

**Bay Area Wetlands Ecosystem Goals Project
Focus Team Orientation Package**

version 2
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Resource Managers Group

Michael Monroe, RMG Co-Chair
U.S. EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105
Phone: 415-744-1963

Carl Wilcox, Co-Chair
Ca Department of Fish and Game
P.O. Box 47
Yountville, CA
Phone: 707- 944-5525

Peggy Olofson, Project Manager
S.F. Bay Regional Water Quality Control Board
2101 Webster Street, Suite 500
Oakland, CA 94612
Phone: 510-286-0427
Fax: 510 873 6322

Joshua N. Collins, Ph.D.
Science Coordinator
San Francisco Estuary Institute
Building 180 RFS
1325 South 46th Street
Richmond, CA 94804
Phone: 510-231-9539
Fax: 510-231-9414
E-mail: Josh@SFEI.org

PROJECT GOALS STATEMENT

The Bay Area Regional Wetlands Ecosystem Goals Project will use available scientific knowledge to identify types, amounts, and distribution of wetlands and related habitats needed to sustain a diverse and healthy community of fish and wildlife resources in the San Francisco Bay Area.

Recommended by the Comprehensive Conservation and Management Plan, the project will provide a biological basis to guide a regional wetlands planning process and public and private interests seeking to preserve, enhance, and restore the ecological integrity of wetland communities.

SUMMARY OF PROJECT PLANNING PROCESS

(Denninger suggested section; Basic text by Pratt; edited by Collins for consistent terminology)

Information RMG Provides to Focus Teams

- ?? Orientation Package
- ?? Definition and Map of Geographic Scope
- ?? Identified Target Wetlands Types
- ?? Historical and Modern Wetland Descriptions by Type
 - ?? Distribution
 - ?? Total Area
 - ?? Patch Metrics (size, shape, edge/area, inter-patch distance, etc.)
- ?? Available Modern Ecological GIS Overlays
 - ?? **National Wetlands Inventory** *Collins*
 - ?? **Bay Area Baylands Atlas** *Collins*
 - ?? Avian Resources
 - ?? **Infrastructure** *Collins*
 - ?? **Land Use Zonation** *Collins*
- ?? Recent Summary Reports
 - ?? **Geological Survey Open File Report 94-543** *Collins*
 - ?? San Francisco Estuary Project Status and Trends Report
 - ?? **Fish and Wildlife Service Endangered Species Recovery Plans** *Collins*
 - ?? **Fish and Wildlife Service Concept Plans for Waterfowl Habitat Protection**
Collins

?? **Descriptions of Current Federal and State Estuarine Research and Monitoring** *Collins*

Information Focus Teams Provide to RMG

?? **Species Associations By Wetlands Type**

- ?? Overall Total
- ?? Assemblages
- ?? Key Species and Assemblages

?? **Status of Key Species and Assemblages** *Breaux also*

- ?? Review of Existing GIS Coverages
- ?? Compilation of Additional Historical and Modern Data for GIS Coverages

?? **Habitat ~~Prescriptions~~ Recommendation** *Breaux* for Key Species and Assemblages

(map and/or narrative) *also Collins, Breaux*

- ?? Minimum Required Habitat Area,
- ?? Optimal Habitat Patch Size, Patch Shape, Patch Array

Information RMG Provides to Public

?? **Integrated Focus Team Habitat ~~Prescriptions~~ Recommendation** *Breaux*

- ?? Resolved Ecological Conflicts
- ?? Identified Research Needs

?? **Alternative Regional Habitat Mosaics**

- ?? Narrative ~~Prescription~~ **Recommendation** *Breaux*
- ?? GIS

?? **Adaptive Management Model for Wetlands Ecosystem Decisions**

- ?? **How to Assess Project Risks** *Collins*
- ?? **How to Assess Project Performance** *Collins*
- ?? **How to Revise Regional Goals** *Collins*

BASIC RATIONALE OF PROJECT

The Bay Area Regional Wetlands Ecosystem Goals Project is recommended by the ~~California State~~ **Governor's** *Denninger* Wetlands Policy and the

