

## SAN FRANCISCO BAY SUBTIDAL HABITAT GOALS REPORT



### Appendix I-I: Project Description and Methodology

MARILYN LATTA

## **I. Project Purpose**

The San Francisco Bay Subtidal Habitat Goals Project (Subtidal Goals Project) is a collaborative interagency effort between the San Francisco Bay Conservation and Development Commission (BCDC), California Ocean Protection Council (OPC)/California State Coastal Conservancy (SCC), National Oceanic and Atmospheric Administration (NOAA) and the San Francisco Estuary Partnership (SFEP) that will establish a comprehensive and long-term management vision for protection, restoration, and research of the subtidal system of San Francisco Bay. The Subtidal Goals Project is an outgrowth of both the need for greater information to make sound management decisions, and the desire of diverse stakeholders to know where it is appropriate to locate potential projects, as well as to identify restoration opportunities.

**Problem Statement:** San Francisco Bay is a dynamic urban estuarine environment that provides important habitat for fish, other aquatic organisms, and wildlife, and is a valuable economic and aesthetic resource. There are numerous pressures facing the subtidal habitats of San Francisco Bay. Human uses such as fishing, marinas, shipping and ports, dredging, sand mining, transportation projects, recreational use, and industrial uses have direct impacts on the subtidal habitat of the Bay. Subtidal habitats are also threatened by non-native species and other systemic alterations such as bathymetric changes, water control in the delta and both point and non-point source pollution. Despite the considerable research conducted in San Francisco Bay, many gaps in knowledge remain concerning the different components of subtidal habitats and their utilization by aquatic species. There is also a lack of information regarding the natural changes the Bay has undergone and continues to undergo. A coordinated, comprehensive, focused effort that identifies research needs as well as goals for protecting and enhancing the subtidal ecosystem is needed in order to improve management of the Bay's resources.

## **II. Vision Statement**

The vision of the Subtidal Habitat Goals Project is to achieve, over the next 50 years, a net improvement of the San Francisco Bay's subtidal ecosystem through restoration, science, and management. To achieve this improvement, the Subtidal Habitat Goals Project proposes:

- ∞ Increasing the quantity of desired but currently limited habitats;
- ∞ Emphasizing support of native species;
- ∞ Increasing our understanding of the physical and biological processes that affect subtidal habitats and species.

As the first step in implementing the Project Vision, the Subtidal Habitat Goals Project will produce a document that will outline the best available existing scientific information for subtidal habitats in San Francisco Bay:

- ∞ Identify, document, and describe subtidal habitats, their function and relationships within the San Francisco Bay
- ∞ Recommend management, science, and restoration goals for subtidal habitats in the San Francisco Bay based on the best available scientific information

- ∞ Identify, prioritize, and recommend research needs for understanding San Francisco Bay subtidal habitats and the current level and source of impacts to these habitats.

### **III. Overall Project Approach**

#### **Key Decisions:**

- ∞ The geographic scope of the Subtidal Habitat Goals Project is San Francisco Bay from Sherman Island west to the southern extent of the bay and ocean-ward to the Golden Gate (Point Bonita to Point Lobos). Although the Delta is not included in the project scope, conditions in the Delta and their relationship to subtidal habitat in the bay are addressed in the sections on freshwater input and climate change (see Chapter 3).
- ∞ For the purposes of this project, “subtidal habitat” includes all submerged areas of the bay. The project also includes certain intertidal habitats, that were not specifically addressed in the 1999 Baylands Ecosystem Goals Report, especially intertidal mudflats, eelgrass, sand beaches, rocky intertidal areas, and hard substrate.
- ∞ Existing conditions and available habitat information serve as baseline conditions.
- ∞ Science, restoration, and management needs must all be considered. Science goals include both monitoring and research. Management goals include both management of priority stressors and protection of habitats. Restoration goals include regional recommendations and specific actions at specific sites.
- ∞ The goals build upon opportunities and information developed by existing subtidal pilot projects, including in-the-water monitoring, restoration, mitigation, and research projects in San Francisco Bay.
- ∞ This document avoids prioritizing among habitats; however, restoration of some may result in conversion of others: for example, some soft substrate may be lost or enhanced through restoration of eelgrass or shellfish beds.
- ∞ Because there is a great deal of uncertainty about the functions and value of subtidal habitats and the utility and likely success of restoration, this report suggests using an adaptive management approach to implementing the goals. See discussion that follows.
- ∞ To the extent that adaptive management proves infeasible at the program level, progress on achieving the goals—as measured by improved scientific understanding and practical experience in subtidal habitat restoration and protection—should be reviewed and evaluated in a report by 2020. The goals can then be modified as needed. Interim updates on particular topics can potentially be provided within 10 years, and discussed through regional forums and conferences.

