Project Title:

Sustaining healthy ecosystems in the face of sea level rise: Ensuring the Baylands Ecosystem Habitat Goals Report continues to inform acquisition, restoration, and management of the region's baylands.

Proposal by:

Nadine Hitchcock, Deputy Executive Officer
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Scope & Budget:

Location: Bay-Delta
Duration in months: 12
Requested Funding: $60,374.00
Leveraged Funding: $327,147.00

Briefly summarize the goals of the project, what products will result, and how the products support decision-making and conservation delivery for natural resource management within the CA LCC.

The main goal of this project is to ensure that the 2011-13 climate change update to the Baylands Ecosystem Habitat Goals Report (Baylands Goals) and other key, ongoing conservation activities in the SF Bay region use the latest information about the current and future status of San Francisco Bay tidal marsh ecosystems, particularly in the context of sea-level rise. The main product of the project will be the improved SLR Tool, specifically upgraded to inform the Baylands Goals Report update. Upgrade requests will be solicited from the stakeholders most involved in the update, and those who will use the report to guide habitat management going forward. The tool will continue to be available online at www.prbo.org/sfbayslr. All data layers going into the tool are and will continue to be downloadable from the site. PRBO's ongoing work to describe the state of the Bay's tidal marsh habitats and their futures under the range of possible sea-level rise, sediment, salinity and organic materials scenarios has yielded many results of high relevance to the Baylands Goals Report and adaptive conservation in SF Bay in general. For example, results show where the highest priority upland sites are, which will allow for marsh migration but might require levee removal or setbacks; identify the critical remaining locations for the endangered Clapper Rail, and project where those sites are likely to be in the future; identify areas that are relatively (naturally) resistant to the effects of SLR, rank them according to their value to wildlife, and can help prioritize their conservation; and show that initial bed elevations and suspended sediment concentrations are very important to determining marsh outcomes – these facts can provide the basis for specific management options.

For continuing 2010 CA LCC projects, describe the accomplishments and outcomes to date, why additional funds are needed, and what this proposal will add to the project.

Phase I of this project, funded as part of the 2010 CA LCC, completed the following: • Spatial layers for current and future tidal marsh elevations, vegetation and bird species distributions • A preliminary set of model results for current and future population estimates for tidal marsh avian focal species • Online map viewer, decision support tool, and downloadable GIS layers online at http://www.prbo.org/sfbayslr • Draft report of methods, findings and recommendations • Results presented at the following meetings: Bay-Delta Science Conference, Sediment Management Workshop, PIER California Vulnerability and Adaptation Study, and Climate Variability of the eastern north Pacific and western North

America (PACLIM); presented to multiple partners, e.g.: BCDC, SFBJV Management Board and Restoration Committee, North Bay Managers, East Bay Regional Parks District. • Two manuscripts for peer reviewed journals are in preparation. • The SLR Tool is designed to incorporate new data and is ready for an improved user interface to maximize its utility in SF Bay's Tidal Marsh adaptive management framework. Additional funds are needed to maximize the new tool's utility to the land management community through iterative feedback and to incorporate new datasets that will refine the model's applicability to management decisions. This proposal will allow the integration of the tool into the key management decision processes outlined in the main proposal, particularly the Baylands Goals technical climate change update, as well as allow for the updates, validation, and enhancements also described therein.

Identify which National LCC Performance Measure(s), if any, your project addresses.

3. A population and habitat assessment developed or refined to predict changes in species populations and habitats. 5. A management evaluation action evaluated for effectiveness in response to climate change and research activities conducted to address information needs in response to climate change.

List Partners

1) Coastal Conservancy and Bay Area Ecosystem Climate Change Consortium – coordinate outreach to Baylands Goals Report update project and other Bay Area partners, gather feedback, prioritize requests for improvements. 2) PRBO Conservation Science – integrate new data and modify SLR Tool. 3) USGS - provide high resolution elevation data for model validation. 4) SF Bay NERR – provide input and incorporate SLR tool use in the Coastal Training Program. 5) USFWS SF Bay Refuge Complex, East Bay Regional Parks, and South Bay Salt Pond Restoration Project – provide input. Funding Leveraged: This project will leverage approximately $242,900 in direct contributions as detailed below: •$22,000 (State Coastal Conservancy support for Baylands Goals Report update coordinator; in hand) •$100,000 (State Coastal Conservancy support for PRBO SLR Tool development; in hand) •$80,900 (NOAA-SARP/Bay Area Ecosystem Climate Change Consortium for SLR Tool development/ preliminary integration with Patrick Barnard modeling; in hand) •$15,000 (Lisa and Douglas Goldman Fund – to be requested – for outreach to conservation practitioners about SLR Tool) •$25,000 (Mary A. Crocker Trust – to be requested – for outreach to conservation practitioners about SLR Tool) This project will leverage approximately $84,247 in in-kind support as detailed below: •$10,000 (State Coastal Conservancy Deputy Executive Officer and Deputy Bay Area Program Manager time for project oversight and participating in focus group interviews and user trainings) •$50,000 (PRBO California Avian Data Center server infrastructure for hosting SLR Tool) •$9,247 (PRBO SF Bay Initiative leader participation in focus group interviews and user trainings) •$5,000 (USGS/John Takekawa salary for compiling/transferring RTK GPS data for elevation validation) •$10,000 (USGS/John Takekawa RTK GPS dataset for elevation validation)

Briefly describe how the project team (main PIs) provides the range of experience, expertise, and organizational capacity needed to accomplish the project. List recent and current projects (names, time-periods, PI time commitments, and total budgets). Also attach 1 page CVs for the principle investigator and/or project leaders per below under additional information.

