



**South Bay Salt Pond  
Restoration Project**  
*Restoring the Wild Heart of the South Bay*

## Restoration Funding Application Cover Sheet

### APPLICANT INFORMATION

Name of Organization(s) Requesting Funding: PRBO Conservation Science

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### PROJECT INFORMATION

RFP Study Topic # 6

Project Title: Integrating Avian Datasets for Management, Modeling and Visualization to Benefit the South Bay Salt Pond Restoration Project

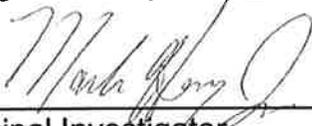
Funding Request per year \$112,461 and \$75,910 Number of years: 2

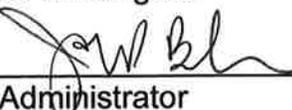
Confirmed in-kind or matching contributions: \$

Source of in-kind or matching contributions:

Purpose and Objectives: The proposed project intends to integrate avian datasets using technology from the California Avian Data Center and facilitate data management, review of baseline data, modeling, data visualizations and other synthetic analyses that address baseline waterbird numbers in San Francisco Bay habitat.

Proposed starting date: May 2009 Estimated completion date: April 2011

Signature :  Date: 12-05-08  
Principal Investigator

Signature :  Date: 12-5-08  
Grant Administrator

# South Bay Salt Pond Restoration Project, 2008 RFP

## PROPOSAL TITLE

Integrating Avian Datasets for Management, Modeling and Visualization to Benefit the South Bay Salt Pond Restoration Project

## ABSTRACT

The purchase of more than 15,000 acres of salt ponds in San Francisco Bay, created North America's second largest habitat restoration project. Utilizing an adaptive management framework, the South Bay Salt Pond Restoration Project (SBSPRP), requires access to historical and current data to inform managers. For over 20 years, PRBO Conservation Science, U.S. Geological Survey, and San Francisco Bay Bird Observatory have been the leaders in large-scale, long-term avian data collection in San Francisco's South Bay. These data represent millions of dollars in investments, and will provide the SBSPRP with accurate baseline estimates of bird numbers. We propose the Integrated South Bay Avian Database (ISBA-DB), utilizing the industry-proven infrastructure of the California Avian Data Center ([www.prbo.org/cadc](http://www.prbo.org/cadc)) to organize and facilitate the synthesis and visualization of avian data in the South Bay. Modeling efforts will help set restoration targets and assist the SBSPRP team make informed management decisions. The application will provide the information required to determine data needs and prioritize future collection efforts. The new system allows new data to be entered and made instantly available for managers and restoration assessment. Linkages between ISBA-DB and the existing South Bay Salt Pond Project Database will provide managers with even more decision support resources.

## BACKGROUND AND JUSTIFICATION

In 2002, the U.S. Fish and Wildlife Service (FWS) and the California Department of Fish and Game (DFG) purchased over 15,100 acres of commercial salt ponds in South San Francisco Bay for tidal wetland restoration. The primary objective of the South Bay Salt Pond Restoration Project (SBSPRP), the largest tidal wetland restoration project on the West Coast, is to convert 50-90% of purchased salt ponds to tidal marsh. The San Francisco Bay is of hemispheric importance to migratory and wintering shorebirds (Page et al. 1999, Stenzel et al. 2002) and the salt ponds support large numbers of shorebirds and other waterbirds (e.g., ducks, gulls and terns; Warnock et al. 2002). A major goal of the habitat conversion is to provide sufficient managed and natural habitat to support pre-restoration waterbird populations while increasing habitat for depleted marsh bird populations.

Assessing past and current bird population levels is technically feasible, as many studies have been conducted on the distribution and abundance, population dynamics, and habitat use of waterbird populations in San Francisco Bay (see references list and Appendix A). These studies used a variety of survey methods

including area surveys, transects, aerial surveys, playback surveys, and nest surveys, and were conducted at various spatial scales within the Bay. Data have been recorded in different formats. Some lack detailed metadata and can only be obtained by contacting individual researchers. As a consequence, it is currently very difficult to analyze or summarize data at appropriate spatial and temporal scales to determine the pre- and post- restoration bird populations, much less any more complicated analyses. The existing monitoring data are extensive and represent a significant investment of time and resources. They include Bay-wide surveys of migrating and/or wintering shorebirds; inventories of nesting waterbirds, and comparisons of marsh and salt pond use by waterbirds including ducks. The full value of these data can only be achieved by integrating them and ensuring they are readily available for synergistic modeling efforts and decision and assessment tools. Therefore, we propose to build a new web portal and database, the Integrated South Bay Avian Database (ISBA-DB) modeled on successful databases previously created at the California Avian Data Center. Aside from basic population counts, results of the proposed multi-organizational data consolidation effort can be used directly for carrying capacity modeling and "what-if" scenario analyses, including climate change and sea-level models. Additional analytical support will be supported by two proposed graduate fellowships aimed at modeling and predicting waterbird numbers in South Bay ponds and mud flats. ISBA-DB will also inform researchers and wildlife managers on the completeness of the pre-restoration baseline data on waterbird use of the estuary and identify important data gaps needed to evaluate the success of the of the restoration project on a regional scale. Project managers will have the ability to more easily track bird numbers and other parameters using multiple datasets in way that helps the SBSRP assess restoration progress and achieve their conservation goals.

This proposal describes a coordinated effort of the three primary avian science organizations of the San Francisco Bay area to combine resources in order to provide the SBSRP with access to the information and recommendations needed to accurately assess the success of the SBSRP. Utilizing an already in use and proven database infrastructure, we propose to identify, integrate, and synthesize major avian data sets (preliminary inventory is presented in Appendix A). Using these data, we will provide "baseline" and current estimates of habitat-specific densities of waterbirds in the San Francisco Bay estuary (with an emphasis on South San Francisco Bay). Baseline values are defined as estimates of waterbird densities prior to the purchase of the salt ponds. During this process, we will also identify and document where data are not available or are inadequate for estimation. ISBA-DB will provide an integrated and interactive system of data entry, storage, and retrieval to help the SBSRP managers make science-based decisions based on the best available information. It will be designed for ease of use, consistency, and reliability of data entry and storage so analyses and modeling, including projections of carrying capacity, can be performed across a diversity of datasets collected in the past and in the future.

## STUDY OBJECTIVES

The SBSPRP needs data on pre-and post-restoration project numbers of birds in the South Bay and in the San Francisco Bay estuary to assess the success of the restoration project for waterbirds.

To provide this information to the SPSP Restoration Project we will:

- 1) Consolidate available bird survey data within a single database management system and develop an application framework for data summaries and visualizations useful for tracking and assessing restoration progress.
- 2) Integrate carrying capacity modeling with avian population data
- 3) Summarize historical waterbird numbers and nesting data
- 4) Develop a data needs and gaps assessment.

### **Consolidating available bird data within a robust data management system and developing an application framework for data summaries and visualizations useful to managers for tracking and assessing restoration progress.**

The California Avian Data Center (CADC; Ballard et al. 2007. [www.prbo.org/cadc](http://www.prbo.org/cadc)) is an in-use, secure, and well-tested platform that will provide a powerful cost-effective solution to the data consolidation and management needs of the SBSPRP. Utilities made available through CADC will enable data collected in the past and future to be integrated to provide managers information on restoration progress at multiple scales (e.g. individual restoration pond, pond complex, South Bay, and San Francisco Bay). The underlying CADC database model is designed to accommodate different methods and organization of study and project design. It has successfully been used to consolidate point count data and banding data from multiple organizations throughout California (see: <http://data.prbo.org/cadc2/index.php?page=137>). It is designed to provide easy access to data while also ensuring data security, and ownership and sharing policies. We will work with project managers to: 1) populate a customized "ISBA-DB" with San Francisco Bay avian datasets, 2) provide a password-secure repository for San Francisco Bay bird data and data sharing agreements, and 3) provide project managers with data entry, management, visualizations, and analysis tools to facilitate the adaptive management process, essential for SBSP restoration success.

### **Integrate carrying capacity modeling with avian population data**

We will integrate pond productivity (chlorophyll) data, macroinvertebrate densities, and waterbird abundance (Takekawa et al. 2005, 2006a) with published information on bird habitat needs to derive a conceptually-based salt pond carrying capacity model for selected species of waterbirds.

### **Summarize historical waterbird numbers and nesting data**

This effort will concentrate on South Bay bird populations and will use data from the rest of the Bay as comparison. We will review, summarize and synthesize the

results of specific studies (both published and unpublished) to describe baseline populations and historical trends for selected species or groups of species. We will estimate baseline nest density, nest success, hatching success, and clutch size for nesting waterbird colonies (avocets, stilts, and Forster's terns) in South San Francisco Bay salt ponds. We will assess habitat characteristics that increase reproductive success. The studies and/or data we will review and summarize include:

- Baseline shorebird and waterfowl numbers in tidal marsh habitat (PRBO)
- Baseline information on waterbird use of salt ponds (PRBO, USGS, SFBBO)
- Bay-wide surveys of shorebirds (PRBO)
- Nesting Snowy Plovers in South Bay salt ponds (SFBBO, FWS).
- Nesting herons and egrets (SFBBO)
- Nesting gulls and terns (SFBBO)
- Clapper Rail, Black Rail abundance and distribution in tidal marsh habitat (PRBO)

### **Develop a data needs and gaps assessment**

There are many challenges facing managers with the SBSPP, and it is important to anticipate where baseline data are needed to answer future questions. We will meet with SBSPP managers and San Francisco Bay Joint Venture (SFBJV) partners to determine the priority data needs for the South Bay. A comprehensive review of information on waterbird use of San Francisco Bay habitats will reveal the following:

- *Gaps in knowledge of bird use of salt ponds and mudflats.* Modeling efforts within this proposal will not only provide information on bird use, but also areas where more research is required.
- *Gaps in available literature:* Our synthesis of available South Bay avian data will provide information on analyses that are possible with currently available data, but have yet to be performed.
- *Gaps in available data.* Our data synthesis and modeling efforts will provide input on which valuable datasets are missing in order to more fully inform SBSPP about carrying capacity and assess the success of restoration efforts.

## **STUDY AREAS**

PRBO, USGS, and SFBBO have collected avian data throughout San Francisco Bay for over 20 years. Significant resources have been put into monitoring avian and habitat conditions with the South Bay. Together, we have performed research and monitoring on nearly all taxa of birds, and in all habitat types found within South San Francisco Bay, including the commercial salt ponds. Appendix A represents an initial data inventory of avian data available within San Francisco Bay, and Appendix B provides a graphical representation of the data collected,

Since 2005, SFBBO has completed monthly bird surveys of 22 active salt ponds within the Don Edwards San Francisco Bay National Wildlife Refuge in the Newark and Mowry salt ponds complexes, including the Newark, Dumbarton, and Mowry ponds. These salt ponds are owned by FWS, but Cargill Salt regulates water flow and these ponds are not included in the SBSPRP area. SFBBO has monitored the reproductive success of western snowy plovers at Eden Landing Ecological Reserve and Don Edwards San Francisco Bay National Wildlife Refuge since 2003. In 2008, SFBBO initiated a chick color-banding study to determine fledging success. Since 1982, SFBBO has also been monitoring local populations of herons, egrets, terns, and gulls that nest in the San Francisco Bay.