**Habitat Approach:**

- ∞ Utilize a habitat approach in the development of goals. As such, goals will be based on habitat needs, rather than needs of representative species. Habitats are categorized as follows:
  1. Soft substrates (including mud, sand, shell mix)
  2. Rock habitat (including all sizes from pebbles to large outcrops)
  3. Artificial structures
  4. Shellfish beds
  5. Submerged Aquatic Vegetation
  6. Macroalgal Beds
- ∞ Natural habitats are preferred over artificial structures because of their higher performance for ecosystem functions (i.e. species diversity, productivity). Artificial habitats, when they have similar physical properties as natural habitats or substrates, can also provide similar functions that may be beneficial to the bay ecosystem.
- ∞ Where appropriate, address special features of habitat types (e.g., sand waves, morphology, three dimensional structure, and texture).

**Goal Development:**

- ∞ Use best available information and best professional judgment when developing goals

***Definition:** Best professional judgment is the ability of a single professional or team of professionals recognized as experts in their fields. to draw conclusions, give opinions, and make interpretations based on objective evidence as well as experience, which includes some subjectivity.*

***Definition:** Best available information refers to the most relevant existing information that is currently and readily available, that is not contingent on acquisition of new information, and was acquired with the most relevant and contemporary data and methods. This term acknowledges the existence of scientific uncertainty and dictates that prudent management be consistent with the information that is available even though data gaps exist. For the Subtidal Habitat Goals Project, best available information may include published scientific research articles; grey literature; relevant government agency reports; regional project information from academics, non-profits, and the private sector; and unpublished information provided by committee members and regional experts.*

- ∞ When relying on best professional judgment, default to conservation of natural resources

***Definition:** In developing restoration and management goals and recommendations, when there are potential adverse impacts to the environment, the consequences of*

*stressors are uncertain, or cause and effect relationships of stressors are not fully established scientifically:*

- (1) protective or restorative measures should be recommended; and*
- (2) the benefit of the doubt should be given to conservation of natural resources.*

*A precautionary approach is important, because:*

- (1) scientific standards for demonstrating cause and effect are very high;*
- (2) serious, evident effects such as climate change and the disappearance of species can seldom be linked decisively to a single cause; and*
- (3) the effects of harmful activities have accumulated over the years, and the natural world has a limited capacity to absorb and overcome this harm.*

- ∞ Consider climate change as scientifically evident and incorporate into goal development process the following climate change projections for the years 2010-2060.

- (1) sea level will rise between 16.5” and 55” in San Francisco Bay, depending on the rate of thermal expansion and arctic ice melt<sup>1</sup>,*
- (2) air temperature will rise between 1 and 5.5 degrees Fahrenheit depending on future emission scenarios<sup>2</sup> and,*
- (3) water temperature will rise between 1 and 2 degrees Fahrenheit depending on future emissions scenarios<sup>3</sup>.*

*Additionally, it is our belief that salinity will increase in the northern reaches of the Bay and the Suisun Marsh, thereby reducing the extent of brackish waters in the Suisun Marsh<sup>4</sup>, and that Bay water turbidity changes are uncertain: salinity may decrease due to reduced wave-induced shear stress in the shallowest areas or potentially increase due to increased precipitation falling as rain<sup>5</sup>.*

- ∞ Sediment supply and budget should be a driving factor in goal development, especially goals for protection or restoration of habitats that depend on sediment supply for success.
- ∞ Incorporate strategies for measuring progress towards goals in a 10 year review document, and the success of goals in meeting the project’s overall vision.

