisions, and otherwise account for the public investment in wetlands.

But these needs cannot be met at this time because the ambient conditions of wetlands in the region are not being monitored, local projects are monitored in disparate ways, there is little assurance of data quality, and monitoring results are not readily available to the public.

What Is the *Regional Wetlands Plan*?

The Wetlands RMP is part of the Regional Wetlands Plan. The Wetlands Plan is being developed to help government agencies and stakeholders work together for the protection of wetland resources in the Region. Key related efforts include the multi-agency Bay Area Wetlands Recovery Project that coordinates wetlands policies and reviews project designs, the private-public San Francisco Bay Joint Venture that develops wetlands projects, and SFEI that manages the Wetlands RMP and related science.

What Is the *Wetlands RMP*?

The Wetlands RMP is envisioned as one of three major programs of the San Francisco Bay Regional Monitoring Strategy. The other two envisioned programs are the Bays RMP for the open waters and subtidal reaches of the Estuary (represented at this time by the RMP for Trace Substances), and the Watersheds RMP for the rivers, streams and uplands of the San Francisco Bay Region. All three programs are being developed at the same time through the San Francisco Estuary Institute and its partners, but they differ in status and schedule. The status of the Wetlands RMP is represented by this prospectus. It is hoped that each of these programs will eventually have three major components: ambient monitoring, project monitoring, and special studies. Many organizations will need to work together to develop the technical aspects of the Wetlands RMP, such as collecting and managing data, interpreting their meaning, and reporting the findings to the public.

Wetlands Ambient Monitoring

The WRMP will initially focus on the development of information that is needed to assess the status and trends of the overall ecological health of the baylands and the effects of management actions.

For the Wetlands RMP, the ambient monitoring component will be emphasized first. The strategy is to begin to assess the overall health of the baylands ecosystem while also demonstrating that ambient monitoring helps the sponsors of local wetland projects distinguish the performance of their projects from background variability among comparable wetlands. It is hoped that project sponsors will therefore help support ambient monitoring in the future, and that they will strive for comparability between ambient monitoring and project monitoring.

The ambient monitoring will need to answer questions about wetlands at many scales of time and space, from local habitat patches and mosaics of patches within subregions to the regional wetlands ecosystem as a whole. The Steering Committee has started to develop a list of questions that should be answered by the ambient monitoring component of the Wetlands RMP. Some example questions are listed below.

Some Examples of Science and Management Questions That Might Be Answered by Wetlands Ambient Monitoring

1. What are the spatial and temporal distributions of wetland habitats?
2. Are the regional wetland habitat goals being appropriately implemented?
3. How does the tidal marsh plant community vary throughout the Estuary?
4. In general, what are appropriate measures of plant communities as habitat?
5. Should invertebrates, amphibians and reptiles be monitored, and if so, where, how, and when?
6. How do non-native species compare to other ecological stressors or threats?
7. How do intertidal sedimentation rates vary throughout the Estuary?
8. Are tidal marsh plains and tidal flats aggrading or degrading?
9. Is the Estuary shoreline eroding or accreting?
10. Where do shorebirds go during high tide?
11. Where are the most critical patches of habitat for shorebirds?
12. How do tidal marshlands support fish?
13. What might be the effects of rapid sea level rise on intertidal habitats, diked baylands, and adjacent lands properties?
14. What are the effects of large-scale tidal marsh restoration on sediment supply, tidal currents, and bathymetry in the Estuary?

A conceptual framework for ambient monitoring has been drafted to address these kinds of wetlands management questions (see WRMP Conceptual Framework Models document). The framework can evolve over time, as experience is gained and new questions arise.

The framework calls for the development of detailed conceptual models that represent the known and expected ecological, hydrological, and geomorphic functions of the major types of wetlands in the Region

Based upon the conceptual models and indicators of key functions will be selected or developed. Indicator development can involve special studies, including field tests. Standard protocols for data collection and management will also be developed. Data collection and analysis may involve many different organizations using the standard protocols. Data management, including data quality control and assurance, might be distributed among the data sources using standard formats and procedures. Qualified data will be accessible through a centralized web site. The data could be independently interpreted by different users, but some common interpretation will be provided by the Steering Committee as regular public reports on the status and trends of the wetlands ecosystem. These reports will be widely distributed in paper and electronic media. Based upon these reports, the management questions and hence the ambient monitoring component might be revised.

Wetlands Project Monitoring

The project monitoring component of the Wetlands RMP will assess the performance of local wetlands projects relative to their goals and objectives in the context of ambient variability of comparable wetlands in the region.