USGS has monitored waterbirds within Don Edwards San Francisco Bay NWR, as well as former salt evaporation ponds and marshes in the Alviso salt pond complex, Moffett salt pond complex, Newark salt pond complex, Ravenswood salt pond complex, Eden Landing Ecological Reserve, and Napa-Sonoma Marsh Wildlife Area (not displayed on map; Ponds 2, 4, 5, Mare Island, Figeras Tract, and Rush Creek).

PRBO conducted pre-ISP foraging/roosting waterbird surveys in 21 active salt ponds, 13 of which are now part of the restoration project area, and 8 of which are still owned by Cargill Salt; as well as in tidal marsh habitat in the South and North bays. South Bay and Bay-wide population data includes:

- 1) *Pacific Flyway shorebird surveys*  
Pacific Flyway shorebird surveys from the 1990s included the south Bay subregion, and the entire San Francisco Bay. Both tidal flats and high tide roost areas were included in surveys.
- 2) *Recent November Bay-wide shorebird surveys*  
The San Francisco Bay-wide high tide shorebird censuses included all habitats used by roosting shorebirds including project and non-project salt ponds in North Bay and South Bay. Active crystallizers and ponds near salt production plants were not surveyed.
- 3) *South Bay salt marsh and salt pond surveys*  
PRBO surveys covered 21 ponds, 13 of which are now part of the Project area; the remaining eight ponds are still owned by Cargill Salt. PRBO also conducted shorebird surveys and behavioral observations in tidal marsh habitat within the South Bay and San Pablo Bay. Tidal flats from Hayward shoreline and Foster City shoreline south to Alviso Slough mouth were surveyed from 1988 to 1993.
- 4) *Rail Surveys*  
Rail surveys have been conducted at tidal marsh, restored tidal marsh, muted tidal marsh, and managed marsh sites from 2004 to present. Sites in the vicinity of the project ponds include Whales Tail North, Newark Slough, Dumbarton Point, Palo Alto Baylands, Guadalupe Slough, Alviso Slough, Faber-Laumeister Tracts, Cooley Landing, Bair Island, Greco Island. Other South Bay subregion sites include Cogswell Marsh and Alameda

Creek. Within San Francisco Bay, PRBO and its collaborators are surveying all tidally-influenced areas that are accessible to surveyors.

## APPROACH

**Integrate available bird survey data within a database management system and developing an application framework for data summaries and visualizations useful for tracking and assessing restoration progress.**

ISBA-DB will be used for collecting, housing and managing all avian-related science observations, we will use the infrastructure that underlies CADC. This structure is composed of the following:

- NodeDb, an enterprise level database capable of securely maintaining years of observation data, as well as information about project and study design, including study area hierarchies, sampling protocols, and geography.
- Ravian, a library designed for the statistics program R, providing solutions to common avian data summary needs and standard data analyses.
- Avian Science Applications, a suite of web applications that allow different user roles to enter, manage, access and analyze data stored in NodeDb.

The ISBA-DB will serve four purposes for the SBSP Restoration Project. First, it provides a set of tools for scientists to capture historical and future avian observations, including area-search and point-count observations. These tools will include bulk uploaders for legacy data as well as interactive data-entry applications for ongoing observations. All data is proofed, reviewed and edited by project leaders using tools that help ensure the highest possible data quality.

Second, ISBA-DB provides a safe repository for controlled access to all avian observation data, with the goal of providing wildlife managers as complete access to data as possible, while restricting or preventing access to people outside of the project. Data owners control the access rights for all users, from restricted (no access outside of project) to full public availability. Users are assigned to and removed from projects and application access. Publishing data (raw or summary) and the corresponding data sharing agreements are controlled using observation event level values set by project/data owners, allowing data owners to control how data consumers will receive datasets. All system hosting and administration tasks (e.g., data backup and recovery) are performed by PRBO, with the ability of data owners to request a complete copy of all project observation data at any time, in several standard formats.

Third, project managers will use ISBA-DB to understand avian population trends and to assess the impacts of management decisions on birds. Managers can select data by geography, visits or dates, among other criteria, to produce reports on-screen or in common download formats, which can in turn be used as inputs to other analyses performed using desktop statistical packages and other tools.

Finally, ISBA-DB is also used to inform the public on the status and progress of the SBSP Restoration Project. For this project, we will modify an existing interactive map application online that will provide visualization of summary data for project (see: <http://data.prbo.org/cadc2/index.php?page=137>). All of the resident data in ISBA-DB can be readily used as the basis for other web applications appropriate for the public.

#### Coordination with existing South Bay Salt Pond Project Database

ISBA-DB infrastructure not only provides relational links among the datasets within the database, but also facilitate linkages and communication across databases. The ISBA-DB team will ensure that appropriate methods are available to allow cross database communication, and are optimistic that these synergies will facilitate even larger more integrative decision support systems that will improve SBSPRP restoration management.

#### **Integrate carrying capacity modeling with avian population data**

We will develop a conceptually-based salt pond carrying capacity model for four species of waterbirds: western sandpipers (*Calidris mauri*), American avocets (*Recurvirostra americana*) ruddy ducks (*Oxyura jamaicensis*), and northern shovelers (*Anas clypeata*). These species were selected due to their relative importance and abundance in salt pond habitats (Stralberg et al. 2006) and our previous diet studies on sandpipers, avocets, and ruddy ducks (Takekawa et al. *in press*). The model will be developed at the pond level and will integrate pond productivity (chlorophyll) data, macroinvertebrate densities, and waterbird abundance (Takekawa et al. 2005, 2006a). Existing data are likely not sufficient for a robust data-driven energetics model, but we will use published information on bird ecology and energetic needs, as well as our understanding of trophic relationships in salt ponds (e.g., Takekawa et al. 2006b) to derive a conceptually-based salt pond carrying capacity model for these waterbird species.

#### **Summarize historical waterbird numbers and nesting data**

We will search for information pertaining to bird populations during the pre-ISP including published literature, reports, and unpublished data. We will identify relevant datasets in addition to those described in Appendix A. We will assess the relevancy of literature and unpublished data for establishing a baseline number of waterbirds using San Francisco Bay habitats pre-ISP. Our focus will be the habitats and/or species not included in objectives 2. We will also identify datasets that can be uploaded to ISBA-DB. For breeding waterbirds (avocets, stilts, and Forster's terns) we will compile the existing datasets and summarize nest abundance, species distributions, nesting success, hatching success, nest initiation dates, and clutch size for each breeding colony. These summarized data will be the primary data resource in a dynamic simulation model to assess habitat characteristics that increase reproductive success. For each monitored colony, we checked nests weekly and determined clutch size and nest fate (hatched, failed, or depredated). We will use these datasets to calculate nest success and estimate nest density for each colony and species using Mayfield (1961, 1975) techniques. We will consider a nest successful if at least one egg hatched. Hatching success, also known as egg success, will be defined as the

number of chicks hatching in a successful nest divided by the total clutch size (Sargeant and Raveling 1992). Clutches that are partially depredated (Ackerman et al. 2003) will be excluded from analyses of hatching success.

#### **Develop a data needs and gaps assessment.**

Throughout the completion of the work described within this proposal we will identify and document specific data gaps and uncertainties, which if filled, would significantly improve our knowledge about how birds will continue to respond during the restoration project. These gaps may be informational, temporal, spatial, or a result of poor data quality. During our documentation process we will determine appropriate actions to take for resolution. These may include recommendations for new data collection, and if so, we will provide initial recommendation on the methods and effort required. We will present these data gaps and important research needs along with recommended actions for resolution within our final report.

### **DATA ARCHIVING PROCEDURES**

Data handling and storage will follow Federal Geographic Data Committee (FGDC) metadata standards. All data will be compiled, QA/QC checked, and archived on a data server with mirrored drives, tape backup, and redundant copies offsite. Field data will be referenced in GIS coverages, data projected in UTM in NAD83 horizontal and NAVD88 vertical datum. Datasets will be made available with permission for use specified in the metadata. The databases will be made accessible through the SBSRP website. Results will be presented spatially to allow managers and policy makers to view bird datasets to examine changes with restoration.

Avian data identified in Appendix A as well as other important avian survey datasets identified during literature and data review (Obj. 3) will be input into ISBA-DB through interactive web applications (for previously unentered forms) or bulk loaders (for data stored in non-proprietary data formats with agreed upon structures). Data is stored on PRBO managed servers employing a Windows/Apache/MySQL/Php (WAMP) technology infrastructure. Data is made available through the Avian Science applications for data downloading, reporting and statistical analysis. Upon request, data owners will receive a copy of their data in a non-proprietary structured format. User access to integrated datasets will adhere to the sharing rules agreed upon by data owners.

### **WORK SCHEDULE**

Work will commence from final signature of the agreement for a period of two years with an annual report delivered at the end of year one and other products (with the exception of workshops and updates) at the end of year two.

**Timeline by quarter**

	Year 1				Year 2			
	1	2	3	4	1	2	3	4
Obj 1: Integrate avian survey data (ISBA-DB)		x	x	x	x	x	x	
Obj 2: Integrate modeling with avian population	x	x	x	x	x	x	x	x
Obj 3: Summarize historical data						x	x	x
Obj 4: Develop data gaps assessment							x	x

**EXPECTED PRODUCTS**

**Integrate available bird survey data within a database management system and developing an application framework for data summaries and visualizations useful for tracking and assessing restoration progress**

*Product:* ISBA-DB. A web-accessible database populated with data relevant to SBRPRP and with associated data entry, management, analysis and visualization tools. By April 2011 we will also have an interactive map application for public.

**Integrate carrying capacity modeling with avian population data**

*Product:* A conceptually-based salt pond carrying capacity model for 4 species of waterbirds.

**Summarize historical waterbird numbers and nesting data**

*Product:* Final Report on baseline numbers and nesting parameters of waterbirds in San Francisco Bay habitats. Included in this report will be:

- A detailed map of waterbird nesting distributions throughout the project area that identifies relative nest abundances for each of the three species by colony.
- Summary of waterbird nesting data (nest success and egg hatchability) during a 5-year period for each of the three species by colony and year.
- Comparison of results from dynamic simulation modeling and Habitat Conversion Model for key San Francisco Bay waterbird species
- Literature and data review to summarize baseline numbers of waterbirds use of other habitats, such as tidal marsh.

**Develop a data needs and gaps assessment**

*Product:* Final Report synthesis of the research results. We will describe the state of our knowledge of baseline bird numbers, nest success, carrying capacity, and habitat use of waterbirds in San Francisco Bay habitats.