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<sup>1</sup> California Climate Action Team Report on Climate Change

<sup>2</sup> Robert Bilby, National Marine Fisheries Service; California Climate Change Center

<sup>3</sup> US EPA

<sup>4</sup> California EPA

<sup>5</sup> Neil Ganju on behalf of Dave Schoelhammer, USGS

#### **IV. Summary of Methodology and Participant Roles**

The following section describes the organization of the Subtidal Habitat Goals planning participants and partners, including their role and key tasks. These descriptions include recent changes made in project structure, staff, and consultants.

##### Executive Steering Committee

The Executive Steering Committee consists of key executive managers from Federal and State agencies that have management or regulatory authority regarding subtidal habitats in the San Francisco Bay. The role of this group will be to provide direction, commit resources, and provide support for the development of the Subtidal Goals Project.

##### Project Manager

The Project Manager position was created in light of the challenges faced by the Subtidal Goals project related to staff resources and committee management. Project Manager Marilyn Latta (State Coastal Conservancy) manages all aspects of the Subtidal Goals Project and acts as the main liason for the Science Advisor, Administrative Core Group staff, consultants, committee members, scientific experts, key stakeholders, and the general public. Major tasks and responsibilities include: setting up and participating in regular Administrative Core Group planning meetings; being responsible for the project timeline and for meeting all deadlines; supervising all of the consultants as well as content development and deliverables; managing all grants; developing content for the project website and mapping tool; and serving as the lead on outreach to stakeholders and on all public workshops.

##### Administrative Core Group

The Administrative Core Group is made up of staff from NOAA (Korie Schaeffer from National Marine Fisheries Service and Natalie Cosentino-Manning from the NOAA Restoration Center; plus work by NOAA Coastal Services Center staff Adrienne Harrison, Becky Smyth, Christina Hoffman, Christina Cairns), Bay Conservation and Development Commission (Caitlin Sweeney, Brenda Goeden), State Coastal Conservancy (Marilyn Latta, prior work by Michelle Jesperson, Abe Doherty, and Moira McEnespy), and the San Francisco Estuary Partnership (Judy Kelly). This group manages the Subtidal Goals Project, including coordinating and facilitating the Executive Steering Committee, the science, restoration and resource management working committees, the science advisor, and the stakeholders. The members of this group have had a key role in the formation of the Project, and hold extensive institutional knowledge that is drawn upon to guide project direction, partners, and outcomes. The group coordinated the development of the Subtidal Habitat Goals Project document, and worked with the committees to review information developed by the Administrative Core Group, the consultants, and the Science Advisor. This group will also assist with developing information to be included in the project website and any other outreach materials and efforts.

##### Science Advisor

Dr. Wim Kimmerer, a faculty member at San Francisco State University, is the Science Advisor for the Subtidal Goals Project, and provided key direction for project vision and the overall approach. Dr. Kimmerer prepared the conceptual models, adaptive

management approach, potential long-term change impacts, and other scientific background information for the project. He developed the research goals and worked closely with the Administrative Core Group to integrate research goals with restoration and management goals.

#### Editor

The Editor (Lisa Owens Viani of the San Francisco Estuary Partnership, plus prior work by Eleanor Ely) is responsible for editing the final content of the Subtidal Habitat Goals Document.

#### GIS Manager

The GIS maps for the project were initially developed by Dan Robinson (NOAA 2007-08 fellow at the Bay Conservation and Development Commission); and then finalized by Charleen Gavette (NOAA National Marine Fisheries Service). Additional consultants developed GIS layers as part of the San Francisco Bay Creosote and Artificial Structures Assessment Report and the Subtidal Goals website Google Maps tool (described below).

#### Management Consultant

##### *Subtidal Habitat Stressor Narrative Descriptions*

The Subtidal Habitat Goals Project hired technical writer Dr. Andrew Cohen (private consultant and staff of the San Francisco Estuary Institute) to compile relevant information about specific stressors to subtidal habitats (see Appendix 2-1). The stressors include contaminants, activities that disturb bottom sediments, activities that increase suspended sediments, activities that increase nutrients, and placement of artificial structures in the bay. The narrative descriptions provide information about specific impacts to subtidal habitats from these stressors, and are used to develop ratings for severity, irreversibility, and scope of these stressors on subtidal habitats in the bay. This information was used to inform management recommendations.