Comprehensive Conservation and Management Plan (CCMP) produced by the San Francisco Estuary Project of the U.S. Environmental Protection Agency (EPA). ~~The project~~ **Wetlands Ecosystem Goals Project** *Tasto* is supported by ~~all most~~ *Collins in response to Breaux, Olofson, Pratt* agencies and non-governmental groups with major planning, operational, or regulatory interests in Bay Area wetlands. ~~The~~ *Tasto* Recovery Plans of the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) for the Estuary recommend restoration of tidal marshlands, with care to conserve the important natural resources of the diked baylands of the region. Major programs ~~that are designed~~ *Breaux* to recover and protect wetlands resources in the Bay Area **include:** *Breaux* the North Bay Wetlands Protection Plan of the Bay Conservation and Development Commission (BCDC), the Citizens **Committee** *Pratt* to Complete the Refuge, the Suisun Marsh Protection Plan, the U.S. Army Corps of Engineers (COE) Long-Term Management Strategy for dredging, the Bay Area Joint Venture, and the proposed National Estuarine Research Reserve of the National Oceanic and Atmospheric Administration (NOAA). ~~The~~ *Collins* Regional Wetlands ~~habitat goals~~ **Ecosystem Goals Project** *Pratt* ~~are is~~ *Collins* needed to coordinate these plans and maximize their individual and collective benefits.

~~These important~~ *Olofson* Efforts to recover and protect **wetlands in the Bay Area** ~~are commonly driven by the following beliefs.~~ ~~recognize three common facts.~~ *Olofson, Breaux* First, the ecological health of the region will require more wetlands of higher quality than exist now. Second, the amount of land available for wetlands **restoration** *Tasto* is decreasing. And third, no amount of wetland of any one kind can provide all the desired and necessary functions of wetlands. Therefore, the basic questions are: how much of what kinds of wetlands are required where, and why? ~~The process to establish regional wetlands habitat goals~~ **Bay Area Wetlands Ecosystem Goals Project** *Denninger, Olofson* is designed to answer these questions.

WHAT THE WETLANDS ECOSYSTEM GOALS WILL BE

?? The goals will be scientifically ~~valid~~ **derived.** *Tasto*

< *OR* >

**The goals will be based on biological information
and consensus of best professional judgment** *Pratt*

This means that the goals will be based upon an orderly and documented method of investigation that identifies the important questions, assembles a body of knowledge based upon observation and experimentation that addresses the important questions, draws conclusions based upon the knowledge, and assesses the uncertainty of the conclusions. Dissenting scientific opinion or **best professional judgment** *Pratt* will be included in the documentation of the goals process.

?

?? The goals will be flexible **to the extent that they will** *Tasto* allow dissenting public as well as scientific opinion, and changes in understanding.

< *OR* >

?? **The goals will be flexible enough to allow for public and scientific dissent and for changes in understanding** *Breaux, Olofson*

< *OR* >

?? **The goals will be flexible to address changing scientific opinion, landscape and public support.** *Pratt*

?? The goals will be **expressed as** *Denninger* one or more narratives and/or graphics of alternative habitat scenarios with quantitative and qualitative objectives. This might include producing alternative regional wetlands mosaics in a Geographic Information System (GIS) that would be available to the public and government decision-makers. These scenarios will be the basis for a regional wetlands protection policy to assist Bay Area government with the development of local action plans. The scenarios will also provide the foundation for the implementation plan of the San Francisco Bay Area Joint Venture, a partnership of public agencies, **private interests,**

Denninger and conservation organizations focused on wetlands acquisition, restoration, and enhancement.

WHAT THE WETLANDS ECOSYSTEM GOALS WILL NOT BE

- ?? The goals will not be a legal delineation of wetlands.
- ?? The goals will not be a substitute for detailed investigations or studies of wetlands project sites.
- ?
- ?? The goals will not dictate wetlands policy or land use regulation for any ~~private~~ *Pratt* property.

GEOGRAPHIC SCOPE OF THE PROJECT

At this time, the wetlands ecosystem goals project only pertains to the baylands of the Bay Area. The Bay Area is a region of the Golden Gate Ecosystem, which also includes the watersheds of the Sacramento River, the watersheds of the San Joaquin River, the watersheds of the ~~middle-rivers~~ **East Side Streams** *Wernette, Pratt* (e.g., the Consumnes, the Calaveras, and the Mokelumne), the Delta, and the Gulf of the Farallones. The Bay Area includes the Golden Gate Estuary and its watersheds downstream of the Delta at Broad Slough (see Figure 1). The baylands consist of the mudflats, the existing tidal marshlands, the tidal marsh channels, and the diked historical tidal marshlands (see Figure 2). **Subtidal areas will be considered to the extent necessary to develop ecological goals for the baylands.** *Collins in response to question from Tasto*

The project will initially focus on the baylands because they encompass the best understood wetlands, support the most species of special concern, and may represent the ~~largest~~ **greatest** *Tasto* opportunities to restore or enhance regional wetlands resources in the near future. Funding restrictions, **in addition to** *Breaux* inter-agency emphasis on the recovery of endangered **salt marsh** *Breaux* species of ~~salt marshes~~ and **to** *Breaux* solutions for dredging issues also help explain the initial focus of the goals process on the baylands of the Bay Area. Expansion of the

project to include the baylands upstream of Broad Slough may be scientifically advisable but is not practicable at this time.