Project coordinator (Nadine Hitchcock, Deputy Executive Officer at California State Coastal Conservancy) has extensive experience developing and managing natural resource and recreation projects and programs. As a project manager, she managed the Napa River Salt Pond Restoration project, the Napa River Flood Protection project, and she served on the Resource Manager's Group for development of the Baylands Goals report. As the first San Francisco Bay Area Conservancy program manager, she provided leadership and supervised a staff of nine in the development of numerous regional and significant projects including the South Bay Salt Pond Restoration Project, the Hamilton-Bel Marin Keys Restoration Project, and the Invasive Spartina Project. She is currently responsible for overseeing the Conservancy's

fiscal and administrative matters, and serves as a liaison and advocate for federal funding of Conservancy supported projects. She leads the Conservancy's climate change policy development and activities, including the board-adopted climate change policy and project selection criteria. She is currently overseeing development of the Conservancy's Climate Change Guidance, and is on the steering committee for the Bay Area Ecosystem Climate Change Consortium. SLR Tool Team coordinator (Grant Ballard, PhD., Climate Change and Informatics Director at PRBO Conservation Science) leads PRBO's core team of spatial and quantitative ecologists, GIS experts, and informatics engineers to develop conservation decision support tools, including the SLR Tool. He is a co-founder of the Avian Knowledge Network (www.avianknowledge.net), the leader of the California Avian Data Center (www.prbo.org/cadc) and has published several peer-reviewed articles documenting and predicting the effects of climate change on ecosystems. Ballard serves on the Science and Informatics Subcommittees of the USFWS California Landscape Conservation Cooperative as well as the Conservation Delivery Committee of the San Francisco Bay Joint Venture. Current Projects: Title: Adélie penguin response to climate change at the individual, colony and metapopulation levels; Source of Support: NSF/OPP; Total Award Period Covered: Aug 2010 – Jul 2015; Person Month/Year: 3.5; Total award: $1,400,000 Title: Preparing for Sea-Level Rise Along the San Francisco Bay Area's Outer Coast; Source of Support: NOAA/SARP; Period Covered: Oct 2010 – Sep 2012; Person Month/Year: 0.5; Total award: $300,000 Title: Scientific Review and Recommendations for Ecosystem Management of the Ross Sea; Source: Lenfest Foundation; Period Covered: 6/1/09 – 6/30/11; Person Months/Year: 0.75; Total award: $100,000 Title: How do we monitor the ecological consequences of climate change? Developing an Environmental Change Network in the California Landscape Conservation Cooperative; Source: US Fish & Wildlife Service / California LCC; Period Covered: Oct 2010 – Sep 2011; Person Month/Year: 1.75; Total award: $86,065 Title: Tidal Marsh Bird Population and Habitat Assessment for SF Bay Under Future Climate Change Conditions; Source: US Fish & Wildlife Service / California LCC; Period Covered: Oct 2010 – Sep 2011; Person Month/Year: 0.75; Total award: $100,241 Title: Vulnerability Analysis and Monitoring Program for Detecting Changes in San Francisco Bay Tidal Marsh Bird Populations Resulting from Climate Change; Source: US Fish & Wildlife Service / California LCC; Period Covered: Oct 2010 – Sep 2011; Person Month/Year: 0.5; Total award: $40,995

Sustaining healthy ecosystems in the face of sea level rise: Ensuring the *Baylands Goals Report* continues to inform acquisition, restoration, and management of the region's baylands.

Project Description: The Bay Area Ecosystem Climate Change Consortium (BAECCC), the California Coastal Conservancy (Conservancy) and others will partner with PRBO Conservation Science (PRBO) to enhance and apply PRBO's San Francisco Bay Estuary sea-level rise decision support tool (SLR Tool; www.prbo.org/sfbayslr) in an adaptive conservation framework. This targeted modification effort will maximize the SLR Tool's utility to the 2011-13 climate change technical update of the *SF Baylands Ecosystem Habitat Goals Report* (*Baylands Goals*) and other key, ongoing conservation activities in the San Francisco Bay (see partners). The SLR Tool will be modified to fill information gaps and improve access to management-relevant information as identified in interviews with habitat managers, planners, conservation groups, and other stakeholders. The SLR Tool currently provides this user group with an interactive map for exploring projections of tidal marsh habitat under various sea-level rise and sediment scenarios for the entire SF Bay Estuary (San Francisco, San Pablo and Suisun bays), but it has not been tailored for use in the adaptive conservation framework, and we are already aware of key modifications needed to significantly improve its utility. To make these enhancements and others identified over the course of this project, we will: 1) identify and prioritize user needs through stakeholder consultations, focusing on the Baylands Goals update and targeting specific decision makers representing land managers from East Bay Regional Parks, the US Fish and Wildlife Service, the South Bay Salt Pond Restoration Project team and others; 2) update the SLR Tool models with newly available and more detailed elevation, sedimentation, and levee data; 3) use partner feedback to improve the user interface and query outputs of the SLR Tool; 4) validate the elevation model using new very high-resolution data from collaborators; 5) use the SLR Tool to accomplish the *Baylands Goals* update, and 6) conduct workshops with the SF Bay NERR Coastal Training Program and others to train wetland managers and planners on using the SLR Tool.