#### Restoration Consultants

##### *Restoration and Research Planning: Native Oyster and Native Eelgrass Habitats*

The Subtidal Habitat Goals Project hired a team of consultants from University of California at Davis, including Dr. Chela Zabin, Dr. Ted Grosholz, Sarikka Attoe, and Caitlin Coleman-Hulbert, to prepare a report on Shellfish Conservation and Restoration in San Francisco Bay: Opportunities and Constraints (see Appendix 7-1), with suggested research and restoration targets for the project. The project also hired a consultant team, including Dr. Katharyn Boyer from San Francisco State University and Dr. Sandy Wyllie-Echeverria from the University of Washington, to develop a report on Eelgrass Conservation and Restoration in San Francisco Bay: Opportunities and Constraints (see Appendix 8-1), with suggested eelgrass restoration and research targets for the bay.

##### *San Francisco Bay Creosote and Artificial Structures Assessment*

The Subtidal Habitat Goals Project has recognized removal of artificial structures, particularly abandoned pilings and structures that were treated with creosote, as a possible priority restoration activity for San Francisco Bay. A bay-wide assessment of the impacts and benefits of creosote pilings in San Francisco Bay was conducted by the San Francisco Estuary Institute (SFEI) with assistance from NOAA. SFEI and a team of

subcontractors assessed the potential impacts (and the benefits) of the creosote-treated pilings; mapped the structures throughout the Bay; developed methods for determining potential historic significance or lack of significance; and assessed the methods and actions that would be needed to remove or treat the structures. The group also made recommendations for reducing impacts from other types of artificial structures in the bay, including pier pilings, wharves, moorings, and others.

The consultant work listed above provided the basis for further planning by the Administrative Core Group, Science Advisor, and Committees.

#### Working Committees- Advisory Role

The Subtidal Goals Project consists of four working committees, whose role is to provide review and input to the goals development process. The draft goals and strategies for each habitat type were developed by the Project Manager, Administrative Core Group, Science Advisor, and Consultants. Each of the Committees – the Executive Steering Committee, Science Committee, Restoration Committee and Resource Management Committee – provided advice and guidance to the Administrative Core Group in the development of subtidal habitat goals for research, restoration and resource protection.

Please see a complete list of Committee Members at the end of this document.

#### *Science Working Committee*

The Science Committee is composed of well-known experts in the different physical and biological aspects of the Bay. The Science Committee worked to identify what is known about subtidal habitats, and what is yet to be studied. They also identified aspects of human activities that have impacts on the Bay, as well as ways to quantify the quality of the existing habitat. The Science Committee reviewed goals and strategies for priority research and monitoring needs for the bay.

#### *Criteria for Science Committee:*

1. Area of expertise essential to process and not duplicative with another member.
2. Objective representation; no conflicts of interest.
3. Expertise recognized by peers and reflected in work, publications, etc.
4. Expertise relative to San Francisco Bay.
5. Availability/willingness to participate fully at all steps of the process.
6. Knowledge of interaction between species, habitat function and physical processes.

#### *Areas of Expertise to Cover:*



- ∞ Marine Algae (macro to phytoplankton)
- ∞ Invertebrates (macro to zooplankton)
- ∞ Fishes
- ∞ Seagrasses
- ∞ Birds
- ∞ Geology
- ∞ Hydrology
- ∞ Sediment Chemistry
- ∞ Sediment Dynamics
- ∞ Biological Oceanography
- ∞ Water Quality
- ∞ Non-native invasive species
- ∞ Climate Change/Sea-level Rise
- ∞ Experience from other estuarine systems (i.e., Chesapeake Bay, Puget Sound, New York)
- ∞ Marine Mammals

*Restoration Working Committee*

The Restoration Committee is composed of scientists, resource managers, and representatives from community groups actively engaged in and knowledgeable about restoration efforts pertinent to subtidal habitats in San Francisco Bay. The Restoration Committee reviewed goals and strategies for priority restoration techniques and sites in the bay.

*Criteria for Restoration Committee:*

1. On-the-ground restoration experience relative to habitats of concern.
2. On-the-ground restoration experience in San Francisco Bay.
3. Area of expertise not duplicative with another member.
4. Expertise recognized by peers and reflected in work, publications, etc.
5. Availability/willingness to participate fully at all steps of the process.
6. Objective representation, no conflict of interest.