It is anticipated that after goals are established for the baylands of the Bay Area, the project should be adjusted with new partnerships to include the baylands of the Delta. Thereafter, the project ~~should continue to be adjusted to~~ **would** *Tasto* include in-stream, riparian, and terrestrial habitats of the Bay Area. The project should eventually provide a common vision of ~~ecological health~~ *Tasto*, *Breaux* *Tasto* for all watershed planning, bio-diversity, and estuarine conservation efforts in the region.

~~BRIEF HISTORY OF THE PROJECT~~

(Breaux and Olofson suggests strike entire section)

The wetlands ecosystem goals project emerged from the State of The Estuary Conference held at the California Academy of Sciences on June 5, 1993. During that conference, an invited presentation by the San Francisco Estuary Institute (SFEI) promoted the concept of regional wetlands habitat goals, as recommended by the Comprehensive Conservation and Management Plan (CCMP) of the Estuary Project. Immediately thereafter, ~~the community that cares about wetlands~~ *Tasto* **a number of environmental organizations and agencies** *Pratt* in the Bay Area embraced a proposal by SFEI to answer the following basic questions: how much of what kinds of wetlands are needed where, and why? The questions and the willingness to answer them are positive outcomes of serious and sometimes divisive debates that had been ongoing within the community about the best use of existing and anticipated wetlands restoration opportunities.

SFEI, as recommended by the CCMP, assumed the initial leading role for development of the project. Based upon continuing dialog with leaders in the community, SFEI outlined a process to establish wetlands ecosystem goals based upon three kinds of understanding about wetlands: (1) what was the historical, pre-European condition of wetlands; (2) what is the modern condition; and (3) how has the distribution and abundance of wetlands been affected by natural habitat controls and human operations.

During the latter part of 1993, SFEI developed a proposal for the project that was ~~generally~~ approved **in concept** *Collins in response to Olofson* by government agencies representing the State Wetlands Policy and the Estuary Project, namely the State Resources Agency, the San Francisco Bay Regional Water Quality Control Board (Regional Board), and the EPA. **In support of the SFEI proposal, and in regard to other wetlands planning efforts in the Bay Area,** *Collins in response to Olofson* these agencies then began to meet regularly with all other state and federal agencies that have major interests in Bay Area wetlands ~~to provide policy alignment and funding in support of the project.~~ *Collins* By the start of 1994, this assembly of agencies had begun to refer to itself as the Bay Area Wetlands Planning Group.

Funding for the project began in early 1994. Since then, the project has progressed steadily in two main ways. SFEI has developed background scientific materials about the historical and modern conditions of baylands in the region, and the **Bay Area Wetlands** *Collins in response to Breaux* Planning Group has developed an administrative plan to ~~enable the project to happen through coordination of~~ **coordinate** *Breaux* wetlands policies for regional, state, and federal government. The background scientific materials were produced by SFEI as byproducts of work conducted under contract to ~~different Planning Group members. In this way, the Project evolved as a source of coordination of various wetlands conservation efforts, with appreciable in-kind services, and a broad funding base.~~ SFEI conducted work for *Olofson* the COE, the BCDC, the FWS, the NOAA, the Shell Oil Spill Trustees, the State Resources Agency, and the Bay-Delta Oversight Council (BDOC). Significant in-kind services have been provided to SFEI by the State Lands Commission (SLC), the FWS, the University of California (Berkeley and Davis campuses), the BCDC, and the Regional Board. At this time, the project was elevated to the position of highest priority for wetlands planning by the State Resources Agency.

~~As the project evolved, special efforts were initiated to strengthen relationships among the participating resource-Olofson-agencies. strikethrough suggested by Pratt~~ Starting in mid 1994, a "core group" of senior biologists from the California Department of Fish and Game (CDFG), the FWS, and the NMFS worked together to ~~build a consensus of understanding about the ecological functions~~ **discuss a shared vision of the Estuary and needed improvements in interagency coordination.** ~~of baylands in the Bay Area. Pratt~~ In late 1994, the "core group" began working with SFEI to develop the analytical process for scientifically valid, wetlands ecosystem goals. A draft process was produced through SFEI and presented to the Planning Group in March, 1995.

Following the presentation of the draft analytical process, the Planning Group began to implement its administrative plan with the formation of the interagency Resource Managers Group (RMG) to direct the project, and the Administrative Core Team (ACT) for ~~hands-on~~ *Breaux* logistical and clerical support, data management, and public outreach. The RMG consists of the "core group" plus other senior staff of the Planning Group who function well at the intersection between resource science, policy, and practical land management. The ACT began meeting in April 1995. The first meeting of the full RMG was held June 1, 1995. Since their formation, the RMG and ACT have met regularly to finalize plans for completing the project.