Project monitoring will start with large-scale restoration projects and will evolve to include compensatory mitigation projects. *The project monitoring component cannot be fully planned until pilot projects are conducted. Until then, case studies of wetlands projects will be used to help guide the selection and development of indictors for ambient monitoring and thus increase the likelihood that ambient monitoring will complement project monitoring.*

The use of standard protocols to monitor projects as well as ambient conditions will enable the Wetlands RMP Steering Committee and the public to compare wetlands projects over time and to one another, relative to background conditions. Project monitoring and ambient monitoring will co-evolve, as experience is gained.

Based upon past and existing wetlands projects in the Region, the Steering Committee has begun to list typical management questions for wetlands projects. Some questions relate directly to project performance, whereas other questions foretell the need to use projects as learning opportunities to improve wetlands project design.

Some Example Management Questions That Might Be Answered by Wetland Project Monitoring

1. What are the optimal land surface elevations and water depths for the desired project goals and objectives?
2. What are the best indicators of project performance and stress, relative to the selected goals and objectives?
3. How are constructed channels and basins performing, relative to their design objectives?
4. What is the predicted hydrology of the project, and how do the predictions compare to what is observed? What is the expected on-site water budget?
5. What is the predicted rate of sedimentation? Where is erosion a risk? How does the project perform, relative to these predictions?
6. Are the levees and other water control structures performing as designed or required?
7. Should native vegetation be planted, and if so, what should be the initial species composition and density of plants, and how does this vary with hydrology and salinity regime?
8. Should the soils or sediments at the project site be treated in any way?
9. What are the optimal sampling designs for various indicators of project performance and stress?

A framework for project monitoring has been drafted to show the expected relationship between monitoring and project-specific goals and objectives. This framework will be revised as the project monitoring component of the Wetlands RMP is developed. The framework might not apply to all wetlands projects in the Region.

The framework for project monitoring calls for multi-agency, multi-disciplinary review of the habitat concepts and engineering designs of projects to assure their compatibility with their local settings and the regional habitat goals. After this initial review, project-specific goals and objective are defined, and indicators of performance and stress are selected. Standard protocols are used to collect data that are comparable to ambient monitoring data. Standard procedures are used to manage data that are also available through a centralized web site. The qualified data are used by the project sponsors and the Policy Group to evaluate project performance, relative to each goal and objective. If necessary, the goals and objectives, project designs, and the monitoring plan are adjusted to accommodate lessons learned. The evaluations are made public in paper and digital media as reports on the status and trends of the projects.

Special Studies

The special studies component of the Wetlands RMP will be developed as needed. In the near term, special studies will mostly involve development of conceptual models of wetlands form and function, development of indicators of ambient conditions of wetlands, the design of sampling programs, and the development of an information management system. As data are collected and analyzed, they will raise important new questions about the causes and effects of the observed conditions, and special studies will be needed to answer these questions. The special studies component should eventually produce quantitative models that predict the kinds and amounts of wetlands functions based upon wetlands form, structure, local setting, and location in the region.

The special studies component will not be the only source of original scientific information about wetlands in the Region. The Wetlands RMP will need to build upon other wetlands research programs and projects. To the extent possible, the special studies of the Wetlands RMP should be conducted by existing research institutions in the Region.

Key Institutions and Groups

These institutions and groups presently constitute the basic organization for development of the ambient monitoring component of the Wetlands RMP.

<u>Bay Area Wetlands Restoration Program</u>

The Bay Area Wetlands Restoration Program consists of the regional administrators of federal and state agencies responsible for the protection of wetlands in the Region. The Restoration Program includes an Executive Committee with a Policy Group that coordinates wetlands policies, a Project Design Review Group that provides advice and review on conceptual plans and engineering plans for wetlands projects, and the Monitoring Group with its Wetlands RMP Steering Committee.

Bay Area Wetlands Recovery Project Member Agencies

US Army Corps of Engineers	California State Resources Agency
US Environmental Protection Agency	California Department of Fish and Game
US Fish and Wildlife Service	California Coastal Conservancy
National Oceanic and Atmospheric Admin.	Regional Water Quality Control Board
SF Bay Conservation and Development Comm.	CALFED

Wetlands RMP Steering Committee

The Steering Committee will consist of senior staff in the wetlands regulatory, management, and protection agencies of the Region plus the Leaders of the Scientific Focus Teams. Membership is not necessarily restricted to these agencies, however. Members can be added as needed. The Steering Committee will take charge of Program planning and development, including identification of science and management questions, creation of the Science Review Group, selection of Focus Team Leaders, formulation of Focus Team tasks, oversight of special studies, and direction of SFEI's involvement in the Program. The Steering Committee will also work with SFEI to develop an institutional plan for long term Program funding. The Steering Committee will include an Executive Committee of WRMP sponsors that will be responsible for financial decisions.