CA LCC Priorities addressed: This proposal addresses both decision-making and conservation delivery for natural resource managers pertaining to climate induced sea-level rise in the SF Bay ecosystem. Specifically, refining the SLR Tool to address particular manager-identified needs such as the latest elevation, sediment, and levee data will ensure the best science is easily available to guide decisions towards maximizing biodiversity and ecosystem benefits while minimizing human infrastructure conflicts. The proposed workshops, refined and validated models, and improved user interface will help land managers make urgent decisions and improve adaptation planning based on the best available science while taking into account the uncertainty related to accelerating environmental change. The findings and recommendations resulting from these tool improvements and partner interactions will be incorporated into the *Baylands Goals* update to produce a more scientifically robust and practical guiding document for all San Francisco Bay users.

CA LCC Criteria addressed: This project meets all 7 criteria specified by the LCC: 1) The approach we will follow and the improved SLR Tool itself directly aid decision-makers requesting clear climate change adaptation guidance. 2) One of the major purposes of the SLR Tool is to enable evaluation of habitat and species response to alternative climate change/restoration scenarios. 3) The SLR Tool is integrative: it will include the best available physical data, as well as updated bird and vegetation models. 4) The target audience shapes the online tool to maximize ease-of-use and value. 5) The SLR Tool model and results are applicable to tidal habitats in other LCC regions, and scientific papers being produced through this process provide thorough documentation of our methodology. 6) The project includes (and relies upon) multiple partners, some providing in-kind support/data. 7) A more robust and user-friendly SLR

Tool is needed now to ensure the *Baylands Goals* update, already initiated, and critical restoration decisions use the latest climate change science.

Approach and Scope of Work: Over the past decade, a staggering commitment of resources has been directed toward funding the protection and restoration of the historic baylands (including tidal and diked historic tidal lands) of the San Francisco Bay. The *Baylands Goals* has been a significant catalyst to this end, having contributed to the protection of 40,000 acres of baylands, and having attracted significant funding for implementation of acquisition, protection, and restoration projects. With the impending significant effects that climate change will have on the Bay's wetland ecosystems, there is an urgent need to incorporate an assessment of these predicted impacts and to develop recommendations for associated adaptation strategies in a technical update of the report. PRBO's modeling of responses of tidal marsh ecosystems to SLR has identified several impacts and potential adaptive conservation measures to offset these impacts. For example, their findings include:

- 92% of current mid and high tidal marsh in the SF Bay could be lost by 2100 under potential high sea level rise and low sedimentation scenarios.
- Suspended sediment concentration is extremely important to tidal marsh sustainability; strategic sediment manipulation is a potentially powerful management option.
- While there is only approximately 700 ha available to accommodate future marshes, four times as much area could be reclaimed by removing levees and other barriers to tidal action.
- There are substantial differences among regions of the SF Bay Estuary in the population responses of tidal marsh birds to sea-level rise, so developing adaptation plans requires strategies tailored for specific regions of the estuary.
- High rates of SLR will negatively impact bird populations, but this is mitigated under high sediment scenarios; thus, active management of sediment in tidal marsh systems can lead to positive population effects.
- Some tidal marshes are relatively resistant to SLR and will remain high quality habitat for wildlife across most of the scenarios tested, and thus should be prioritized for conservation.

For this project, the Conservancy and BAECCC will lead the process to develop a climate change technical update to the *Baylands Goals.* A *Baylands Goals* update project coordinator (paid for by the Conservancy) will work with BAECCC to lead the process. The technical update will commence with a workshop whose participants will include scientists and managers that contributed to the original *Baylands Goals,* and with experts on the most critical scientific and technical expertise related to SLR, sediment budgets, and wetland processes. The workshop will seek input and consensus about the scope and process for completing the technical update; this will include identifying targeted focus teams to produce or review technical work, including a synthesis of existing sediment budget information, estimating the amount of sediment needed to sustain baylands, and incorporating advances in hydrological, SLR, and carbon sequestration modeling. The targeted focus teams will identify critical information gaps that need to be filled to begin and to complete the technical update, and they will be the primary "test" users of the evolving SLR Tool, using it to help (for example):

- Identify upland sites that can accommodate wetland migration upslope;
- Identify management strategies for marshes to maximize resilience (e.g., improve sedimentation dynamics);

- Identify long-term science and management gaps needing resolution to implement recommendations;
- Develop recommendations for "living shorelines"- using habitats to reduce shoreline erosion; and
- Revise habitat restoration and protection goals for agencies and organizations working to protect the Bay's wetlands, while taking into account projections of tidal marsh sustainability through the end of the century.