**RELATED PROJECTS**

The ISBA-DB provides the infrastructure to extend well beyond the research described within this proposal. The following projects include additional SBSP RFP proposals, outside proposal efforts, and ongoing research which will utilize the resources provided by ISBA-DB and ultimately be available within the system itself.

**Modeling mudflat carrying capacity for South Bay Shorebirds**

*(Rowan, Fellowship proposal – submitted through SBSP RFP)*

Shorebirds are important species within the South Bay Salt Pond Restoration Project. Most shorebirds feed on the intertidal mudflats adjacent to the salt ponds in addition to the salt ponds themselves, so conservation efforts directed towards shorebirds at the Restoration Project should focus on both habitats. However, the foraging value of these mudflats to shorebirds is not well understood. The availability of food resources on the mudflats and their carrying capacity will be a primary concern for conservation of shorebirds as salt ponds are converted. This mudflat carrying capacity model will use USGS datasets and will provide a quantitative evaluation of habitat value for shorebirds that can be incorporated into long-term planning efforts and future baywide modeling efforts. The proposed modeling effort will bridge the knowledge gap to examine the carrying capacity of the mudflat habitats, located between the restored pond system and the open water bays.

### **Mechanistic modeling of shorebird abundance and distribution in salt pond habitats**

*(Athearn, Fellowship proposal – submitted through SBSP RFP)*

Supporting similar numbers of waterbirds with fewer ponds will require adaptive management to react quickly when management actions trigger an unexpected drop in abundance of key waterbird species, but baseline numbers are needed to identify changes in waterbird abundance. A dynamic simulation model will be developed to estimate bird response to habitat conditions. Model parameters will be generated from existing bird-habitat relationship data as well as published data, and model relationships will be developed through consultation with published literature as well as San Francisco Bay bird biologists. Existing monitoring data provided by collaborators at USGS, PRBO, and SFBBO will be used to validate the model at three spatial scales: the project area, the South Bay subregion, and San Francisco Bay. Sensitivity analysis will assist in model validation and help identify potential data gaps by demonstrating where parameter uncertainty may influence model results. This model will be used to estimate baseline numbers as well as to predict changes in breeding and wintering waterbird abundance in response to changing conditions.

### **Integration, Analysis, and Spatial Distribution Mapping of Salt Pond Birds Within and Outside of the South Bay Salt Pond Restoration Project**

*(USGS/SFBBO)*

Consistent monitoring data for the SBSPRP continues to be critical, but integration, analysis, and interpretation will be necessary for extracting maximum informational value from these comprehensive surveys to best benefit adaptive management. Integrated analyses of the separate South Bay Salt Pond Restoration Project and Cargill-operated pond monitoring datasets will provide a more complete picture of waterbird use of the South Bay salt ponds. The resulting data compilations and distribution maps will be a useful reference for tracking changes in bird use through time, and will help elucidate trends that will be critical for decision-making processes, including model development and future monitoring needs.

**November Shorebird Census Analysis**

*(PRBO – proposal to be submitted to Resources Legacy Fund)*

We anticipate funding to analyze migratory shorebird census data collected at the SF Bay scale. Specifically, we intend to compare the results of three years of data collected during 2006-2008 with the results from three censuses conducted in the 90s. We will analyze overall change in shorebird abundance and distribution between the North, Central, and South bays.

**Breeding in San Francisco Bay Salt Ponds and Marshes**

*(Ackerman, USGS – submitted through SBSP RFP; Topic Area #3)*

The waterbird nesting component of this proposal is strongly linked to two other proposed studies. Ackerman et al. plan to continue to evaluate nesting success in waterbirds, specifically focusing on the benefits of island creation and pond enhancement. Summarizing the historical data will provide a strong comparison to current and future nesting data for determining how pond management is influencing waterbird reproduction. This baseline work is also closely linked to past and a proposed study (Ackerman et al.) evaluating the impacts of California Gull predation on waterbird reproduction. Predation is the primary factor limiting waterbird reproduction in the Project Area, and integrating studies of nesting ecology with those on predators such as gulls is an important component to evaluating effective management options.

**Online databases**

*(PRBO – funding through National Science Foundation)*

IDBA-DB will be an integrated component of the California Avian Data Center (CADC), a member of the Avian Knowledge Network (AKN; <http://www.avianknowledge.net>). The AKN is an international organization of government and non-government institutions focused on understanding the patterns and dynamics of bird populations across the Western Hemisphere. The AKN maintains a repository of avian observations collected worldwide, contributed by the many AKN partners, including PRBO. As data managers in IDBA-DB determine how data should be shared, observation data with appropriate levels of access will be made available to the AKN for further distribution to avian researchers worldwide.

With seamless connections within CADC and AKN, and available connectors with other databases such as SBSP Project Database, we fully anticipate that in future years the IDBA-DB will provide researchers tools and resources that will support conservation efforts throughout the bay, California, and the world.

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**EXPECTED CONTRIBUTION:** Principal Investigator will oversee the management and coordination of partners/contractors, supervise the building of PRBO/CADC technology for SBSPRP use, conduct analysis related to the synthesis of baseline bird data from tidal marsh and other habitats, and lead report preparation.

**EDUCATION:**

August 2002 **University of Alaska Fairbanks**, Fairbanks, AK 99775  
**Ph.D.** in Biological Sciences  
*Dissertation:* "Variation in growth of black brant goslings on Yukon Kuskokwim Delta"

April 1995 **New Mexico State University**, Las Cruces, NM 88003  
**M.S.** in Fisheries and Wildlife Management  
*Thesis:* "Role of Gizzard Shad in New Mexico Reservoirs"

April 1992 **University of Arizona**, Tucson, AZ 85721  
**B.S.** in Applied Mathematics, Ecology and Evolutionary Biology (double major)

**RELATED WORK EXPERIENCE:**

Mark Herzog is the co-director of PRBO's Informatics Division and is leading PRBO's Climate Change Initiative. Mark's expertise is in quantitative ecology, avian ecology, and population dynamics. Previously, he has performed extensive research in waterfowl ecology and population modeling. Mark received his Master of Science in 1995 at New Mexico State University, where he collaborated on a state-wide fishery model, and received his doctorate in 2001 at the University of Alaska Fairbanks. His dissertation examined density dependent effects on growth and development of Black Brant goslings on the Yukon-Kuskokwim Delta in Alaska. Recently, Mark has developed population models for western Mallards for the Pacific Flyway and U.S. Fish and Wildlife Service. Recently completed projects at PRBO include developing spatial optimization models for waterbirds and land birds within the South San Francisco Bay salt pond restoration areas. Mark is also analyzing population data within the tidal marsh communities of San Francisco Bay, and developing statistical tools for PRBO's biologists to use to analyze and visualize their data.

**PUBLICATIONS/PAPERS**

- Sedinger J, D. Ward , J. Schamber, W. Butler, W. Eldridge, B. Conant, J. Voelzer, N. Chelgren, M. Herzog. 2006. Effects of El Nino on distribution and reproductive performance of Black Brant. *Ecology* 87(1): 151-159.
- Stralberg, D., M. Herzog, N. Warnock, N. Nur, and S. Valdez. 2006. Habitat-based modeling of wetland bird communities: an evaluation of potential restoration alternatives for South San Francisco Bay. Draft final report to California Coastal Conservancy. PRBO Conservation Science, Petaluma, CA. [URL: <http://www.prbo.org/wetlands/hcm>]
- Liu, L., M. Herzog, N. Nur, P. Abbaspour, A. Robinson, and N. Warnock. 2006. San Francisco Tidal Marsh Project Annual Report: 2005. PRBO Publication 1500.
- Herzog, M, Liu L, Nur N, Spautz H, Warnock N. 2005. San Francisco Bay Tidal Marsh Annual Report: 2004. PRBO Publication 1165.
- Herzog, M.P. and J.S. Sedinger. 2004. Dynamics of foraging behavior associated with variation in habitat and forage availability in captive black brant goslings (*Branta bernicla*). *Auk* 121(1): 210-223.
- Sedinger, J.S., M.P. Herzog and D.H. Ward. 2004. Early environment and recruitment of black Brant (*Branta bernicla nigricans*) into the breeding population. *Auk* 121(1): 68-73.

- Hannam, K.M., L.W. Oring, M.P. Herzog. 2003. Impacts of salinity on growth and behavior of young American Avocets. *Waterbirds* 26(1): 119-125.
- Person, B.T., M.P. Herzog, R.W. Ruess, J.S. Sedinger, R.M. Anthony, and C.A. Babcock. 2003. Feedback dynamics of grazing lawns: coupling vegetation change with animal growth. *Oecologia* 135(4): 583-592.
- Sedinger, J.S., M.P. Herzog, B.T. Person, M.T. Kirk, T. Obritschkewitsch, P.P. Martin, and B.A. Anderson. 2001. Large scale variation in growth of black brant goslings related to food availability. *Auk* 118:1088-1094.
- Flint, P.L. and M.P. Herzog. 2000. Breeding of Steller's Eiders (*Polysticta stelleri*) on the Yukon Kuskokwim Delta, Alaska. *Can. Field Nat.* 113:-306-308.
- Sedinger, J.S., M.S. Lindberg, B.T. Person, M.W. Eichholz, M.P. Herzog, P.L. Flint. 1998. Density dependent effects on growth, body size, and clutch size in Black Brant. *Auk* 115:613-620.

**RECENT COLLABORATORS**

Josh Ackerman, USGS, Davis, CA  
Steve Bollens, Washington State University, Vancouver, WA  
John Eadie, UC Davis, Davis, CA  
Jules Evans, Avocet Research Associates, Point Reyes Station, CA  
John Kelly, Audubon Canyon Ranch, Marshall, CA  
Maggi Kelly, UC Berkeley, Berkeley, CA  
Brian Person, F&W Dept, North Slope Borough, Barrow, AK  
James Sedinger, University of Nevada Reno, Reno, NV  
Stuart Siegel, Wetlands and Water Resources, San Rafael, CA  
Si Simenstad, University of Washington, Seattle, WA  
John Takekawa, USGS, Vallejo, CA

## GARY W. PAGE

**PRBO Conservation Science, 3820 Cypress Drive #11, Petaluma CA 94954**  
**Phone (415) 868 0371, Ext. 309 Email [gpage@prbo.org](mailto:gpage@prbo.org)**

**EXPECTED CONTRIBUTION:** Contribute to organization of available datasets, literature review, synthesis of baseline bird data, and report writing.

**EDUCATION:** MSc Zoology. University of Guelph, Ontario. 1970. Thesis: "The relationship between fat deposition and migration in the Semipalmated Sandpiper".

**EXPERIENCE:** Gary is Co-director of the Wetlands Ecology Division at PRBO. Gary came to PRBO in 1971. His work has included an ecological study, focused on shorebirds, of Bolinas Lagoon; a long-term study of the geographic distribution, status, life history, and population ecology of the Snowy Plover in central California; waterbird surveys of Point Reyes wetlands; the assessment of the effects of several major oil spills on marine bird populations; a large study of the distribution and abundance of shorebirds in wetlands west of the Rocky Mountains; and currently with other researchers at PRBO, an intensive study of bird use of San Francisco Bay wetlands.