RESPONSIBILITY FOR THE WETLANDS HABITAT GOALS

The Resource Managers Group (RMG): senior agency wildlife biologists, representing expertise in Bay Area wetlands ecology - will establish and oversee Goals Project and act as the main decision-making body. *Olofson, Breaux*

~~—The RMG is responsible for establishing regional wetlands habitat goals. The RMG consists of senior wetlands managers in the Federal and California State agencies that have major regulatory or operational interests in wetlands of the Bay Area. Members of the RMG operate at the intersection among natural resource science, policy, and practical land management. The RMG is therefore the most appropriate group to produce the wetlands ecosystem goals. An Administrative Core Team supports the RMG with logistical planning, public outreach, science coordination, and inter government liaison (see Appendix I). Olofson, Breaux~~

Administrative Core Team (ACT): agency representatives - will provide administrative and public outreach support for Goals Project. *Olofson*

~~The Planning Group: The Planning Group is responsible for coordination and alignment of state and federal wetlands plans and operations that relate to the project. For example, the Planning Group helps coordinate among the Long Term Management Strategy (LTMS) of the COE, the Cal Fed Group, the North Bay Wetlands Protection Plan of BCDC, the Regional Wetlands Monitoring Program of SFEI, Endangered Species Recovery Plans of NMFS and FWS, the Concept Plan for Waterfowl Habitat Protection of the FWS, the Bay Area Habitat Joint Venture, the National Estuarine Research Reserve of NOAA, and the Ecosystem Demonstration Projects of the NRCS, NOAA, NASA, and USGS. Members in the Planning Group authorize their staff participation, including assignment to the RMG. The Planning Group is co chaired by the Ca State Resources Agency and the S.F. Bay Area Regional Water Quality Control Board (see Appendix II). Olofson~~

Focus Teams: scientists with recognized expertise in targeted populations of fish, wildlife and plants - will prepare habitat recommendations, including patch size, shape, vegetation type, and scientific rationale. Each Focus Team will be supervised by one or more RMG member, and will act as technical advisors to the RMG. *Olofson, Breaux*

~~The RMG members do not themselves have all of the technical expertise that will be required to establish goals that are scientifically valid. To meet the need for additional expertise, scientists are being recruited to serve on Focus Teams. The Focus Teams will function as the technical staff of the RMG. Each Focus Team will be **guided** *Tasto* by one or more RMG members. Olofson, Breaux~~ The Focus Teams may include scientists from government agencies, academic institutions, non-governmental organizations, and the private sector. Focus Team membership

will be decided by the RMG, based upon expertise, regional experience, and commitment to the project.

The following *Olofson* five Focus Teams are being established: ~~Together the Focus Teams represent all of the living resources of the baylands.~~ *Tasto, Denninger, Olofson* (1) Estuarine Fishes and Invertebrates; (2) Baylands Resident Mammals, Reptiles, and Amphibians; (3) Shorebirds and Waterfowl; (4) Other Baylands Birds; (5) Baylands Plants.

In addition to these five Focus Teams, a Hydro-geomorphic Advisory Team (HAT) is also being established. The HAT will work with each Focus Team and the RMG to assure that the goals are consistent with the best available information about baylands habitat controls.

San Francisco Estuary Institute (SFEI): will provide scientific support, research and coordination for the RMG and the Focus Teams, including digitizing and analyzing habitat maps and identifying/minimizing potential ecological conflicts among proposed habitats. *Olofson*

~~—SFEI will coordinate the scientific process used by the Focus teams and the RMG to establish the regional goals. **Coordination will include sponsorship or supervision of the HAT, orientation of the Focus Teams, data management, GIS for background data layers and products of the Focus Teams and the RMG, and final report writing.** *Collins response to request by Denninger for clarification* SFEI will provide regular progress reports to the ACT, the Planning Group, and the Science Review Group. *Strikethrough in response to Olofson*~~

Science Review Group: leading scientists with expertise in ecosystem analysis, integrated resource planning, and wildlife refuge design (membership not restricted to Bay Area experts) - will provide peer review for Goals Project process and products. *Olofson*

~~The sponsoring agencies of the RMG will establish a Science Review Group to assure that the wetlands ecosystem goals are comprehensive and scientifically **developed.** *Tasto* The Science Review Group will provide the leading expertise for the analysis and management of estuarine ecosystems. The Science Review Group will review the analytical process used to establish the wetlands ecosystem goals, will review the products of the Focus Teams, and will review any final products of~~

~~the project. The Science Advisory Committee of SFEI will serve as the core of the Science Review Group. Additional members for the Science Review Group are being recruited by the RMG, the ACT, and the Science Advisors Committee of SFEI (see Appendix III).~~ *Strikethrough in response to Olofson*

SCIENCE PROCESS

The following eight steps are provided as a draft outline of the orderly and documented investigation that the RMG will use to begin the scientific process to establish wetlands ecosystem goals for the baylands of the Bay Area. The RMG understands that the draft process outlined below may not work equally well for all Focus Teams, and that the process is likely to be modified by the Focus Teams in varying ways. The draft science process is what the RMG expects the Focus Teams to try to do.