*Areas of Expertise to Cover:*

- ∞ Seagrasses
- ∞ Invertebrates (w/ regards to habitat associations)
- ∞ Fishes (w/ regards to habitat associations)
- ∞ Oysters
- ∞ Invasive species
- ∞ Water Quality
- ∞ Birds
- ∞ Wetlands (focus on subtidal habitats/processes within wetlands)
- ∞ Pollutants
- ∞ Contaminant remediation
- ∞ Removal of substructures
- ∞ Restoration experience outside of San Francisco Bay
- ∞ Restoration experience in San Francisco Bay
- ∞ Community-based Restoration with volunteers

*Resource Management Working Committee*

The Resource Management Committee includes staff from federal, state, and local agencies that manage or regulate the use of subtidal resources in San Francisco Bay. The Resource Management Committee reviewed goals and strategies for best management practices and protection of subtidal habitats in the bay.

*Criteria for Resource Management Committee:*

1. Represent Federal, state, or local agency or other entity directly involved with management of subtidal resources in San Francisco Bay.
2. Availability/willingness to participate fully at all steps of the process.
3. Objective representation.

*Agency/Organization Representation:*

- ∞ NOAA Fisheries, Habitat Conservation Division, Southwest Region
- ∞ US Environmental Protection Agency
- ∞ US Fish and Wildlife Service, San Pablo Bay National Wildlife Refuge
- ∞ National Park Service, Golden Gate National Recreation Area
- ∞ San Francisco Bay National Estuarine Research Reserve
- ∞ CA Coastal Conservancy
- ∞ CA Department of Fish and Game
- ∞ CA Department of Parks and Recreation/ Boating and Waterways
- ∞ CA State Lands Commission
- ∞ SF Bay Conservation and Development Commission
- ∞ SF Bay Regional Water Quality Control Board
- ∞ East Bay Regional Park District
- ∞ Association of Bay Area Governments

**Scope of Work (All Committees):** Provide technical oversight, review draft recommendations, and participate in committee meetings for the San Francisco Bay Subtidal Habitat Goals Project.

**Tasks:**

- 1) Review Habitat Characterization Report (NOAA 2007) and Habitat Categories
- 2) Identify Habitat Threats/Opportunities of Concern
- 3) Conduct preliminary review of draft recommendations, consultant reports, and GIS maps for the Subtidal Habitat Goals Project.
- 4) Participate in Science, Restoration, Management, and Executive Steering Committee meetings to discuss and provide verbal feedback on draft recommendations.
- 5) Provide written comments on all draft recommendations towards development of final public draft recommendations and products.

**Work Products**

1. Final Public Draft Subtidal Habitat recommendations and document edits.

**Stakeholders**

The Subtidal Habitat Goals Project communicated with a broad range of stakeholders, in order to be inclusive and seek input and review from all agencies, groups, organizations, and user groups with interest in the San Francisco Bay. Stakeholders provided input on the project process, recommendations to the working committees, and feedback on the draft habitat goals document to bring a broader vision to the process.

The Project utilized a project partner and public outreach list, and the Project Manager made over 20 presentations to targeted audiences and stakeholders to build awareness and support for the Project. The Project held multiple public meetings dating back to 2006,

including individual stakeholder group interviews, public meetings to introduce the planning process, to give updates on the planning, and to voluntarily invite written comments on the June 2010 draft report. In addition to these public meetings, the Project held several targeted meetings with non-profit and industry groups to gather feedback and written comments on the draft report.

The Final Subtidal Goals Report will be broadly accessible on a website ([www.sfbaysubtidal.org](http://www.sfbaysubtidal.org)) with complete project information, consultant reports, and GIS maps.

## **V. Brief Summary of Project Planning**

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### Initial meetings 2000, 2002: Science Workshops

- (1) Outlined existing data about subtidal habitats; pulled scientists together
- (2) Focused attention to subtidal habitat issues; information to stakeholders and received positive feedback
- (3) BCDC: subtidal goals policy
- (4) NOAA Fisheries and Restoration Center support, Essential Fish Habitat

### Stakeholder Meetings 2005-06

- (1) The Center for Collaborative Policy conducted 10 stakeholder interviews with academic, agency, and non-profit staff to compile stakeholder interest.
- (2) NOAA CSC conducted a one day meeting to discuss the Final Subtidal Goals Document preferred focus, use, and format.