**SCIENTIFIC PUBLICATIONS:** 60 including:

- 1972. With A. L. A. Middleton. Fat deposition during autumn migration in the Semipalmated Sandpiper. *Bird-Banding* 43:85-96
- 1975. With D. F. Whitacre. Raptor predation on wintering shorebirds. *Condor* 77:73-83.
- 1976. With L. E. Stenzel and H. R. Huber. Feeding behavior and diet of the Long-billed Curlew and Willet. *Wilson Bull.* 88:314-332.
- 1983. With L. E. Stenzel, D. W. Winkler, and C. W. Swarth. Spacing out at Mono Lake: Breeding success, nest density and predation in the Snowy Plover. *Auk* 100:13-24.
- 1984. With B. E. Kus, P. Ashman and L. E. Stenzel. Age-related mortality in a wintering population of Dunlin. *Auk* 101:69-73.
- 1985. With L. E. Stenzel and C. A. Ribic. Nest site selection and clutch predation in the Snowy Plover. *Auk* 102:347-353.
- 1986. With J. S. Warriner, J. C. Warriner, and L. E. Stenzel. Mating system and reproductive success of a small population of polygamous Snowy Plovers. *Wilson Bull.* 98:15-37.
- 1989. With P. L. Quinn and J. C. Warriner. Comparison of the breeding of hand- and wild-reared Snowy Plovers. *Conservation Biology* 3:198-201.
- 1991. With L.E. Stenzel, W. D. Shuford, and C. R. Bruce. Distribution and abundance of the Snowy Plover on its western North American breeding grounds. *J. Field Ornithology* 62:245-255.
- 1991. With J.G. Evens, S.A. Laymon and R.W. Stallcup. Distribution, relative abundance and status of the California Black Rail in western North America. *Condor* 93:952-966.
- 1994. With R. E. Gill Jr. Shorebirds in western North America: late 1800s to late 1900s. *Studies in Avian Biology* 15:147-160.
- 1994. With L.E. Stenzel, J.C. Warriner, J.S. Warriner, K.S. Wilson, F.C. Bidstrup. Long-distance breeding dispersal of Snowy Plovers in Western North America. *J. Animal Ecology* 63:887-902.
- 1995. With M. A. Stern and P.W.C. Paton. Differences in wintering areas of Snowy Plovers from

- inland breeding sites in western North America. *Condor* 97:258-262.
1998. With W. D. Shuford and J. E. Kjelson. Patterns and dynamics of shorebird use of California's Central Valley. *Condor* 100:227-244.
1999. With L. E. Stenzel and J. E. Kjelson. Overview of shorebird abundance and distribution in wetlands of the Pacific coast of the contiguous United States. *Condor* 101: 461-471.
2002. With N. Warnock, T. D. Ruhlen, N. Nur, J. Y. Takekawa and J. T. Hanson. Management and conservation of San Francisco Bay salt ponds: effects of pond salinity, area, tide and season on Pacific flyway waterbirds. *Waterbirds* 25: 79-92.
2003. With T. D. Ruhlen, S. Abbott, and L. E. Stenzel. Evidence that human disturbance reduces Snowy Plover chick survival. *J. Field Ornithology* 74:300-304.
2004. With K. K. Neuman, L. E. Stenzel, J. C. Warriner, and J. S. Warriner. Effect of mammalian predator management on Snowy Plover breeding success. *Waterbirds* 27: 257-263.
2006. With T. D. Ruhlen and L. E. Stenzel. Effect of a changing environment on nesting Snowy Plovers at Owens Lake, California. *Western Birds* 37:126-138.
2007. With L. E. Stenzel, J. C. Warriner, J. S. Warriner, D. E. George, C. R. Eyster, B. A. Ramer and K. K. Neuman. Survival and natal dispersal of juvenile Snowy Plovers in central coastal California. *Auk* 124:1023-1036.
2008. With K. K. Neuman and L. A. Henkel. Shorebird use of sandy beaches in central California. *Waterbirds* *in press*.

**PROFESSIONAL AFFILIATIONS:** *Elective Member:* American Ornithologists Union.

*Member:* Association of Field Ornithologists, Cooper Ornithological Society, Wader Study Group, Waterbird Society, Western Field Ornithologists, and Wilson Ornithological Society

**NAME**

Julian K. Wood

**PRESENT ADDRESS**

PRBO Conservation Science  
3820 Cypress Dr., # 11  
Petaluma, CA 94954  
Ph: (707) 781-2555 x313  
Email: jwood@prbo.org

**CONTRIBUTION:** Julian will contribute to the literature and data review, final report and data needs assessment. He will also serve as the grant administrator.

**EDUCATION**

B.A. Biology, 1995, Earlham College, Richmond, IN

**RELEVANT EXPERIENCE** (Short Narrative)

Julian Wood is the San Francisco Bay Program Director at PRBO Conservation Science. In 1996, he joined PRBO as a Palomarin Field Station intern and since 2000, has been responsible for the development and supervision of numerous bird monitoring projects in the San Francisco Bay Area and San Joaquin Valley with an emphasis on evaluating restoration. Current areas of interest include bird response to habitat restoration, and impacts of human land use to bird communities.

**RELEVANT PUBLICATIONS**

Howell, C. A., J. K. Wood, M. D. Dettling, K. Griggs, C. C. Otte, L. Lina, T. Gardali. *In prep.* Least Bell's Vireo breeding records in the Central Valley following decades of extirpation. *Western North American Naturalist*

Howell, C. A., J. K. Wood, N. Nur, and K. Lindquist. 2006. Impacts of flooding and global climate cycle on Song Sparrow reproductive success at Cosumnes River Preserve, California, U.S.A. Unpublished report submitted to the California Bay-Delta Authority Ecosystem Restoration Program, Contract: ERP- 01-NO1.

Kreitinger K. and J. K. Wood. 2005. Least Bell's Vireo nests in Stanislaus County: are they coming back? *Central Valley Bird Club Bulletin* 8: 45-48

Seavy, N. E., J. H. Viers, J. K. Wood. *In press.* Riparian bird response to vegetation structure: A multiscale analysis using LiDAR measurements of canopy height. *Ecological Applications*.

Wood, J. K., H. Spautz, and N. Nur. 2001. Avian Monitoring for Lower Tubbs Restoration Project San Pablo Bay National Wildlife Refuge: Annual Report 2001

Wood, J. K., T. Gardali, and G. R. Geupel. 2001. Neotropical and Resident Songbird Populations in the Lower Creek Floodway Restoration Project: a progress report for the 2000 field season. PRBO contribution #810

Wood, J. K., S. Hinic, R. Cormier, and G. R. Geupel. 2003. Bird Inventory and Monitoring Along the San Joaquin River: Results from Year 1 (March-October 2003). PRBO contribution # 1190

Wood, J. K., T. Haff, and G. R. Geupel. 2004. Avian Studies of the McCormack-Williamson Tract, Cosumnes River Preserve, 2000 and 2001. PRBO contribution #1175

**NAME: Michael Fitzgibbon**

PRBO Conservation Science

**EXPECTED CONTRIBUTION:** Build additional functionality onto PRBO/CADC technology to provide SBSRP with an integrated and interactive avian data repository and management system.

**EDUCATION**

- University of California, Berkeley, CA. Landscape Architecture (Environmental Planning), MLA. (1985)
- University of Wisconsin, Green Bay, WI. Mathematics. BS. 1981.

**PROFESSIONAL EXPERIENCE (Short narrative)**

Michael Fitzgibbon is the Informatics Engineer at PRBO Conservation Science. Michael's has over 20 years of experience in computer software programming, and product development. He has worked most recently at Intuit as a Group Software Architect and prior to that at a variety software corporations including Autodesk (as Director of Program Management and Chief Strategist) and ESRI (as a Senior Systems Analyst).

**PUBLICATIONS (published software products – major releases)**

- Intuit. Intuit Quicken Online v.1 – architect, system designer
- Intuit. Intuit QuickBooks Easy Estimate v. 1 & 2 – architect, lead system designer, UI design manager, engineered core calculation engine
- Omware/Intuit. Intuit MasterBuilder v. 7 – development manager, designed and engineered API, system components
- Omware. MentorPoint v. 2 – development manager, designed and engineered core system components
- Autodesk. Autodesk MapGuide v. 1 and 2 – product lead, all aspects of design and management
- Autodesk. Autodesk World v. 1 – product lead, all aspects of design and management
- Autodesk. AutoCAD Map v. 1 and 2 – functional, system and UI design
- ESRI, Arc/Info v. 6 and 7 – co-designed Librarian module, wrote user documentation
- Manatron. Manatron Maps – designed and engineered GBEDIT, GBDEED, GBPOLY

**SYNERGISTIC ACTIVITIES**

- Led many different software development releases at Intuit and Autodesk, frequently involved in the entire product lifecycle from concept and design through public availability and on-going maintenance releases.
- Extensive experience with a wide variety of development methodologies on different development platforms.
- Taken class work in Software Architecture through the Software Engineering Institute at Carnegie Mellon.
- Was on advisory committee to University of California at Berkeley Extension for development of a GIS program
- Represented Autodesk as a member of ANSI committee for development of SQL-93 Multimedia standards.
- Represented Autodesk as a member of Open GIS Consortium (OGC) during development of the first OpenGIS Specifications.
- Helped develop PRBO Informatics Division strategic plan as a volunteer.

## JOSHUA T. ACKERMAN

U.S. Geological Survey, Biological Resources Discipline, Western Ecological Research Center, Davis Field Station, University of California, Davis, CA, 530/752-0485, jackerman@usgs.gov

### EDUCATION

Ph.D. Ecology. University of California, Davis (2002).

B.S. (High Honors) Wildlife, Fish, and Conservation Biology. University of California, Davis (1997).

### RELEVANT EXPERIENCE TO THIS PROJECT

As a Principal Investigator with the USGS Western Ecological Research Center, I lead several research projects investigating waterbird ecology, avian reproduction, and mercury bioaccumulation in the San Francisco Bay Estuary. I have been conducting research on waterbirds in the South San Francisco Bay for five years and have led studies investigating (1) nesting ecology of avocets, stilts, and Forster's terns, (2) movements, habitat selection, and diet of avocets, stilts, and Forster's terns, (3) movements and diet of California gulls, and (4) mercury bioaccumulation and ecotoxicological effects of mercury on avian reproduction. Important to this proposal, I lead the largest avian nest monitoring dataset on waterbirds in the South Bay salt ponds which will provide a detailed 5-year dataset on nesting distributions, densities, and nest success at several colonies within the project area.

### EXPECTED CONTRIBUTIONS TO THIS PROJECT

I will summarize, analyze, and report the breeding bird datasets for this project.