Step 1: The RMG will develop ecological criteria to select target baylands environments and/or major ecological support functions **and values** *Pratt* that should be emphasized by regional and local wetlands recovery projects. **The support of a species or species group is considered a function.** *Collins in response to question from Breaux, Olofson This step has been completed.*

Step 2: The RMG will select the functions **and values** *Pratt* to be emphasized, and will establish Focus Teams to address the functions **and values** *Pratt* that are selected. *Target environments, species, and species groups have been selected. The selected species should not be construed as “indicator” or “evaluation” species.* *Tasto Hydro-geomorphology will be addressed as habitat controls by the Hydro-geomorphic Advisory Team (HAT) with coordination by SFEI.*

Step 3: The Focus Teams will **attempt** *Collins in response to suggestion by Pratt* estimate the target levels of support for the selected functions **and values** *Pratt* that should be achieved for the ecological health of the region. The target support level could represent a measured average value for a population parameter, an average value plus or minus some measured or estimated amount of variability in the parameter, an historic level of support, or a level of support that is unprecedented for the region but consistent with natural trends in the changing distribution or magnitude of the support function. **Existing**

Endangered Species Recovery Plans, Waterfowl Management Plans, goals for Habitat Joint Venture of neighboring regions, goals contained in the CVPIA and the Cal-Fed Accord, or other ecological goals for the estuary established through government can be used as starting points for estimates of target support levels of selected species. *Collins in response to suggestions by Pratt*

Step 4: Following a thorough review of existing pertinent information, including information about the historical and modern distribution and abundance of targeted wetlands environments, species, or species groups, *Collins in response to suggestions by Pratt* the Focus Teams will **attempt to** *Collins in response to suggestions by Pratt* translate the target levels of support into a **one or more** *Collins in response to suggestions by Pratt* narrative ~~prescription~~ **recommendations** *Breaux* for the amount and arrangement of habitats. Each habitat ~~prescription~~ **recommendation** *Breaux* should, to the extent possible, indicate the minimum patch size, optimal patch shape, maximum distance between patches, and total habitat amount for each of four subregions: (1) the South Bay Area, (2) Central Bay Area, (3) North Bay Area, and (4) Suisun Bay Area. The narrative ~~prescription~~ **recommendation** *Breaux* should be illustrated with map overlays of the SFEI Baylands Atlas suitable for GIS. To the extent possible, the connections between adjacent subregional mosaics should be seamless.

Each Focus Team will provide its narrative ~~prescription~~ **recommendation(s)** *Breaux* and map(s) **(if available)** *Collins in Response to Pratt, Breaux* to SFEI, plus a short report of the supporting scientific rationale. This rationale should be provided in three categories of information: (1) what is certain based upon established scientific fact, (2) what is expected based upon extrapolation from fact, and (3) what is anticipated in the absence of fact **but** *Tasto* based upon best professional judgment.

The regional wetlands habitat goals should be stated in terms of habitat (i.e., habitat ~~prescription~~ **recommendation** *Breaux*) rather than level of ecological function (i.e., population size) for three main reasons. First, some targeted populations vary in size due to natural processes and human operations outside of the Bay Area. For these populations, ecosystem goals stated in terms of population size might not be achieved because of undocumented circumstances beyond the ecosystem, and failure of efforts to achieve the goals might therefore be wrongly inferred. The chosen way to avoid this problem is to state the target level of support in terms of habitat. Second, the distribution, abundance, and hydroperiod of Bay Area wetlands are particularly variable in time, due to natural climatic variability. Population response to this variability in habitat involves lag times and other dynamics which can greatly increase costs of routine functional assessments. The chosen way to avoid these costs is to represent the variability as attributes of habitat for each function. Third, habitats are easier to monitor than living resources.