### Administrative Core Group (ACG) and Committee Planning 2005-09

- (1) ACG was formed, partner agencies dedicated initial funding and staff time
- (2) Committees were formed with key experts, scopes of work developed
- (3) ACG and committee members developed initial function and distribution information by habitat type, initial stressor ratings, initial research questions, and lists of key management and science questions.
- (4) A total of 17 committee meetings occurred to develop planning.
  - ∞ Steering Committee: 3 meetings
  - ∞ Management Committee: 2 meetings
  - ∞ Science Committee: 6 meetings
  - ∞ Restoration Committee: 2 meetings
  - ∞ Joint Committee: 2 meetings
  - ∞ Public: 2 meetings

### Committee Review of Draft Goals in 2010

Science Committee: 1 meeting  
Restoration Committee: 2 meetings  
Resource Management Committee: 1 meeting  
Executive Steering Committee: 3 meetings  
Joint Committee Meeting: 1 meeting  
Stakeholder Meetings: 3 meetings

Public Meeting to introduce Final Public Draft: 1 meeting  
Public review of draft (June 16- July 28, 2010)

Final Supporting Documentation

- 1) Subtidal Habitat Distribution and Abundance Matrix
- 2) Stressor Matrix: showing severity, irreversibility, and scope of impacts from four main stressors: Contaminants, Activities that disturb the bottom, Activities that increase suspended sediments, and Artificial Structure placement.
- 3) Subtidal Stressor Narrative Descriptions: Consultant Dr. Andrew Cohen developed Stressor Narrative Descriptions to accompany these tables. The narratives describe specific stressors on each of the subtidal habitats, and were planned to be utilized as one part of the foundation in developing goals for subtidal habitat research, restoration and management.
- 4) List of Key Science and Management Questions: A summary list of existing management and science questions related to subtidal habitats in San Francisco Bay was developed through committee member input and review of relevant regional policy and project information.
- 5) Summary of Existing Subtidal Agency Regulations and Information: Consultants Dr. Andy Cohen, Diego Holmgren, and a Tetra Tech consultant were hired to compile existing information about subtidal habitats. Intern Danny Pham at the San Francisco Estuary Project, intern Nicole Loeffler-Gladstone at BCDC, and intern Kiya Gornik at the State Coastal Conservancy also compiled information.
- 6) Subtidal Habitat Characterization Report: was produced by NOAA staff and partner colleagues in November 2007, outlining existing information by habitat type for San Francisco Bay.
- 7) Economic Valuation of Subtidal Habitats in San Francisco Bay: was completed by Battelle July 2008, outlining existing economic information and values for subtidal habitats and select species in San Francisco Bay.
- 8) Subtidal Habitat Goals Consultant Reports: 1) UC Davis Shellfish Opportunities and Constraints Report, 2) San Francisco State University Eelgrass Opportunities and Constraints Report, 3) San Francisco Estuary Institute Creosote Piling and Artificial Structure Assessment Report, 4) William Kimmerer: Conceptual Models by Habitat (text and diagrams), Science Goals, Climate Change and Other Long-Term Changes Document
- 9) The Project Manager, Science Advisor, and Consultants have compiled relevant published research articles, agency reports, and regional project information.
- 10) Draft Goal Recommendations: Science, Protection, and Restoration.
- 11) Subtidal GIS Maps: Habitat Distributions, Stressors, and Restoration Sites.