### PROFESSIONAL EXPERIENCE

Research Wildlife Biologist, USGS, BRD, WERC, UC Davis Field Station (2/04-present)

Post-doctoral Researcher, John Muir Institute of the Environment, UC Davis (8/02-2/04)

Doctoral Research, Dept. of Wildlife, Fish, and Conservation Biology, UC Davis (9/97-7/02)

Waterfowl Research Associate, California Waterfowl Association, Sacramento (10/99-4/00)

**PUBLICATIONS:** *I have authored 33 peer-reviewed journal papers (19 lead), 13 popular articles (9 lead), 16 technical reports, and 138 scientific presentations. Below is a selected list of publications.*

**Ackerman, JT**, and CA Eagles-Smith. Integrating toxicity risk in bird eggs and chicks: using chick down feathers to estimate mercury concentrations in eggs. Environmental Science and Technology, submitted.

**Ackerman, JT**, JD Bluso, and JY Takekawa. Postfledging Forster's tern movements, habitat selection, and colony attendance in San Francisco Bay. Condor, submitted.

Eagles-Smith, CA, **JT Ackerman**, J Yee, and TL Adelsbach. 2008. Mercury demethylation in livers of four waterbird species: evidence for dose-response thresholds with liver total mercury. Environmental Toxicology and Chemistry, in press.

Stebbins, KR, JD Klimstra, CA Eagles-Smith, **JT Ackerman**, and GH Heinz. 2008. A non-lethal micro-sampling technique to monitor the effects of mercury on wild bird eggs. Environmental Toxicology and Chemistry, in press.

Iverson, SA, JY Takekawa, S Schwarzbach, CJ Cardona, N Warnock, MA Bishop, GA Schirato, S Paroulek, **JT Ackerman**, H Ip, and WM Boyce. 2008. Low prevalence of avian influenza virus in shorebirds on the Pacific Coast of North America. Waterbirds, in press.

Demers, SA, MA Colwell, JY Takekawa, and **JT Ackerman**. 2008. Breeding stage influences space use of American avocets in San Francisco Bay, California. Waterbirds, in press.

Demers-Bluso, JD, MA Colwell, JY Takekawa, and **JT Ackerman**. 2008. Space use by Forster's terns breeding in South San Francisco Bay. Waterbirds 31:357-364.

**Ackerman, JT**, CA Eagles-Smith, JY Takekawa, and SA Iverson. 2008. Survival of postfledging Forster's terns in relation to mercury exposure in San Francisco Bay. Ecotoxicology 17:789-801.

- Ackerman, JT**, CA Eagles-Smith, JY Takekawa, JD Bluso, and TL Adelsbach. 2008. Mercury concentrations in blood and feathers of pre-breeding Forster's terns in relation to space use of San Francisco Bay habitats. Environmental Toxicology and Chemistry 27:897-908.
- Ackerman, JT**, JY Takekawa, CA Eagles-Smith, and SA Iverson. 2008. Mercury contamination and effects on survival of avocet and black-necked stilt chicks in San Francisco Bay. Ecotoxicology 17:103-116.
- Ackerman, JT**, JY Takekawa, JD Bluso, JL Yee, and CA Eagles-Smith. 2008. Gender identification of Caspian terns using external morphology and discriminant function analysis. Wilson Journal of Field Ornithology 120:378-383.
- Eagles-Smith, CA, **JT Ackerman**, TL Adelsbach, JY Takekawa, AK Miles, and RA Keister. 2008. Mercury correlations among six tissues for four waterbird species breeding in San Francisco Bay. Environmental Toxicology and Chemistry 27:2136-2153.
- Ackerman, JT**, CA Eagles-Smith, JY Takekawa, SA Demers, TL Adelsbach, JD Bluso, AK Miles, N Warnock, TH Suchanek, and SE Schwarzbach. 2007. Mercury concentrations and space use of pre-breeding American avocets and black-necked stilts in San Francisco Bay. Science of the Total Environment 384:452-466.
- Mason, JW, GJ McChesney, WR McIver, HR Carter, JY Takekawa, RT Golightly, **JT Ackerman**, DL Orthmeyer, WM Perry, JL Yee, MO Pierson, and MD McCrary. 2007. At-sea distribution and abundance of seabirds off southern California: a 20-year comparison. Studies in Avian Biology 33:1-101.
- Ackerman, JT**, JY Takekawa, DL Orthmeyer, JP Fleskes, JL Yee, and KL Kruse. 2006. Spatial use by wintering greater white-fronted geese relative to a decade of habitat change in California's Central Valley. Journal of Wildlife Management 70:965-976.
- Ackerman, JT**, JM Eadie, and TG Moore. 2006. Does life history predict risk-taking behavior of wintering dabbling ducks? Condor 108:530-546.
- Ackerman, JT**, JM Eadie, ML Szymanski, JH Caswell, MP Vrtiska, AH Raedeke, JM Checkett, AD Afton, TG Moore, FD Caswell, RA Walters, DD Humburg, and JL Yee. 2006. Effectiveness of spinning-wing decoys varies among dabbling duck species and locations. Journal of Wildlife Management 70:799-804.
- Bluso, JD, **JT Ackerman**, JY Takekawa, and JL Yee. 2006. Using morphological measurements to sex Forster's terns. Waterbirds, 29:511-516.
- Blackmer, AL, RA Mauck, **JT Ackerman**, CE Huntington, GA Nevitt, and JB Williams. 2005. Exploring individual quality: basal metabolic rate and reproductive performance in Leach's storm-petrels. Behavioral Ecology 16: 906-913.
- Ackerman, JT**, AL Blackmer, and JM Eadie. 2004. Is predation on waterfowl nests density dependent? Tests at three spatial scales. Oikos 107:128-140.
- Ackerman, JT**, JY Takekawa, KL Kruse, DL Orthmeyer, JL Yee, CR Ely, DH Ward, KS Bollinger, and DM Mulcahy. 2004. Using radiotelemetry to monitor cardiac response of free-living tule greater white-fronted geese to human disturbance. Wilson Bulletin 116:146-151.
- Ackerman, JT**, J Adams, JY Takekawa, HR Carter, DL Whitworth, SH Newman, RT Golightly, and DL Orthmeyer. 2004. Effects of radio transmitters on the reproductive performance of Cassin's auklets. Wildlife Society Bulletin 32:1229-1241.
- Blackmer, AL, **JT Ackerman**, and GA Nevitt. 2004. Effects of investigator disturbance on hatching success and nest-site fidelity in a long-lived seabird, Leach's storm-petrel. Biological Conservation 116:141-148.
- Ackerman, JT**, JM Eadie, GS Yarris, DL Loughman, and MR McLandress. 2003. Cues for investment: nest desertion in response to partial clutch depredation in dabbling ducks. Animal Behavior 66:871-883.
- Ackerman, JT**, JM Eadie, DL Loughman, GS Yarris, and MR McLandress. 2003. The influence of partial clutch depredation on duckling production. Journal of Wildlife Management 67:576-587.
- Ackerman, JT**, and JM Eadie. 2003. Current versus future reproduction: an experimental test of parental investment decisions using nest desertion by mallards. Behavioral Ecology & Sociobiology 54:264-273.
- Ackerman, JT**. 2002. Of mice and mallards: positive indirect effects of coexisting prey on waterfowl nest success. Oikos 99:469-480.
- Ackerman, JT**, MC Kondratieff, SA Matern, and JJ Cech, Jr. 2000. Tidal influence on spatial dynamics of leopard sharks in Tomales Bay, California. Environmental Biology of Fishes 58:33-43.

**NAME**

John Y. Takekawa

**PRESENT ADDRESS**

U. S. Geological Survey  
505 Azuar Drive  
Vallejo, CA  
94592

**EXPECTED CONTRIBUTIONS (short narrative)**

I will oversee the coordination with USGS datasets, provide consultation towards modeling and database efforts, and contribute to report preparation.

**EDUCATION**

Ph.D., 1987 Animal Ecology, Iowa State University, Ames  
M.S., 1982 Fish and Wildlife Resources, University of Idaho, Moscow  
B.S., 1979 Forestry and Wildlife Science, University of Washington, Seattle

**RELEVANT EXPERIENCE (short narrative)**

I established the San Francisco Bay Estuary Field Station in 1995 to conduct research on waterbirds and their habitats in an ecosystem of international significance for migratory birds. My station has led several projects to examine the movements and habitat use of migratory species within the estuary. Our studies have shown that tidal flats are critical habitats for many species, yet there are few studies that studied their importance or their ecological function supporting foraging resources for waterbirds.

We also have studied the relationship between former salt evaporation ponds that are now part of large restoration programs and adjacent tidal flats. Restoration of large bayland habitats may result in changes in sensitive adjacent tidal flat foraging habitats, and the effects of such change are largely unknown. Thus, we have been focusing our research on the relationship of migratory birds to their estuarine habitats, to better understand how these resources provide the necessary support for wintering and migrating populations. Climate change is expected to have major effects on western estuaries, where changes in snowpack and sea level rise may greatly alter current hydrology and sediment processes. Our project will use existing data to model changes in tidal flats, and we will extend those models to predict likely effects on migratory birds that rely on those habitats.

**FIVE RELEVANT PUBLICATIONS**

- Takekawa, J. Y., A. K. Miles, D. H. Schoellhamer, D. C. Tsao-Melcer, S. Fregien, and N. D. Athearn. *In press*. Dietary Flexibility in Three Representative Waterbirds across Salinity and Depth Gradients in Salt Ponds of San Francisco Bay. *Hydrobiologia*.
- Foxgrover, A. C., P. Dartnell, B. E. Jaffe, J. Y. Takekawa, and N. D. Athearn. 2007. High-resolution bathymetry and topography of south San Francisco Bay, California: U. S. Geological Survey Scientific Investigations Map 2987, 1 sheet. [<http://pubs.usgs.gov/sim/2007/2987>].
- Takekawa, J. Y., A. K. Miles, D. H. Schoellhamer, N. D. Athearn, C. Jannusch, M. K. Saiki, W. D. Duffy, and S. Kleinschmidt. 2006. Trophic structure and avian communities across a salinity gradient in evaporation ponds of the San Francisco Bay estuary. *Hydrobiologia* 567: 307-327.

Poulton, V.K., J. R. Lovvorn, and J. Y. Takekawa. 2004. Spatial and overwintering changes in clam populations of San Pablo Bay, a semiarid estuary with highly variable freshwater inflow. *Estuarine, Coastal, and Shelf Science*, 59: 459-473

Warnock, S. E., and J. Y. Takekawa. 1995. Habitat preferences of wintering shorebirds in a temporally changing environment: western sandpipers in the San Francisco Bay estuary. *Auk* 112:920-930.

### **SYNERGISTIC ACTIVITIES**

Many of our studies in the San Francisco Bay Estuary have been conducted with interdisciplinary collaborators. We have worked with scientists conducting the CASCaDE project (Computational Assessments of Scenarios of Change for the Delta Ecosystem; led by Jim Cloern, USGS) as part of the Priority Ecosystem Science program, and we have been the lead USGS center in providing science support for large restoration programs that seek to restore former salt evaporation ponds to wetland habitats for wildlife.