The base map for the habitat ~~prescription~~ **recommendations** *Breaux* will be the Baylands Atlas produced by SFEI. As instructed by the RMG, the Baylands Atlas shows the distribution and abundance of twelve operational categories of baylands throughout the Bay Area: (1) Tidal and Subtidal Shallow Water; (2) Tidal Lagoon; (3) Tidal Mudflats; (4) Tidal Marsh; (5) Managed Tidal Marsh (having water control structures); (6) Salt Ponds; (7) Permanent Wetlands Ponds; (8) Seasonal Managed Wetlands; (9) Diked Seasonally Flooded Wetlands (halophyte dominated); (10) Farmed or Grazed Seasonal Wetlands; (11) Abandoned Salt Ponds; and (12) Vernal Pools (recently evolved or adjacent to baylands).

Step 5: The Focus Teams and SFEI will work together to maximize agreement between narrative ~~prescription~~ **recommendations** *Breaux* and illustrative maps, **if they are available.** *Collins in response to Pratt, Breaux* This is a complex step involving some iterative analyses. The rate of progress through this step is likely to vary among the Focus Teams.

The Focus Teams should **attempt to** Collins in response to Pratt, Breaux translate their habitat ~~prescription~~ **recommendations** Breaux into regional habitat maps. Each Focus Team will draw its map directly onto 7.5 minute (1:24000 scale) USGS Topographic Quadrangle Sheets, 1:24000 scale hardcopy of the Baylands Atlas, **or other suitable scale of the Baylands Atlas.** Collins SFEI will digitize each habitat map and, using GIS, will compare each narrative ~~prescription~~ **recommendation** Breaux to its accompanying map. SFEI will continue to work with each Focus Team to maximize the agreement between the maps and the narrative ~~prescription~~ **recommendations** Breaux.

Step 6: As of the time of this writing, the RMG has not agreed upon the level of specificity of the final product Denninger. **While acknowledging this uncertainty, the RMG anticipates that the scientific process will continue with compilation of the habitat prescription recommendation Breauxs from the Focus Teams. The following approach to compilation of the habitat ~~prescription~~ recommendations Breaux has been suggested** Collins. SFEI will construct a matrix ~~show~~ **showing the** Tasto, Wernette, Breaux amount of geographic separation and overlap among the habitat ~~prescription~~ **recommendations** Breaux provided by the Focus Teams. The Focus Teams and the RMG will determine what sympatry between which pairs of habitat ~~prescription~~ **recommendations** Breaux represents potential ecological conflicts. Habitat ~~prescription~~ **recommendations** Breaux that are in conflict will be revised by the Focus Teams, and agreement between the revised maps **(if they are available)** Collins in response to suggests by Pratt and their narrative ~~prescription~~ **recommendations** Breaux will be analyzed by SFEI. Revisions will continue until one or more alternative, regional, optimal wetlands mosaics is developed. The optimal mosaic will minimize the disagreement between each habitat ~~prescription~~ **recommendation** Breaux. All interim stages of production of each habitat ~~prescription~~ **recommendation** Breaux and each

regional mosaic will be archived in electronic format and hardcopy at SFEI.

Step 7: The RMG and Focus Teams will work together to develop guidelines about project size and scheduling to minimize temporal ecological impacts that might occur as the wetlands habitat goals are achieved. The final product of the RMG would be a narrative description of the generalized mosaic with or without illustrative maps for each of the four major subregions, the Suisun Area, the North Bay Area, the Central Bay Area, and the South Bay Area.

Step 8: The RMG will recommend an adaptive management model for wetlands ecosystem decisions. The model will recommend how to assess wetlands project performance, project risks *Collins in response to task list by Pratt*, and how the regional wetlands ecosystem goals should be revisited and adjusted to accommodate new **information and** *Tasto* understanding.

In addition to recommending a decision model, *Collins* the RMG should draft a set of general principles that it can use to guide itself. For example, the RMG might state that tidal marsh restoration without use of dredged sediment should mainly occur near the existing bay edge, where sediment supply and tidal action promotes natural accretion; some diked baylands should be managed intensively for a greater level of waterfowl support than the lands would naturally sustain, as necessary to compensate for declines in habitat throughout the flyway; to the extent possible, cooperative adjustments in farming practices that help achieve the goals should be encouraged; etc.

During this analytical process, questions may arise about the nature of the baylands that are so **large complex** *Collins in response to question from Tasto* and important that while they cannot be answered exactly, they also cannot be ignored. For example, some **large complex** *Collins in response to question from Tasto* questions have been raised about sediment supply, sediment quality, and sea level rise. The RMG and

Focus Teams should help translate such questions into statements of needed research that could serve as the scientific basis to adjust the goals in the future.

The effects of human operations on the ecological functions **and values** *Pratt* of wetlands should be considered as the wetlands habitat goals are established, but the goals should be based upon the natural history of target species and their habitats. Whereas the limitations of ecological **functions and values** *Pratt* change slowly through evolutionary time, human operations and their ecological effects vary greatly and more rapidly. Goals based upon natural history can transcend the vagaries of human operations. The goals will represent what the community should do if it could. And this will change. The goals should help guide adjustments in human operations as necessary to achieve the goals.