**Subtidal Habitat Goals Project Master Contact List**

<b>Project Manager</b>		
<b>Name</b>	<b>Affiliation</b>	
Latta, Marilyn	State Coastal Conservancy	
<b>Science Advisor</b>		
<b>Name</b>	<b>Affiliation</b>	
Kimmerer, Wim	San Francisco State University	
<b>Administrative Core Group Members</b>		
<b>Name</b>	<b>Affiliation</b>	
Cosentino-Manning, Natalie	NOAA Fisheries Restoration Center	
Goeden, Brenda	San Francisco Bay Conservation & Development Commission	
Kelly, Judy	San Francisco Estuary Partnership	
Schaeffer, Korie	NOAA Fisheries, Habitat Conservation Division	
Sweeney, Caitlin	San Francisco Bay Conservation & Development Commission	
<b>Project Support Staff:</b>		
Badrei, Natalie	Outreach	NOAA Fisheries Restoration Center
Gavette, Charleen and Map Lead	GIS	NOAA Fisheries, GIS
Selkirk, Mary Facilitator	Meeting	Center for Collaborative Policy
Trigueros, Paula Manager	Contracts	SFEP Contract Manager
<b>Editor:</b>		
Owens-Viani, Lisa Writer	Science	San Francisco Estuary Partnership
<b>Science Working Committee Members</b>		
<b>Name</b>	<b>Area of Expertise</b>	
Allen, Sarah National Park Service	Marine Mammals	
Boyer, Kathy San Francisco State University	Seagrasses	
Brown, Chris Smithsonian Institute	Invasive Species	
Collins, Josh San Francisco Estuary Institute	Wetland/subtidal connections	
Grosholz, Ted University of California at Davis	Native Oysters & Invasive Species	
Hieb, Kathy CA Dept of Fish & Game	Fishes	
Isaac, George CA Dept of Fish & Game	Fishes	
Jaffe, Bruce	USGS	Bedload Sediments
Olyarnik, Suzanne California/ Bodega ML	Audubon	Eelgrass
Schoellhamer, David USGS	Suspended Sediments	
Tasto, Bob NOAA Fisheries	Invertebrates & Fishes	
Thompson, Jan USGS	Invertebrates	
Wainwright-De La Cruz, Susan	USGS	Birds
<b>Restoration Working Committee Members</b>		
<b>Name</b>	<b>Area of Expertise</b>	
Abbott, Robert (Bud) Environ	Fish, Oysters	
Kiriakopoulos, Stephanie graduate student	SFSU	Eelgrass
Huning, Beth Joint Venture	SF Bay	Birds, Waterfowl
Lowe, Jeremy Phil Williams & Associates	Sediment Dynamics	
Semion, Justin Research Associates	Wetland	Eelgrass, Permitting
Siegel, Stuart Wetlands & Water Resources	Wetlands, Modeling	
Spenst, Renee Ducks Unlimited	Birds, Waterfowl	
Sullivan, Laurie NOAA Ocean Service	Contaminant Remediation	
Thom, Ron Battelle Marine Sciences Lab	Restoration Outside of SF	
Zabin, Chela Davis	Smithsonian/UC	Oysters and invasive species
<b>Resource Management Working Committee Members</b>		
<b>Name</b>	<b>Affiliation</b>	
Alexander, Peter	East Bay Regional Parks District	
Batha, Bob	Bay Conservation & Development Commission	
Christian, Beth	SF Bay Regional Water Quality Control Board	
Dillon, Joe	NOAA Fisheries, Southwest Region	
Fong, Darren	National Park Service	
Lawrence, Robert	US Army Corps of Engineers, Regulatory Div.	
Matuk alt: Terri Ely	CA Dept of Boating & Waterways	
Matuk, Vivian	CA Dept of Boating & Waterways	
McEnespy, Moira	California Coastal Conservancy	
Oetzel, Donn	CA State Lands Commission	
Ota, Becky	CDFG	
Psaros, Marina	San Francisco Bay NERR	
Ross, Brian	EPA	
Smith alt: Block, Giselle	US Fish & Wildlife Service, San Pablo Bay Refuge	
<b>Executive Steering Committee Members</b>		
<b>Name</b>	<b>Affiliation</b>	
Jennifer DeLeon	CA State Lands Commission	
Edmondson, Steve	NOAA Fisheries	
Greenberg, Andree	SF Bay Regional Water Quality Control Board	
Olah, Ryan	US Fish & Wildlife Service	
Ota, Becky	CA Department of Fish and Game	
Potter, Chris	CA Resources Agency	
Rutten, Patrick	NOAA Restoration Center	
Schuchat, Sam	State Coastal Conservancy	
Strauss, Alexis	EPA	
Travis, Will	Bay Conservation and Development Commission	
Velasquez, Amanda	US Coast Guard	