### **COLLABORATORS (not to include co-authors)**

Jan Thompson, Bruce Jaffe, Jan Thompson, Mark Marvin-Dipasquale, Jim Cloern, Keith Miles, Josh Ackerman, Michael Saiki, Walter Duffy, Thomas Maurer (Fish and Wildlife Service), Nils Warnock (PRBO Conservation Science), Janet Hansen (San Francisco Bay Bird Observatory), James Lovvorn (University of Wyoming).

**NAME**

Nicole D. Athearn

**PRESENT ADDRESS**

U. S. Geological Survey  
505 Azuar Drive  
Vallejo, CA  
94592

**EXPECTED CONTRIBUTIONS (short narrative)**

I will provide coordination with USGS datasets, relevant data summaries towards modeling and database efforts, and assist in report preparation.

**EDUCATION**

Ph.D., expected 2011 Ecology, University of California, Davis  
M.S., 2002 Wildlife Ecology and certificate in Geographic Information Systems, Oklahoma State University, Stillwater  
B.S., 1996 Wildlife, Fisheries, and Conservation Biology, University of California, Davis

**RELEVANT EXPERIENCE (short narrative)**

I have led the USGS salt pond ecology program at the USGS San Francisco Bay Estuary Field Station since 2002. I have led the collection of monthly bird data and water quality data at all South Bay Salt Pond Restoration Project (SBSRP) ponds since 2003. Additionally, we collected data on shorebird use of mudflats during the winter, shorebird movements (color marking and telemetry), and habitat characteristics (pond bathymetry). I have coordinated our data collection efforts with our collaborators and have worked to prepare reports and manuscripts as well as plan synergistic research efforts. In 2004, I worked with USGS Water Resources Discipline scientists to implement the self-monitoring program for the U.S. Fish and Wildlife Service and California Dept. of Fish and Game. This monitoring program was established to comply with Regional Water Quality Control Board (RWQCB) monitoring requirements for SBSRP ponds under the Initial Stewardship Plan. We further developed monitoring activities to conduct more detailed investigations into dissolved oxygen dynamics within the salt ponds during subsequent seasons. Our most recent study in 2008 examines the spatial and temporal dynamics of dissolved oxygen in managed ponds in relation to pond depth and flow patterns.

I began a doctoral program in Ecology (area of emphasis: ecosystem and landscape ecology) at U.C. Davis in 2006. I am particularly interested in the integration of science and management, and my focus is to develop models and tools that can be used for the management of salt ponds as bird habitat.

**FIVE RELEVANT PUBLICATIONS**

Athearn, N. D., J. Y. Takekawa, and J. M. Shinn. *In press*. Avian response to early tidal salt marsh restoration at former commercial salt evaporation ponds in San Francisco Bay, California, USA. *In* Oren, A., Naftz, D.L., and Wurtsbaugh, W.A. (eds.). 2009. Saline lakes around the world: unique systems with unique values. The S.J. and Jessie E. Quinney Natural Resources Research Library, published in conjunction with the Utah State University College of Natural Resources.

Athearn, N.D., J.Y. Takekawa, B. Jaffe, B.J. Hattenbach, and A.C. Foxgrover. *In press*. Mapping elevations of tidal wetland restoration sites in San Francisco Bay:

comparing accuracy of aerial LiDAR with a singlebeam echosounder. *Journal of Coastal Research*.

- Foxgrover, A. C., P. Dartnell, B. E. Jaffe, J. Y. Takekawa, and N. D. Athearn. 2007. High-resolution bathymetry and topography of south San Francisco Bay, California: U. S. Geological Survey Scientific Investigations Map 2987, 1 sheet. [<http://pubs.usgs.gov/sim/2007/2987>].
- Takekawa, J. Y., A. K. Miles, D. H. Schoellhamer, D. C. Tsao-Melcer, S. Fregien, and N. D. Athearn. *In press*. Dietary Flexibility in Three Representative Waterbirds across Salinity and Depth Gradients in Salt Ponds of San Francisco Bay. *Hydrobiologia*.
- Takekawa, J. Y., A. K. Miles, D. H. Schoellhamer, N. D. Athearn, C. Jannusch, M. K. Saiki, W. D. Duffy, and S. Kleinschmidt. 2006. Trophic structure and avian communities across a salinity gradient in evaporation ponds of the San Francisco Bay estuary. *Hydrobiologia* 567: 307-327.

### **SYNERGISTIC ACTIVITIES**

Many of our studies in the San Francisco Bay Estuary have been conducted with interdisciplinary collaborators. We have been the lead USGS center in providing science support for large restoration programs that seek to restore former salt evaporation ponds to wetland habitats for wildlife. For this interdisciplinary effort, we have worked with scientists from several USGS disciplines: water resources discipline (WRD) and geologic discipline (GD), as well as fellow scientists from the biological resources discipline (BRD). We have additionally formed partnerships with universities (U.C. Davis, Moss Landing Marine Laboratory) and bird research organizations, Point Reyes Bird Observatory (PRBO) and San Francisco Bay Bird Observatory (SFBBO).

### **COLLABORATORS (not to include co-authors)**

Eric Mruz (FWS), Cheryl Strong (FWS), Jan Thompson (USGS WRD), Greg Shellenbarger (USGS WRD), Bruce Jaffe (USGS GD), Mark Marvin-Dipasquale (USGS WRD), Tara Schraga (USGS WRD), Keith Miles (USGS BRD), Deborah Elliott-Fisk (U.C. Davis), Ted Foin (U.C. Davis), Michael Saiki (USGS BRD), Diana Stralberg (PRBO Conservation Science), Mark Herzog (PRBO Conservation Science), Nils Warnock (Wildlife Health Center, U.C. Davis), Scott Demers (H.T. Harvey & Associates).

## COLLIN A. EAGLES-SMITH

US Geological Survey, Western Ecological Research Center, Davis Field Station  
One Shields Ave, University of California, Davis, CA 95616, [ceagles-smith@usgs.gov](mailto:ceagles-smith@usgs.gov), 530-754-8130

### EDUCATION

Ph.D. Ecology. University of California, Davis (2006)  
B.S. (Magna Cum Laude) Env. Resource Sciences. University of California, Davis (2000)

### RELEVANT EXPERIENCE AND RESEARCH INTERESTS

For the past 5 years I have been conducting research on waterbird reproductive and foraging ecology in the San Francisco Estuary, focusing specifically on Forster's terns, American avocets, and black-necked stilts within the South San Francisco Bay. I was the lead USFWS scientist on a large project assessing mercury bioaccumulation and risk in waterbirds and currently co-lead several projects on waterbird reproduction, foraging ecology and ecotoxicological effects of mercury to wildlife. I have also studied foraging ecology of Bald Eagles on the Catalina Islands and reproductive ecology of Western Grebes and Osprey in California Lakes.

### EXPECTED CONTRIBUTIONS TO THIS PROJECT

I will collaborate on the summary, analysis, and reporting of historical waterbird nesting data.

### PROFESSIONAL EXPERIENCE

Wildlife Biologist, USGS, WERC, UC Davis Field Station (8/07-present).  
Senior Biologist, US Fish and Wildlife Service, Sacramento (2/07-8/07).  
Staff Biologist, US Fish and Wildlife Service, Sacramento (2/03-2/07).  
Doctoral Research, Dept. of Wildlife, Fish and Cons. Biology, UC Davis (9/00-11/06).  
Staff Research Assistant, Dept. of Wildlife, Fish and Cons. Biology, UC Davis (2/98-9/00).

**PUBLICATIONS:** *21 peer-reviewed journal publications (4 lead), 6 popular articles (4 lead), 8 technical reports, and 63 scientific presentations. Below is a selected list of publications.*

**Eagles-Smith, CA, JT Ackerman, J Yee, and TL Adelsbach.** 2009 Mercury demethylation in livers of four waterbird species: evidence for dose-response thresholds with liver total mercury. Environmental Toxicology and Chemistry, in press.

**Stebbins, KR, JD Klimstra, CA Eagles-Smith, JT Ackerman, GH Heinz.** 2009. Micro-sampling eggs to monitor the effects of methylmercury on wild birds. Environmental Toxicology and Chemistry. In press.

**Anderson, DW, TH Suchanek, CA Eagles-Smith, T Cahill.** 2008. Mercury residues in ospreys and grebes in a mine-dominated ecosystem: Clear Lake, California. Ecological Applications. In press.

**Eagles-Smith, CA, TH Suchanek, AE Colwell, NL Anderson, PB Moyle.** 2008. Changes in fish diets and food web mercury bioaccumulation induced by an invasive planktivorous fish. Ecological Applications, in press.

**Eagles-Smith, CA, TH Suchanek, AE Colwell, NL Anderson.** 2008. Mercury trophic transfer in a eutrophic lake: the importance of habitat-specific foraging. Ecological Applications, in press.

- Eagles-Smith, CA**, JT Ackerman, TL Adelsbach, JY Takekawa, AK Miles, RA Keister. 2008. Mercury correlations among six tissues for four waterbird species breeding in San Francisco Bay, California, USA. Environmental Toxicology and Chemistry 27:2136-2153.
- Ackerman, JT, **CA Eagles-Smith**, JY Takekawa, SA Iverson. 2008. Survival of postfledging Forster's terns in relation to mercury exposure in San Francisco Bay. Ecotoxicology. 17: 789-801.
- Ackerman, JT, **CA Eagles-Smith**, JY Takekawa, JD Bluso, TL Adelsbach. 2008. Mercury concentrations in blood and feathers of pre-breeding Forster's terns in relation to space use of San Francisco Bay habitats. Environmental Toxicology and Chemistry 27:897-908
- Ackerman, JT, JY Takekawa, JD Bluso, JY Yee, **CA Eagles-Smith**. 2008. Gender identification of Caspian Terns using external morphology and discriminant function analysis. The Wilson Journal of Ornithology. 120:378-383.
- Ackerman, JT, JY Takekawa, **CA Eagles-Smith**, SA Iverson. 2007. Mercury contamination and effects on survival of American avocet and black-necked stilt chicks in San Francisco Bay. Ecotoxicology 17:103-116.
- Ackerman, JT, **CA Eagles-Smith**, JY Takekawa, SA Demers, TL Adelsbach, JD Bluso, AK Miles, N Warnock, TH Suchanek, and SE Schwarzbach. 2007. Mercury concentrations and space use of pre-breeding American avocets and black-necked stilts in San Francisco Bay. Science of the Total Environment 384: 452-466.
- Suchanek, TH, **CA Eagles-Smith**, DG Slotton, EJ Harner, D Adam, AE Colwell, NL Anderson, D Woodward. 2008. Mine-derived mercury: effects on lower trophic species in Clear Lake, California. Ecological Applications. In press
- Suchanek, TH, **CA Eagles-Smith**, EJ Harner. 2008. Is Clear Lake methylmercury decoupled from bulk mercury loading? Implications for lake management and TMDL implementation. Ecological Applications. In press
- Suchanek, TH, **CA Eagles-Smith**, DG Slotton, EJ Harner, AE Colwell, NL Anderson, L Mullen, J Flanders, D Adam, K McElroy. 2008. Spatio-temporal trends of mercury in fish from a mine-dominated ecosystem at Clear Lake, California: individual, species, and population trends. Ecological Applications. In press.
- Suchanek, TH, **CA Eagles-Smith**, EJ Harner, D Adam. 2008. Mercury in abiotic compartments of Clear Lake, California: human health and ecotoxicological implications. Ecological Applications. In press
- Richerson, P, TH Suchanek, R Zierenberg, D Osleger, A Heyvaert, D Slotton, **CA Eagles-Smith**, C Vaughn. 2008. Anthropogenic stressors and changes in the Clear Lake ecosystem as recorded in sediment cores. Ecological Applications. In press.
- McEachern, M, **CA Eagles-Smith**, CM Efferson, DH Van Vuren. 2006 Evidence for local specialization in a generalist mammalian herbivore, *Neotoma fuscipes*. Oikos 113: 440-448
- Suchanek, TH, PJ Richerson, DC Nelson, **CA Eagles-Smith**, DW Anderson, JJ Cech, Jr., G Schladow, R Zierenberg, JF Mount, SC McHatton, DG Slotton, LB Webber, AL Bern, and BJ Swisher. 2003. Evaluating and managing a multiply-stressed ecosystem at Clear Lake, California: A holistic ecosystem approach. In: Managing For Healthy Ecosystems, Case Studies; CRC/Lewis Press, Boca Raton, FL, USA.