PROJECT SCHEDULE (DRAFT)

The following schedule suggests the future major milestones of the project. **The schedule is optimistic and some adjustments are likely.** *Collins in response to comment by Tasto, Pratt* The details of check points for the Focus Teams, public meetings for RMG, and periods of contact with the Science Review Group are not shown. Given that the project is largely without precedence in this region, its timing and duration cannot be forecast exactly.

June - September 1995: Organize Project Structure; Establish Focus Teams (Steps 1 and 2 of scientific process).

October - December 1995: Prepare Habitat ~~Prescription~~ **recommendations** *Breaux* and Scientific Rationale (Steps 3 and 4 of scientific process).

January - February 1996: Prepare GIS of Habitat ~~Prescription~~ **recommendations** *Breaux* (Step 5 of scientific process).

March - May 1996: Develop Draft Wetlands Ecosystem Goals (Step 6 of scientific process).

June 1996: Release Draft Goals for Public Review; Develop Draft Guidelines for Implementation (Step 7 of scientific process).

July - August 1996: Revise Goals; Develop Process for Future Revisions (Step 8 of scientific process).

September 1996: Release Final Products of Project.

~~SOME GUIDING PRINCIPLES TO FRAME DEBATE~~

(Breaux suggests strike entire section)

- ?? The regional wetlands habitat goals will ~~stand alone as~~ **be** *Tasto* the scientific recommendation for how much of what kinds of wetlands should be maintained to achieve target levels for selected ecological functions **and values** *Pratt*, recognizing that new opportunities to realize the goals will emerge as human operations, physical infrastructure, and climate change.
- ?
- ?? The region of interest is the Bay Area, meaning the Golden Gate Estuary and its watersheds between the Delta at Broad Slough and the Golden Gate.
- ?? The Geomorphic boundaries of the Bay Area are transcended by important living resources, such as migratory birds and fishes, which are functional links to other ecosystems and other regions.
- ~~?? The whole is more than the sum of its parts, and the part is more than a fraction of the whole. Pratt~~
- ~~?? If two systems appear to occupy the same position at the same time, then the view is incomplete. Pratt~~
- ~~?? A process at one level of organization has a function at a different, higher level of organization. Pratt~~

- ?? Not all functions **and values** *Pratt* have significant regional aspects. Adoption of a regional perspective demands some insight and selectivity to know which functions **and values** *Pratt* can be addressed locally without serious errors in management, and which functions **and values** *Pratt* must be addressed regionally.
- ?? Fundamentally, the goals should be based upon three understandings: the past, the present, and change.
- ?? Some topics are so large and important that they cannot be addressed completely or ignored. Such topics are best addressed as research needs.

STATUS OF REGIONAL DATA SETS

Some important regional data about the past and present distribution of baylands and the current distribution of major ecological resources have been compiled by SFEI to support the project. Additional data will be compiled, depending upon requests from the RMG, Focus Teams, Science Review Group, and pending funding.

Climate Data

Daily weather data for all NWS stations throughout the region have been compiled for years since 1943 in Excel and on CD. **These data can be used to explore spatial and temporal patterns of seasonal wetland hydroperiod.** *Collins* For example, a first approximation of hydroperiod for obvious places of soil saturation in farmed baylands of the North Bay Area *Collins in response to Breaux , Pratt* has been computed for different water year types, based upon a simple spreadsheet model that relies upon empirical data for rainfall and evaporation, published values for field capacity, and qualitative observations of depth to the free-standing ground water surface.

Historical Wetlands Data

The historical array of tidal marshlands, tidal ponds, riparian features, and palustrine wetlands on the alluvial plains of the region has been compiled at 1:24,000 scale on archival base maps and is moving into GIS ArcInfo at SFEI. **As of the time of this writing, completion of historical wetlands data layer in GIS will take four to six weeks, pending funding.** *Collins in response to question from Tasto* Evidence to support the historical picture has a vintage of 1760 to 1900. A data base exists of all evidence to support the size, shape, and location of each feature (see Figure 3).

Modern Wetlands Data

The Baylands Atlas as described briefly above (see Figure 4) has been reviewed by the environmental community and agencies participating in the project. This review has focused on corrections about the classification of wetlands as mapped, rather than the correction of wetlands boundaries. Attribute data include dominant land management practices, and detailed maps of ditches and seasonal ponding patterns (see Figure 4).