PRBO will identify the best methods for assuring information developed from the SLR Tool and other important findings are readily accessible and used by the focus teams and other SF Bay Estuary conservation stakeholders as they integrate climate change impacts into a new phase of planning and management activities, and then construct or modify the tools needed and make sure users are trained in their use. The project will follow a 5 step approach:

1) Stakeholder Needs Assessment. An outreach team will conduct in-person and phone consultations with stakeholders, especially those participating in the 2011-13 update of the *Baylands Goals*, to make sure that the key results of PRBO's work so far are incorporated, and to determine the types of modifications needed to maximize the SLR Tool's applicability to on-the-ground management, restoration, and acquisition decisions. The outreach team will actively participate in the 2011 *Baylands Goals* update workshop to identify critical gaps in the science needed to begin and to complete the technical update. Results from these needs assessment activities will be prioritized and communicated to the SLR Tool development team.

The outreach team will be led by the *Baylands Goals* update coordinator and supported by PRBO and the San Francisco Joint Venture's Climate Change and Conservation Delivery committees. Needs will be identified in three areas: 1) scientific information gaps, 2) usability, and 3) the types of decisions users must make regarding on-the-ground management, restoration, and acquisition in the context of climate change. For example, restoration planners may need to compare the area in hectares of future marsh under competing levee removal configurations. At the completion of this process, the team will assess measures of success including, for example, key management and planning processes that would benefit by adopting use of the SLR Tool for project selection criteria, and setting goals for the number and types of decisions influenced by the SLR Tool.

2) Acquire and integrate new data layers for SLR Tool. PRBO will acquire and incorporate data layers necessary to address the priorities identified in step 1, likely to include improved elevation, sediment and levee data – data for which preliminary assessment indicates that improved information is already or will soon be available for the study area. *Elevation:* Currently the SLR Tool uses Light Detection and Ranging (LiDAR) data obtained from the USGS for base elevation mapping at 5m horizontal resolution. Recently the USGS and NOAA have acquired new LiDAR data covering most of the SF Bay Estuary at 1m horizontal resolution. We will use this finer resolution LIDAR data to update the base elevation and resulting future elevation models used in the SLR Tool. *Sediment:* Currently the SLR Tool uses estimates from observations and expert opinion to assign high and low values of suspended sediment concentration to 15 sub-regions within the San Francisco Bay Estuary. Although this method captures the regional differences in sediment concentrations within the bay, it does not capture within-region heterogeneity. Work conducted for the NASA Ames DEVELOP Program produced sediment maps of the bay based on satellite remote sensing data (MODIS, Landsat and ASTER). We will use these remote sensing maps to provide more precise estimates of sediment concentrations throughout the estuary to

update outputs from our marsh accretion model. *Levees:* Currently the SLR Tool uses a "diked areas" layer (areas that are currently restricted from tidal inundation by dikes, levees or roads), which is a composite of several layers from the San Francisco Estuary Institute's EcoAtlas (http://www.sfei.org/ecoatlas) modern baylands layer, a levee layer developed for the Pacific Institute's sea level rise impacts study (http://www.pacinst.org/reports/sea_level_rise/data/index.htm) and inspection of aerial photography from Google Maps and the Natural Resource Conservation Service. A revised, state-of-the-art California Levee Database is under development by the State of California and Department of Water Resources (http://www.water.ca.gov/floodmgmt/lrafmo/fmb/fes/levee_database.cfm), with the portion relevant to the study area already completed. We have initiated contact with DWR to acquire this layer. This information will dramatically increase our ability to investigate marsh response to various realistic levee removal configurations.

3) Validate SLR Tool elevation models. PRBO will work with USGS (J. Takekawa) to compare high resolution RTK (Real-time Kinetic) GPS elevation data collected at 5-7 locations with modeled elevations to assess the SLR Tool's model accuracy. This is especially important in marshes with tall, dense vegetation that LiDAR cannot easily penetrate and where a correction factor should be used to adjust elevations. Users will have increased confidence in predicted results knowing that elevations were validated using RTK data.

4) Enhance the SLR Tool for improved usability. PRBO's SLR Tool development team will modify the SLR tool according to discoveries made in steps 1-3 (above). We will continue to develop and host the tool using PRBO's California Avian Data Center, thereby leveraging extensive computing and archiving infrastructure developed specifically to support this kind of project and financially supported by a large and diverse user base. PRBO's spatial and quantitative ecologists will update the tidal marsh vegetation and bird species projections using the refined model inputs as described above, and PRBO's informatics engineers will make the relevant changes to the online SLR Tool. The engineers will also construct queries to deliver data summaries identified by the outreach team, and ensure that the user interface is enhanced to best serve stakeholders.

5) Conduct user trainings. The outreach team will conduct user trainings and interviews with stakeholders throughout the tool update process to make sure improvements are on target and addressing the needs of the user. PRBO will develop and present scenarios to assist in the *Baylands Goals* update, and will evaluate our success at meeting the measures of success identified in step 1, such as tracking the number and types of decisions affected by use of the SLR Tool (see metrics, below). Upon completion of the SLR Tool revision, the outreach team will partner with the NERR Coastal Training Program to include training in how to use the SLR Tool in their existing workshop series, which focuses on habitat management, climate change impacts, and land use planning issues for the San Francisco Bay Region. Further outreach presentations about the SLR Tool will be given through the San Francisco Bay Joint Venture committees and management board, and with the users who participated in the revision.