**NAME**

Jill Bluso Demers

**PRESENT ADDRESS**

San Francisco Bay Bird Observatory  
524 Valley Way  
Milpitas, CA 95043

**EXPECTED CONTRIBUTION:** Provide data for modeling and CADC, assist in model development and validation, assist in report preparation.

**EDUCATION**

M.S., 2007 Natural Resources: Wildlife, Humboldt State University, Arcata, CA  
B.S., 2002 Biology, Colby College, Waterville, ME

**RELEVANT EXPERIENCE (short narrative)**

Jill is a broadly trained wildlife ecologist whose research has focused on avian ecology in the San Francisco Bay estuary.

Prior to joining San Francisco Bay Bird Observatory (SFBBO), Jill was a biologist with the U.S. Geological Survey. Her research focused on the effects of landfills on California Gull reproductive and foraging ecology and other aspects of avian biology, including reproductive biology and ecotoxicology, related to the South Bay Salt Ponds Restoration.

Jill conducted her Master's research on waterbirds in San Francisco Bay as part of a multi-disciplinary, multiagency research team examining the bioaccumulation and ecotoxicological risk of environmental contaminants on avian reproduction. Jill's specific research examined the spatial ecology of Forster's Terns to determine the foraging areas of these species relative to areas of potential mercury exposure.

Prior to her graduate work, Jill worked for the U.S. Geological Survey on a variety of avian research projects in the San Francisco Bay estuary, the Central Valley, and throughout the Pacific Flyway. Jill intensively studied the migratory ecology of Western Sandpipers in Mexico, the US, and Canada and assisted in coordinating the international research effort. She has also conducted avian point counts, fish surveys, and invertebrate sampling in the San Francisco Bay estuary. In addition, Jill helped design a novel bathymetric sampling system to map underwater topology of salt ponds, sloughs, and other wetland areas.

At SFBBO, Jill directs the Science Programs, overseeing the Landbird and Waterbird Programs.

**FIVE RELEVANT PUBLICATIONS**

Demers-Bluso, J.D., M.A. Colwell, J.Y. Takekawa, and J.T. Ackerman. 2008. Space use by Forster's Terns breeding in South San Francisco Bay. *Waterbirds* 31: 357-364.

Ackerman, J.T., J.T. Takekawa, J.D. Bluso, J.L. Yee, and C.A. Eagles-Smith. 2008. Gender determination of Caspian Terns using external morphology and discriminant function analysis. *Wilson Journal of Ornithology* 120: 378-383

Ackerman, J.T., C.A. Eagles-Smith, J.T. Takekawa, J.D. Bluso, T.A. Adelsbach. 2008. Mercury Concentrations in Blood and Feathers of Prebreeding Forster's Terns in Relation to Space Use of San Francisco Bay Habitats. *Environmental Toxicology and Chemistry* 27: 897-908.

Ackerman, J.T., C.A. Eagles-Smith, J.T. Takekawa, S.D. Demers, T.A. Adelsbach, J.D. Bluso, K.A. Miles, N. Warnock, T.H. Suchanek, S.E. Schwarzbach. 2007. Mercury concentrations and space use of pre-breeding American Avocets and Black-necked Stilts in San Francisco Bay. *Science of the Total Environment* 384: 452-466.

Bluso, J. B., J.T. Ackerman, J. Y. Takekawa, and J.L. Yee. 2006. Sexing Forster's Terns using morphometric measurements. *Waterbirds* 29: 511-516.

**NAME**

Caitlin Robinson

**PRESENT ADDRESS**

San Francisco Bay Bird Observatory  
524 Valley Way  
Milpitas, CA 95043

**CONTRIBUTION:** Caitlin maintains the salt pond database and supervised the data collection. She will be responsible for formatting data for the modeling work. She will also contribute to the data needs section (especially regarding nesting SNPL in SF Bay).

**EDUCATION**

M.S., 2008 Environmental Studies, San Jose State University, San Jose, CA  
B.S., 2000 Environmental Studies, Skidmore College, Saratoga Springs, NY

**RELEVANT EXPERIENCE (short narrative)**

Caitlin is a biologist with San Francisco Bay Bird Observatory whose research focuses on avian conservation in the San Francisco Bay. Caitlin conducted her Master's research on Western Snowy Plovers in San Francisco Bay. She researched the Snowy Plover use of salt ponds managed as part of the South Bay Salt Pond Restoration Project.

Prior to joining SFBBO, Caitlin monitored Piping Plovers on Long Island, NY for the Nature Conservancy. She also worked as a research assistant in the rainforests of Australia where she lead projects studying avian use of restored and old-growth rainforests.

At SFBBO, Caitlin oversees the Waterbird Program which includes research projects on Western Snowy Plovers, California Gulls and waterbird use of salt ponds.

**FIVE RELEVANT PUBLICATIONS**

Robinson, C.W., C. Strong, L. Tucci, J. Albertson. 2007a. Western Snowy Plover Numbers, Nesting Success, and Avian Predator Surveys in the San Francisco Bay, 2006. Unpubl.Rep. San Francisco Bay Bird Observatory, Milpitas, CA.

Robinson, C.W., D. Le Fer, C. Strong, J. Albertson. 2007b. Western Snowy Plover Numbers, Nesting Success, and Avian Predator Surveys in the San Francisco Bay, 2007. Unpubl.Rep. San Francisco Bay Bird Observatory, Milpitas, CA.

Robinson, C.W., J.D. Demers, C. Strong, J. Albertson. In Prep. Western Snowy Plover Numbers, Nesting Success, Fledge Success and Avian Predator Surveys in the San Francisco Bay, 2008. Unpubl.Rep. San Francisco Bay Bird Observatory, Milpitas, CA.

Robinson, C.W., C. Strong, L. Trulio. In Prep. Western Snowy Plover Use of Managed Salt Ponds in South San Francisco Bay.

Robinson, C.W., C. Strong, J.D. Demers, J. Albertson. In Prep. Western Snowy Plover Nest Success in the South San Francisco Bay.

**South Bay Salt Pond Restoration Project- Selected Monitoring and Applied Studies Project Budget Worksheet\***

**Timeframe\*\*: May 2009-April 2011 (MASTER BUDGET)**

Budget Categories	Total Project Budget		Total Grant Request		Total Proposed From Other Sources	Proposed funding source
	Year 1	Year 2	Year 1	Year 2		
<b>PRBO Labor (personnel, hours, cost/hour)</b>						
hours rate						
Grant Ballard	40	\$78.10	\$2,812	\$312	\$2,812	\$312
Mark Herzog	160	\$77.55	\$9,306	\$3,102	\$9,306	\$3,102
Michael Fitzgibbon	360	\$60.01	\$17,283	\$4,321	\$17,283	\$4,321
Doug Moody	360	\$58.28	\$5,245	\$15,736	\$5,245	\$15,736
Dennis Jongsomjit	80	\$42.40	\$3,053	\$339	\$3,053	\$339
Gary Page	80	\$78.47	\$1,256	\$5,022	\$1,256	\$5,022
Julian Wood	140	\$48.47	\$2,036	\$4,750	\$2,036	\$4,750
Staff Biologist	80	\$43.85	\$1,754	\$1,754	\$1,754	\$1,754
<i>PRBO Labor subtotal</i>			<b>\$42,744</b>	<b>\$35,336</b>	<b>\$42,744</b>	<b>\$35,336</b>
<b>Contractual Services</b>						
San Francisco Bay Bird Observatory			\$3,663	\$3,663	\$3,663	\$3,663
U.S. Geological Survey			\$61,144	\$32,001	\$61,144	\$32,001
<i>Subtotal</i>			<b>\$64,807</b>	<b>\$35,663</b>	<b>\$64,807</b>	<b>\$35,663</b>
Project Specific Supplies / Materials			\$250	\$250	\$250	\$250
<i>Subtotal</i>			<b>\$250</b>	<b>\$250</b>	<b>\$250</b>	<b>\$250</b>
<b>Overhead (not to exceed 10%)</b>			\$4,661	\$4,661	\$4,661	\$4,661
<b>Other:</b> _____						
<b>TOTAL</b>			<b>\$112,461</b>	<b>\$75,910</b>	<b>\$112,461</b>	<b>\$75,910</b>

**GRAND TOTAL \$188,371**

**Date Created: December 5, 2008**

\* This form is meant to assist you in developing a proposed grant budget, summarizing the use of all grant funds on a single page. Should you need to

**South Bay Salt Pond Restoration Project Selected Monitoring and Applied Studies- Project Budget Worksheet\***

**Timeframe\*\*:** May 2009-April 2011 (SFBBO)

Budget Categories	Total Project Budget		Total Grant Request		Total Proposed From Other Sources (please specify the source, if known)	Proposed funding source
	Year 1	Year 2	Year 1	Year 2		
cost/hour)						
<b>SFBBO Personal</b> hours    rate						
Science Director      80      \$55	\$2,200	\$2,200	\$2,200	\$2,200		
Program Director      65      \$45	\$1,463	\$1,463	\$1,463	\$1,463		
<i>Subtotal</i>	\$3,663	\$3,663	\$3,663	\$3,663	0	
<b>Contractual Services</b>						
Analyses						
<i>Subtotal</i>	\$0	\$0	\$0	\$0	0	
<b>Travel</b>						
<i>Subtotal</i>	\$0	\$0	\$0	\$0	0	
<b>supplies/materials</b>						
<i>Subtotal</i>	\$0	\$0	\$0	\$0	0	
<b>Overhead (not to exceed 10%)</b>	\$0	\$0	\$0	\$0		
(please specify)						
<b>TOTAL</b>	\$3,663	\$3,663	\$3,663	\$3,663		