Wetlands RMP Steering Committee

US Army Corps of Engineers	California State Resources Agency
US Environmental Protection Agency	Regional Water Quality Control Board
US Fish and Wildlife Service	California Department of Fish and Game
National Oceanic and Atmospheric Admin.	California Coastal Conservancy
San Francisco Bay Joint Venture	SF Bay Conservation and Development Comm.
San Francisco Estuary Institute	

San Francisco Estuary Institute

The San Francisco Estuary Institute will manage the Wetlands RMP under the direction of the Steering Committee. SFEI will provide technical and logistical support to the Focus Teams, the Steering Committee, and the Science Review Group. SFEI will draft scopes of work, program plans, proposals, and technical products as requested by the Steering Committee. SFEI will develop and maintain a data and information management system to support the Wetlands RMP. The Steering Committee can authorize SFEI to respond to service requests from the Focus Team Leaders, the Design Review Group, and the Policy Group.

Science Review Group

The Science Review Group will involve wetlands scientists and engineers who do not serve on any Focus Team but have outstanding abilities to advise and review regional science programs. SRG members can come from inside or outside the Region. The SFEI Committee of Science Advisors will facilitate the creation of the SRG by recruiting members based upon the criteria provided by the Steering Committee. The SRG will review the overall program approach and the progress of the Focus Teams, and will provide written reports of findings to the Steering Committee.

SFEI Committee of Science Advisors

Alan Mearns	National Oceanic and Atmospheric Administration
Luna Leopold	University of California at Berkeley
Fred Nichols	US Geological Survey

Focus Teams

The Steering Committee will decide on the number and general subject matter of the Focus Teams and will choose Focus Team Leaders. The Team Leaders will form their Teams based upon criteria provided by the Steering Committee. During the first year of the Wetlands RMP, the Focus Teams will begin to develop conceptual models of wetlands form and function, select indicators of wetlands status and trends based upon the conceptual models, draft protocols for data collection for some key indicators, and choose sites for data collection. The Focus Teams might also begin to formulate hypotheses for special studies. These tasks are likely to continue throughout the life of the Program. Focus Team Leaders and members can serve on the Steering Committee and the Project Design Review Group, as directed by the Policy Group.

Focus Teams and Their Leaders for 2000-01

Physical Processes	
Karl Malamud-Roam	San Francisco Estuary Institute
Plants	
Mike Vasey	San Francisco State University
Invertebrates	
Wes Maffei	Napa County Mosquito Abatement District
Fish	
Todd Hopkins	San Francisco State University
Mammals, Reptiles, and Amphibians	
Andree Breaux	Regional Water Quality Control Board
Birds	
Gary Page	Point Reyes Bird Observatory
Nadav Nur	Point Reyes Bird Observatory
Contaminants	
Don Yee	San Francisco Estuary Institute