Products/Data Sharing: The main deliverable from this project will be the improved SLR Tool specifically upgraded to inform the *Baylands Goals* update, and SF Bay Estuary wetland habitat managers and planners. To best serve the update, the SLR Tool upgrade will be completed by July 2012, anticipating the early 2013 target for the *Baylands Goals* update. The tool will continue to be available online at www.prbo.org/sfbayslr. All data layers going into the tool are and will continue to be downloadable from the website, including GIS-compatible grids of modeled elevation, vegetation, and bird projections for each SLR and sediment scenario.

In addition, a format for conducting training workshops and user needs assessments will be established, providing 'lessons learned' and guidance for future needs assessment activities conducted through BAECCC, SF Bay NERR Coastal Training Program and other conservation efforts.

Timetable for Completion:

Primary Tasks	Sep 2011	Dec 2011	Mar 2012	Jun 2012	Sep 2012
Preliminary *Baylands Goals* scenario analysis	X				
Interviews with focus teams, prioritize improvements	X	X	X	X	
Acquire and integrate new data	X	X	X		
Validate elevation models		X	X		
Enhance SLR Tool		X	X	X	
Conduct user trainings (e.g., with NERR, USFWS, EBRP)				X	X

Measuring results:
We will know this project is successful at influencing on-the-ground decision making for marsh restoration, acquisition, and management, when:

- The PRBO SLR Tool has been modified to address the priorities identified in step 1, likely to include improved elevation, levee, and sediment data, and improved methods for summarizing results relevant to specific managers.
- The *Baylands Goals* technical update team uses the SLR Tool for their 2011-13 update.
- The South Bay Salt Pond restoration team uses the SLR Tool to evaluate Phase II restoration plans.
- The East Bay Regional Parks uses the SLR Tool to evaluate restoration activities (e.g., Breuner Marsh) and identify upland marsh migration areas for protection.
- The SLR Tool's model accuracy has been assessed from an elevation perspective and users of the tool have confidence in the results.
- Ultimately, adaptation plans and land management actions are changed in light of findings and recommendations derived from the improved SLR Tool or from those portions of the Goals update that were created or improved as a result of this project.

CONTINUING PROJECTS

Phase I of this project, funded as part of the 2010 CA LCC, completed the following: • Spatial layers for current and future tidal marsh elevations, vegetation and bird species distributions • A preliminary set of model results for current and future population estimates for tidal marsh avian focal species • Online map viewer, decision support tool, and downloadable GIS layers online at http://www.prbo.org/sfbayslr • Draft report of methods, findings and recommendations • Results presented at the following meetings: Bay-Delta Science Conference, Sediment Management Workshop, PIER California Vulnerability and Adaptation Study, and Climate Variability of the eastern north Pacific and western North America (PACLIM); presented to multiple partners, e.g.: BCDC, SFBJV Management Board and Restoration Committee, North Bay Managers, East Bay Regional Parks District. • Two manuscripts for peer reviewed journals are in preparation. • The SLR Tool is designed to incorporate new data and is ready for an improved user interface to maximize its utility in SF Bay's Tidal Marsh adaptive management framework.

California Landscape Conservation Cooperative 2011 Proposal Budgets

Task	Budget Categories	CA LCC Request	Partner(s) Contribution(s) (monetary)	Partner(s) Contribution(s) (non-monetary value/in-kind)	**Total**
Preliminary scenario analysis,	Salaries (SCC)		$ 16,000.00	$ 7,500.00	$ 23,500.00
interviews with focus teams	Salaries (PRBO)	$ 4,881.00	$ 5,600.00	$ 6,935.00	$ 17,416.00
	Supplies	$ -	$ -	$ -	$ -
	Overhead	$ 1,970.00	$ -	$ -	$ 1,970.00
	Equipment	$ -	$ -	$ -	$ -
	Other (travel & meetings)	$ 1,000.00	$ 1,000.00	$ -	$ 2,000.00
Acquire and integrate new data	Salaries (SCC)	$ -	$ -	$ -	$ -
	Salaries (PRBO)	$ 12,599.00	$ 50,600.00	$ -	$ 63,199.00
	Supplies	$ -	$ -	$ -	$ -
	Overhead	$ 4,221.00	$ -	$ -	$ 4,221.00
	Equipment	$ -	$ -	$ -	$ -
	Other (specify)	$ -	$ -	$ -	$ -
Validate elevation models	Salaries (SCC)		$ -	$ -	$ -
	Salaries (PRBO)	$ 5,790.00	$ 6,600.00	$ 5,000.00	$ 17,390.00
	Supplies	$ -	$ -	$ -	$ -
	Overhead	$ -	$ -	$ -	$ -
	Equipment	$ -	$ -	$ -	$ -
	Other (RTK GPS data)	$ -	$ -	$ 10,000.00	$ 10,000.00
Enhance SLR Tool	Salaries (SCC)	$ -	$ -	$ -	$ -
	Salaries (PRBO)	$ 19,278.00	$ 144,000.00	$ -	$ 163,278.00
	Supplies		$ -	$ -	$ -
	Overhead	$ 7,128.00	$ -	$ -	$ 7,128.00
	Equipment	$ -	$ 10,000.00	$ 50,000.00	$ 60,000.00
	Other (specify)	$ -	$ -	$ -	$ -
User trainings	Salaries (SCC)	$ -	$ 6,000.00	$ 2,500.00	$ 8,500.00
	Salaries (PRBO)	$ 1,627.00	$ 2,100.00	$ 2,312.00	$ 6,039.00
	Supplies	$ -	$ -	$ -	$ -
	Overhead	$ 880.00	$ -	$ -	$ 880.00
	Equipment	$ -	$ -	$ -	$ -