**Date Created: December 5, 2008**

\* This form is meant to assist you in developing a proposed grant budget, summarizing the use of all grant funds on a single page. Should you need

**South Bay Salt Pond Restoration Project-Selected Monitoring and Applied Studies Project Budget Worksheet\***

**Timeframe\*\*:** May 2009-April 2011 (USGS)

Budget Categories	Total Project Budget		Total Grant Request		Total Proposed From Other Sources (please specify the source, if known)	Proposed funding source
	Year 1	Year 2	Year 1	Year 2		
<b>Labor (personnel, hours, cost/hour)</b>						
<b>SFBBO Personal</b>	Hours	Rate				
Ackerman	160	\$92.59	\$7,407	\$7,407	\$7,407	\$7,407
Eagles-Smith	240	\$75.50	\$9,060	\$9,060	\$9,060	\$9,060
Takekawa	80	\$110.00	\$7,040	\$1,760	\$7,040	\$1,760
Athearn	320	\$72.18	\$18,478	\$4,620	\$18,478	\$4,620
Biologist (Davis GS-7)	335	\$34.74	\$5,819	\$5,819	\$5,819	\$5,819
Biologist (Vallejo GS-7)	480	\$34.74	\$13,340	\$3,335	\$13,340	\$3,335
<i>Subtotal</i>			\$61,144	\$32,001	\$61,144	\$32,001
						0
<i>Subtotal</i>			\$0	\$0	\$0	\$0
<b>Overhead (not to exceed 10%)</b>			\$2,201	\$1,152	\$2,201	\$1,152
<b>(please specify)</b>						
<b>TOTAL</b>			\$63,346	\$33,153	\$63,346	\$33,153

**Date Created: December 5, 2008**

\* This form is meant to assist you in developing a proposed grant budget, summarizing the use of all grant funds on a single page. Should you need

## **LIST OF POTENTIAL REVIEWERS**

Josh Collins, San Francisco Estuary Institute; email: jcollins@sfei.org  
Beth Huning, San Francisco Bay Joint Venture; email: bhuning@sfbjv.org  
Lynne Trulio, San Jose State University; email: ltrulio@earthlink.net  
Steve Granholm, LSA Assoc.; email: steve.granholm@lsa-assoc.com

## **NECESSARY ASSESSMENTS, CERTIFICATIONS, AND PERMITS**

No new data collection is proposed and no assessments, certifications, or permits are required for our proposed research.

## **ANIMAL CARE AND USE CERTIFICATION**

No animals will be used in our proposed research

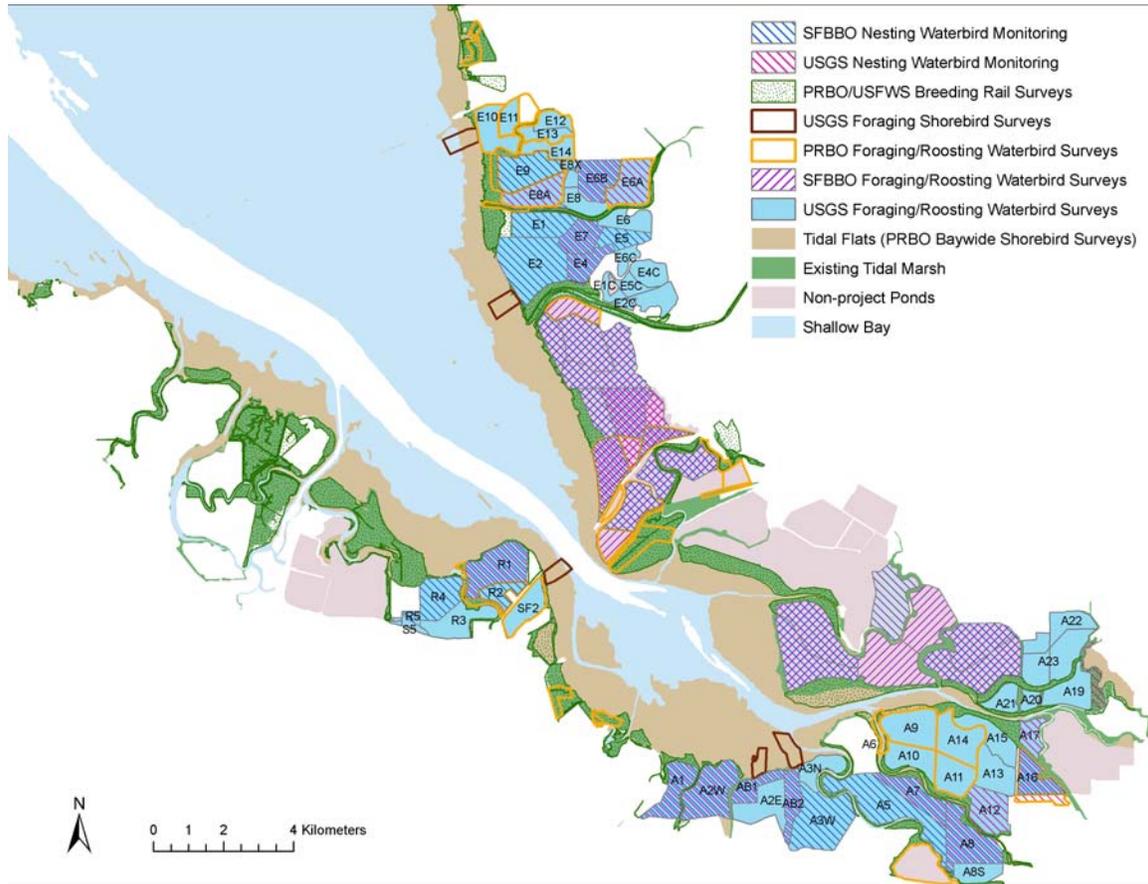
**Appendix A. Initial inventory of important datasets available from investigators, for data consolidation, baseline summaries, synthesis, and modeling.**

Survey Years	Seasons	Bay Region	Habitat	Survey Type	Tides	Description of data
<b>PRBO Conservation Science</b>						
1986-1988	late winter to mid-breeding	South Bay, San Pablo Bay, Suisun Bay, Delta	tidal, muted marsh	call count	n/a	BLRA, vegetation; dataset presumably exists at Hagmaier
1988-1993	spring, fall	South Bay, San Francisco Bay, San Pablo Bay	salt pond, tidal, restoration, muted	area survey	Low and High	site-level shorebird counts
1996-present	Breeding	San Pablo Bay, Suisun Bay	tidal, muted marsh	nest monitoring	all	BLRA nests, nest vegetation; nests/site/year
1999-2001	Year round	South Bay, San Pablo Bay	salt pond, marsh	area search	Low and High	site-level waterbird counts, behavioral obs. at 21 salt ponds and 14 marshes in S Bay, more in N Bay
2000-2002	late winter to mid-breeding	South Bay, San Pablo Bay, Suisun Bay	tidal, muted marsh	call count	n/a	BLRA, vegetation; transect level abundances
2001-2003	spring, fall, winter	San Pablo Bay	restoration marsh	area survey	Low and High	site-level waterbird counts, behavioral observations, habitat associations
2003-2005	spring, fall, winter	South Bay, San Francisco Bay, San Pablo Bay	tidal, restoration marsh	area survey	Low and High	site-level waterbird counts, behavioral observations, habitat associations
2004-present	late winter to early breeding	South Bay, San Pablo Bay, Suisun Bay, Delta	tidal, muted marsh	call count	low	CLRA, BLRA, vegetation; point level counts
2006-2008	Fall	South Bay, San Pablo Bay	salt pond, tidal, restoration, muted	area survey	Low	site-level shorebird counts

**Appendix A (cont). Initial inventory of important datasets available from investigators.**

<b>Survey Years</b>	<b>Seasons</b>	<b>Bay Region</b>	<b>Habitat</b>	<b>Survey Type</b>	<b>Tides</b>	<b>Description of data</b>
<b>San Francisco Bay Bird Observatory</b>						
<b>1980-present</b>	Breeding	San Francisco Bay	Salt Ponds, others	area search: colony walk- thrus	n/a	site-level breeding breeding colonial waterbird counts (CAGU, CATE, FOTE, LETE, BNSK. SNEG, GREG, GBHE, BCNH)
<b>2003-present</b>	year round	South Bay	Salt Ponds	area search	n/a	SNPL monthly surveys
<b>2003-present</b>	breeding	South Bay	Salt Ponds	nest monitoring	n/a	SNPL nest monitoring
<b>2005-present</b>	year round	South Bay: Coyote Hills and Mowry Salt Ponds	Salt Pond	area search	high	site-level waterbird counts, behavioral obs. at 22 non-Project salt ponds in S Bay
<b>2006-presnt</b>	year round	South Bay	Salt Ponds	area search	n/a	Landfill surveys for gulls
<b>2008-present</b>	breeding	South Bay	Salt Ponds	area search	n/a	SNPL chick banding to determine chick fledging rates
<b>US Geological Survey</b>						
<b>2002-2008</b>	Year round	South Bay	salt ponds	area search	Low and High	site-level waterbird counts, behavioral obs.
<b>1999-2008</b>	Year round	San Pablo Bay	salt ponds	area search	Low and High	site-level waterbird counts, behavioral obs, water quality and depth
<b>2006</b>	winter	South Bay	mudflats	area search	Low	site-level waterbird counts, behavioral obs, water quality and depth
<b>1988-2008</b>	winter	San Francisco Bay	open water	area search	High	mid-winter waterfowl survey, aerial waterbird counts
<b>2005-2008</b>	April-August	San Francisco Bay, especially South bay	salt pond, marsh	nest monitoring	NA	Avocet, Stilts, Forster's Terns; nest success; abundance; hatching success; clutch size

Appendix B. Avian study site areas relevant to the data and literature review and data needs assessment.



Herzog\_Topic6

**SPSR RFP Proposal questions and clarifications from the administrative review**  
**Summary of e-mail below**

Regarding your proposal:

Integrating Avian Datasets for Management, Modeling and Visualization to Benefit the South Bay Salt Pond Restoration Project

1. please clarify the USGS budget addition of 10% overhead- since their rate is generally much higher has the 40% already been calculated into above salaries? If yes, can we do away with the additional 10%?

**Response:**

The OH rate listed is not 10%, we just didn't delete the text that said "not to exceed 10%" in the Excel file format you requested.

As we do in all proposals, our personnel costs include salary, benefits, and administrative costs. The 3.6% effective OH shown on the proposal is PRBO's pass through OH rate, since they are the primary grantee.

Josh Ackerman, USGS