Summary of Work Flow

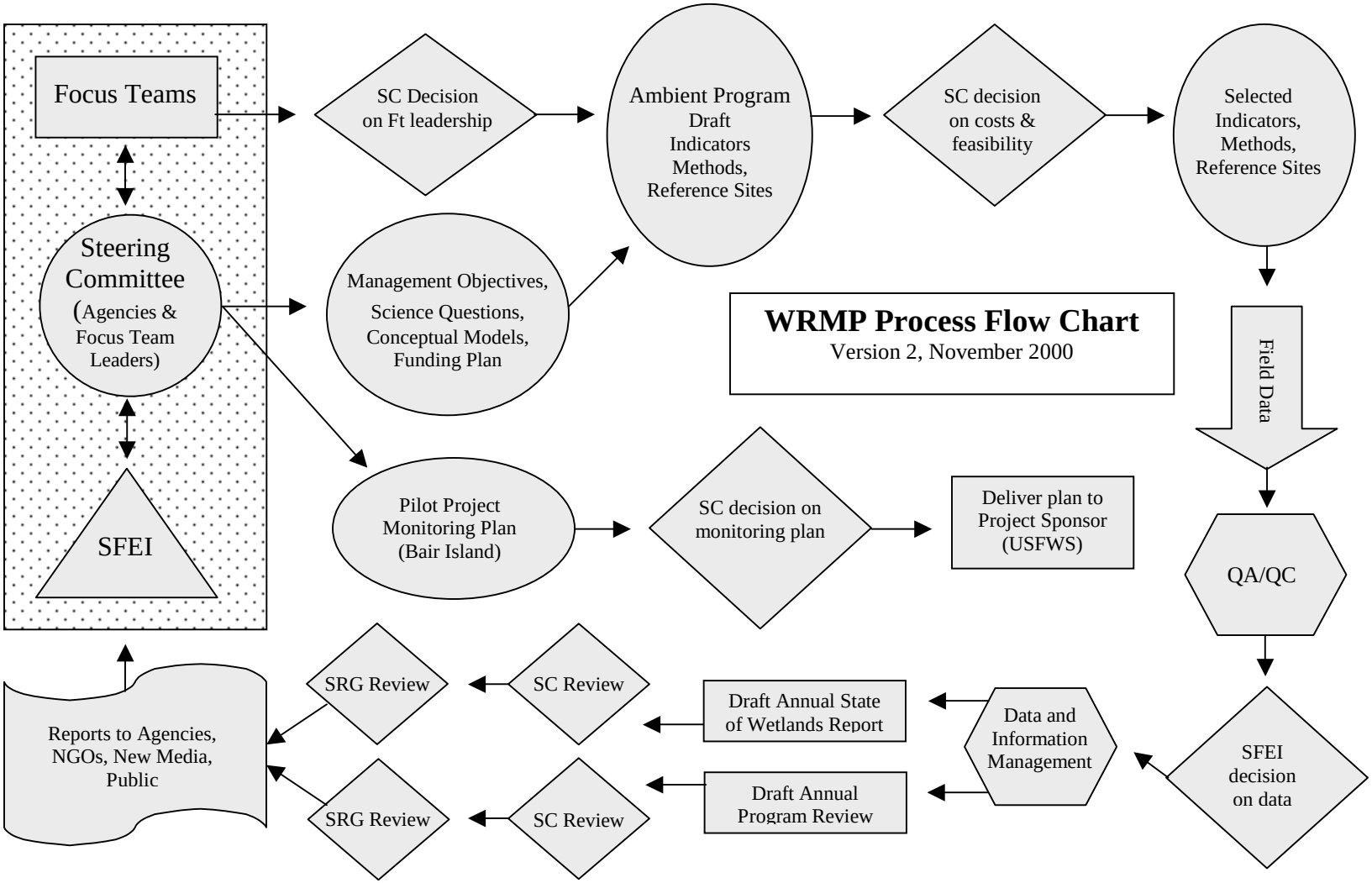
During the first year of the Wetlands RMP, most of the technical work relating to data collection is conducted by the Focus Teams with assistance from SFEI and with review by the Science Review Group and the Steering Committee. Work begins with conceptual modeling of wetlands form and function. Indicators of ambient conditions are selected or developed based upon these models. The models will help assure that the major wetlands functions and their sources of variability are adequately addressed. After indicators are selected, then protocols for data collection will be developed. The contents of the protocols cannot be foretold exactly, but will probably include recommendations for sampling equipment, timing, frequency, sites, and an approach to stratification of the sampling universe that will minimize the amount of introduced error of the samples.

Also during the first year, SFEI will begin to design and develop an information system for data management and information exchange. It is envisioned that the information system will depend upon the use of standard protocols for data collection and

formatting. Data will be reviewed by the data authors before being submitted to SFEI for final QA/QC. Qualified data will be stored with the data authors and at SFEI. Secure archival copies will be maintained. Data access will be facilitated by a dedicated web site maintained by SFEI. The web site will provide access to data and related information through text menus and interactive maps. There may be active links to sources of other data important to the Wetlands RMP but collected and managed through other programs. It is expected that government agencies and the community of professional scientists will have access to all qualified data sets produced through the Wetlands RMP. The public and private sector may also have access to the data sets, but might be better served by summary analyses of the data and statements of their meaning and limitations. The Focus Teams and Steering Committee will advise SFEI on the design of the information system.

Scientific Review

Scientific review of work plans and products will occur in four ways. First, informal peer review of the performance of the Focus Teams will occur in the normal course of their work. Focus Team members will share their work products within and among the Teams before the products are submitted to SFEI or the Steering Committee. Second, Focus Team members and other sources of original data from the Wetlands RMP will be encouraged to publish their findings in refereed scientific journals. It is anticipated that the Program will help pay for publication costs. Third, the summary reports of technical findings of the Program will be published by the Program. A plan of scientific review will be developed that matches the plans implemented by refereed journals. SFEI will work with the Science Review Group to recruit reviewers from outside the Region who will be paid for their reviews of occasional Wetlands RMP technical publications. These publications will be available on-line. Fourth, The Steering Committee and the Policy Group will arrange for regular science audits of the Program through the Science Review Group. The purpose of these audits is to review and improve the design and functions of the Wetlands RMP, pursuant to its mission statement.


Focus Teams
Steering Committee (Agencies & Focus Team Leaders)
SFEI
SC Decision on Ft leadership
Ambient Program Draft Indicators Methods, Reference Sites
SC decision on costs & feasibility
Selected Indicators, Methods, Reference Sites
Management Objectives, Science Questions, Conceptual Models, Funding Plan
WRMP Process Flow Chart
Version 2, November 2000
Field Data
Pilot Project Monitoring Plan (Bair Island)
SC decision on monitoring plan
Deliver plan to Project Sponsor (USFWS)
QA/QC
SRG Review
SC Review
Draft Annual State of Wetlands Report
Data and Information Management
SFEI decision on data
Reports to Agencies, NGOs, New Media, Public
SRG Review
SC Review
Draft Annual Program Review