	Other (travel & meetings)	$ 1,000.00	$ 1,000.00	$ -	$ 2,000.00
Total		$ 60,374.00	$ 242,900.00	$ 84,247.00	$ 387,521.00

bcdc

Making San Francisco Bay Better

April 12, 2011

Debra Schlafmann
Coordinator, California Landscape Conservation Cooperative
Pacific Southwest Region 8
U.S. Fish and Wildlife Service
Sacramento, CA

SUBJECT: Letter of Support for California Coastal Conservancy proposal titled: *Sustaining healthy ecosystems in the face of sea level rise: Ensuring the Baylands Goals can continue to inform good conservation practice*

Dear Ms. Schlafmann:

I am writing to strongly recommend that the California Landscape Conservation Cooperative approve the request for funding for the project titled: Sustaining healthy ecosystems in the face of sea level rise: Ensuring the Baylands Goals can continue to inform good conservation practice.

While our Commission has not itself reviewed the proposal, the Commission is very concerned regarding the impact of climate change on the San Francisco Bay Region. Building on our staff report: *Living with a Rising Bay: Vulnerability and Adaptation in the San Francisco Bay and on the Shoreline*, we are working on a number of initiatives to respond to the threat of sea level rise, including working with Bay Area communities on a pilot project for planning for sea level rise: the Adapting to Rising Tides (ART) project.

The project proposed by the California Coastal Conservancy and its partners will complement and bolster BCDC's efforts to promote climate change adaptation strategies at local and regional scales. We will use the web-based decision support tool developed by PRBO Conservation Science to identify vulnerable habitat along the shoreline and will provide feedback on how the tool and modeling can be improved to better inform community-based adaptation planning.

We look forward to a continued collaboration with the California Coastal Conservancy and its partners and encourage you to fully fund their proposal to integrate the predicted effects of sea-level rise on tidal marsh ecosystems with the Baylands Ecosystem Goals update.

Please do not hesitate to contact me if you have any questions or need any further information.

Sincerely,

STEVE GOLDBECK
Chief Deputy Director

SG

BAY AREA | OPEN SPACE COUNCIL

April 11, 2011

Debra Schlafmann
Coordinator
California Landscape Conservation Cooperative
3020 State University Dr. East #2007
Sacramento, CA 95819

Dear Debra:

We strongly recommend that the California Landscape Conservation Cooperative approve the California Coastal Conservancy's request for funding for the project entitled Sustaining healthy ecosystems in the face of sea level rise: Ensuring the Baylands Goals can continue to inform good conservation practice.

In addition to upland habitat, the Bay Area Open Space Council is very concerned about the impacts of climate change to San Francisco Bay tidal marsh habitat. Our members need information on the projected impacts of sea level rise and increased salinity in order to effectively restore and manage Bayland habitat in a way that that provides long-term benefits to wildlife and the public.

The Bay Area Open Space Council will be involved in the Baylands Ecosystem Goals update. We want to ensure that this update provides the kind of information and recommendations that will help our member organizations assess and prepare for the impacts of sea-level rise and salinity changes on tidal marsh ecosystems. Our members will use the web-based sea level rise decision support tool to identify vulnerabilities along the shoreline and to prioritize projects. The tool will also provide them with the guidance necessary to develop adaptation strategies for their projects.

We look forward to a collaborating with the California Coastal Conservancy and its partners and encourage you to fully fund their proposal to work with land managers to improve the sea level rise decision support tool and to incorporate their results into the Baylands Ecosystem Goals update.

Sincerely,

Bettina K. Ring
Executive Director

East Bay Regional Park District

2950 PERALTA OAKS COURT P.O. BOX 5381 OAKLAND CALIFORNIA 94605-0381 T. 1 888 EBPARKS F. 510 569 4319 TDD. 510 633 0460 WWW.EBPARKS.ORG

April 11, 2011

Ms. Debra Schlafmann
Coordinator, California Landscape Conservation Cooperative
Pacific Southwest Region 8
U.S. Fish and Wildlife Service
Sacramento, CA

SUBJECT: California Coastal Conservancy proposal: Sustaining healthy ecosystems in the face of sea level rise: Ensuring the Baylands Goals can continue to inform good conservation practice

Dear Ms. Schlafmann:

I am writing you to strongly recommend that the California Landscape Conservation Cooperative approve the request for funding for the project titled: *Sustaining healthy ecosystems in the face of sea level rise: Ensuring the Baylands Goals can continue to inform good conservation practice.*

The Board of Directors and staff of the East Bay Regional Park District are very concerned about the impacts of climate change on our lands along the bay shoreline. Our current update of the Park District Master Plan for the will address this issue for the first time in our 76 year history. With 15 shoreline parks to protect and preserve, it is critical we have the best and most relevant scientific data available to understand and respond to the evolving projected impacts of sea level rise and increased salinity on our low-lying shoreline properties. Continuation of this project will improve our ability to make restoration and stewardship decisions that will provide long-term benefits to wildlife and the public. Use of the web-based PRBO Sea Level Rise Tool will help us identify vulnerabilities along the shoreline and we will be able to provide feedback on how the tool and modeling can be improved to better inform adaptation planning, restoration, and land management decisions. We really appreciate being included proactively as a partner to help in the creation of tools and guiding documents that will address our specific needs, providing timely information on the efficacy of restoration and management strategies including levee breaches, fill placement and protection of uplands for marsh migration.