Ecological Resources

Data for avian resources and special status species have been compiled in Excel and GIS ArcInfo at SFEI. Avian data include synoptic surveys by the Point Reyes Bird Observatory, the CDFG, and the FWS that show temporal and spatial patterns for species and major functional groups of waterfowl and shorebirds. **The FWS Diked Baylands Study also indicates the distribution of upland birds and other wildlife among the diked baylands.** *Pratt* A recently completed synoptic survey of fishes of creeks and rivers of the Bay Area sponsored by the EPA could be incorporated into this data set.

Landscape Resistance

The total of physical infrastructure for human operations represents landscape resistance to large-scale wetlands restoration. The infrastructure picture is relatively weak but adequate at this time. Public domain information about roadways and utilities has been augmented with point source outfalls and landfills. Some other

kinds of important information, such as the location of flood control storage basins and some underground facilities, is not available at this time. The landscape resistance data layers exist in GIS ArcInfo at SFEI.

Land Use

A regional map of land use zonation is available in GIS ArcInfo based upon data from the Land Use Status And Trends Report for the Estuary Project, and additional data for the Greenbelt Alliance. In addition, the CDFG and Cargil Salt will help to provide classifications of impounded waters of refuges and salt evaporators based upon their surface water management objectives and operations.

APPENDIX I

Resource Managers Group and Administrative Core Team

THE RMG

Bob Batha	BCDC
Dennis Becker	CDFG
Andree Breaux	RWQCB
Melanie Deninger	CCC
Brenda Grewell	DWR
Paul Kelly	CDFG
Dante Maragni	NMFS
Deborah McKee	CDFG
Mike Monroe	EPA
Ruth Pratt	FWS
Betsey Radke	FWS
Jim Swanson	CDFG
Bob Tasto	CDFG
Frank Wernette	CDFG
Carl Wilcox	CDFG
Tom Yocom	EPA

The Act

Jeff Blanchfield	BCDC
Marcia Brockbank	RWQCB
Michael Carlin	RWQCB
Steve Chistiano	Facilitator
Josh Collins	SFEI
Craig Dennisoff	RA
Jeff Jensen	BCDC
Peggy Olofson	RWQCB
Nancy Schaefer	BA Joint Venture
Carl Wilcox	CDFG
Stephanie Wilson	EPA

APPENDIX II**Planning Group**

(active membership varies and can include people not listed here)

Jim Burroughs (Co-Chair)	CaRA
Michael Carlin (Co-Chair)	RWQCB
Mike Acetuno	FWS
Bill Blais	CaEPA
Bill Campbell	CaWB
Craig Dennisoff	CaRA
Calvin Fong	COE
Maria Rae	EPA
Will Travis	BCDC
Col. Walsh	COE
Carl Wilcox	CDFG
Stepanie Wilson	EPA

APPENDIX III
Science Review Group
(Core Membership)

Dr. Ted Foin	UC Davis
Dr. Bob Given	Marymont College
Dr. Luna Leopold	UC Berkeley
Dr. Sam Luoma	USGS Menlo park
Dr. Alan Mearns	NOAA Seattle
Dr. Fred Nichols	USGS Menlo Park
Dr. Doris Sloan	UC Berkeley
Dr. Mike Stenstrom	UC Los Angeles
Dr. Rick Swartz	USEPA Newport

EXAMPLE HABITAT PRESCRIPTION RECOMMENDATION BREAUX: TIDAL MARSHLAND

As of the time of this writing, the RMG has not agreed upon the level of specificity of the final product *Denninger*. While acknowledging this uncertainty, the following example of a habitat ~~prescription~~ recommendation *Breaux* was invented as an illustration of possible map products from the Focus Teams, and possible final map products from the RMG *Collins*.

Figures 5-7 show three fictitious alternative maps of recommended tidal marshland for a single 1:24000 scale quadrangle of the Baylands Atlas. These alternative maps would connect in a seamless way to similar alternatives shown for adjacent quadrangles. Each alternative would be consistent with a narrative ~~prescription~~ recommendation *Breaux* that is justified and documented with three kinds of information: what is known as scientific fact about the targeted tidal marsh habitat, what is not known but expected based upon established fact, and what is anticipated based upon a consensus of professional judgment. Each alternative map is an illustration of the same habitat ~~prescription~~ recommendation *Breaux*.

Figure 8 shows a possible draft mosaic of all major baylands types for the same quadrangle. This figure illustrates the anticipated product of the effort to integrate the habitat ~~prescription~~ recommendations *Breaux* from the different Focus Teams. What is apparent in this invented example is that a fourth alternative map of tidal marshlands was derived based upon the efforts to integrate among all the habitat ~~prescription~~ recommendations. *Breaux* Based upon this first mosaic, alternative mosaics could be devised that provide the same general mix and relative positions of major environments.