We are also very supportive of this project because the Baylands Ecosystem Goals update has the potential to help us with our strategic planning and prepare for the impacts of sea-level rise and salinity changes on tidal marsh ecosystems.

We look forward to a collaborating with the California Coastal Conservancy and its partners and encourage you to fully fund their proposal to work with land managers to improve the PRBO Sea Level Rise Tool and incorporate their results into the Baylands Ecosystem Goals update.

Most sincerely,

Mike Anderson
Assistant General Manager, Planning/Stewardship & Development
510-544-2303

735 B Center Blvd
Fairfax, CA 94930
415-259-0334 phone
415-259-0340 fax

April 11, 2011

Debra Schlafmann
Coordinator
California Landscape Conservation Cooperative
3020 State University Dr. East #2007
Sacramento, CA 95819

Dear Debra:

I am pleased to send this letter of support by the San Francisco Bay Joint Venture for the second phase of the interdisciplinary research project entitled "Sustaining healthy ecosystems in the face of sea level rise: Ensuring the Baylands Goals can continue to inform good conservation practice."

The San Francisco Bay Joint Venture is one of 17 wetland habitat Joint Ventures operating under the certification of the North American Waterfowl Management Plan, a Congressional agreement between the United States, Canada, and Mexico. It is a partnership of non-governmental organizations, utilities, landowners, and non-voting agencies. The goal of the San Francisco Bay Joint Venture is to protect, restore, increase and enhance all types of wetlands, riparian habitat and associated uplands throughout the San Francisco Bay region to benefit birds, fish and other wildlife. The Management Board consists of 27 agencies and private organizations whose members agree to support and promote the goal of the Joint Venture and who represent the diversity of wetlands interests found in the San Francisco Bay region.

The San Francisco Bay estuary's importance to conservation is disproportional to other estuarine wetlands within the California LCC. Over 35,000 acres of coastal wetland restoration projects are currently planned or in progress within the San Francisco Bay Estuary, many focused on tidal marshes. Yet, climate change is a major uncertainty affecting the success of these restorations and long-term habitat values for birds and wildlife. The San Francisco Bay area stands to experience significant impacts from sea level rise because tens of thousands of acres of low elevations currently support vast areas of tidal flats and tidal marshes.

This CA LCC project will address the projected effects of sea level rise on San Francisco Bay tidal wetlands within a Conservation planning context. In direct partnership with the California Coastal Conservancy, the San Francisco Joint Venture will participate in the upcoming update of the San Francisco Baylands Ecosystem Goals planning document. We will help ensure that it provides the kind of information and recommendations that will help Joint Venture partners assess and prepare for projected sea-level rise impacts and salinity changes on tidal marsh ecosystems.

This project will utilize a web-based sea level rise decision support tool recently developed by PRBO Conservation Science, to identify vulnerabilities along the shoreline, explore a number of scenarios for projected change impacts, and to provide feedback on how this important forecasting tool can be improved to better inform adaptation planning, restoration, and land management. The project will identify information gaps and offer feedback to the California Coastal Conservancy and PRBO on how to modify current models and/or user interface to improve the decision support tool's effectiveness. Ultimately, this improved tool will provide timely information on the efficacy of restoration and management strategies to San Francisco Bay Joint Venture staff and allow prioritization of projects by their capacity to adapt to climate change impacts. In addition, the Joint Venture will be better able to provide guidance for partners interested in developing adaptation strategies for their projects.

This project also ties in with a number of current and proposed investigations on projected impacts of climate change on estuarine ecosystems supported by the Joint Venture. It will directly contribute significant information to the long-term feasibility not only of Joint Venture goals, but also those recently published in the San Francisco Bay Subtidal Habitat Goals report (http://www.sfbaysubtidal.org/). Beyond the direct application of this project to San Francisco Bay, the outlined approach of testing new climate change decision support tools to effectively inform long-term restoration effectiveness and conservation planning is applicable to other areas within California and the Pacific coast. It will so benefit other wetland areas within and beyond the CA LCC.

The San Francisco Bay Joint Venture Management Board would like to recommend this project as a priority for achieving the Joint Venture goals, and encourage you to fully fund this proposal.

Sincerely,

Bettina Ring
Vice Chair

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay National Wildlife Refuge Complex
9500 Thornton Avenue
Newark, California 94560

April 8, 2011

Debra Schlafmann
Coordinator, California Landscape Conservation Cooperative
3020 State University Drive East, # 2007
Sacramento, CA 95819

Dear Debra Schlafmann:

This is a letter of support for funding from the CA LCC for the project titled: *Sustaining healthy ecosystems in the face of sea level rise: Ensuring the Baylands Goals can continue to inform good conservation practice*. The U.S. Fish & Wildlife Service San Francisco Bay NWR Complex is eagerly anticipating the revision of the Baylands Ecosystem Goals report as well as improvements to the PRBO Sea Level Rise Tool because both have direct implications for how we manage, restore, and protect the seven National Wildlife Refuges we manage in the Bay Area.

As an active partner in this project, the USFWS will assist the California Coastal Conservancy and its partners in revising the Baylands Goals Report and modifying the PRBO Sea Level Rise Tool by supplying the project team with specific manager needs regarding marsh restoration and adaptation to climate change. Including the USFWS and other implementation partners in the process is a proactive approach to producing science tools and guiding documents that address the practical questions and challenges managers face. Managing wetlands in the face of climate change is an uncertain process, one that is best considered with current and relevant science. The PRBO Sea Level Rise Tool is currently the best tool we have to consider future restoration and management actions in order to give our tidal marsh ecosystem the best chance of adapting to climate change. Further refining it, applying it to the update of the Baylands Goals Report, and sharing the key findings with Bay Area conservation practitioners is a critical step forward for the SF Bay conservation community.

As a frequent collaborator with the California Coastal Conservancy and its project partners, the USFWS supports their efforts to address these issues. We look forward to a continued collaboration with the California Coastal Conservancy and encourage you to fully fund their proposal to integrate the predicted effects of sea-level rise on tidal marsh ecosystems with the Baylands Ecosystem Goals update. If you have any questions, please call Joy Albertson at (510)792-0222, Ext. 131.

Sincerely,

G. Mendel Stewart
Project Leader

TAKE PRIDE IN AMERICA

Sustaining healthy ecosystems in the face of sea level rise: Ensuring the *Baylands Ecosystem Habitat Goals Report* continues to inform acquisition, restoration, and management of the region's baylands.

N.B.: Nadine Hitchcock is the primary administrative and coordination lead for the project; Grant Ballard is the primary technical lead.

Biographical Sketch: Nadine Hitchcock

Project coordinator (Nadine Hitchcock, Deputy Executive Officer at California State Coastal Conservancy) has extensive experience developing and managing natural resource and recreation projects and programs. As a project manager, she managed the Napa River Salt Pond Restoration project, the Napa River Flood Protection project, and she served on the Resource Manager's Group for development of the *Baylands Goals* report. As the first San Francisco Bay Area Conservancy program manager, she provided leadership and supervised a staff of nine in the development of numerous regional and significant projects including the South Bay Salt Pond Restoration Project, the Hamilton-Bel Marin Keys Restoration Project, and the Invasive Spartina Project. She is currently responsible for overseeing the Conservancy's fiscal and administrative matters, and serves as a liaison and advocate for federal funding of Conservancy supported projects. She leads the Conservancy's climate change policy development and activities, including the board-adopted climate change policy and project selection criteria. She is currently overseeing development of the Conservancy's Climate Change Guidance, and is on the steering committee for the Bay Area Ecosystem Climate Change Consortium.

Biographical Sketch: Grant Ballard

SLR Tool Team coordinator (Grant Ballard, PhD., Climate Change and Informatics Director at PRBO Conservation Science) leads PRBO's core team of spatial and quantitative ecologists, GIS experts, and informatics engineers to develop conservation decision support tools, including the SLR Tool. He is a co-founder of the Avian Knowledge Network (www.avianknowledge.net), the leader of the California Avian Data Center (www.prbo.org/cadc) and has published several peer-reviewed articles documenting and predicting the effects of climate change on ecosystems. Ballard serves on the Science and Informatics Subcommittees of the USFWS California Landscape Conservation Cooperative as well as the Conservation Delivery Committee of the San Francisco Bay Joint Venture.

Grant Ballard

EDUCATION

- University of Auckland, Auckland, NZ. PhD (2010): Ecology, Evolution and Behavior.
- Cornell University, Ithaca NY. English. BA (1989): English

APPOINTMENTS

- 2011 – Climate Change and Informatics Director, PRBO Conservation Science
- 2007 – 2011 – Informatics Division Director, Antarctic Program Leader, Climate Change Initiative Leader - PRBO
- 2006 – 2007 - Senior Conservation Scientist and Informatics Program Director, PRBO.
- 1994 - 2006. Senior biologist, data manager, and analyst, PRBO.

SELECTED CURRENT AND RECENT PROJECTS

2010-2015: (co-PI) Adélie penguin response to climate change at the individual, colony and metapopulation levels – funded by National Science Foundation- more information

2010-2011: (co-PI) How do we monitor the ecological consequences of climate change? Developing an Environmental Change Network in the California Landscape Conservation Cooperative – funded by US Fish and Wildlife Service – more information

2010-2011: (PI) Tidal Marsh Bird Population and Habitat Assessment for SF Bay Under Future Climate Change Conditions – funded by US Fish and Wildlife Service – more information

2010-2012: (co-PI) Preparing for Sea-Level Rise Along the San Francisco Bay Area's Outer Coast – funded by NOAA –SARP – more information

2006-2010: (co-PI) Multi-scaled data in ecology: Scale dependent patterns in the environment - funded by National Science Foundation.

PEER REVIEWED PUBLICATIONS (2010 - 2011; full list available here)

Ballard, G., K.M. Dugger, N. Nur, D.G. Ainley. 2010. Foraging strategies of Adélie penguins: adjusting body condition to cope with environmental variability. Marine Ecology Progress Series 405: 287–302.

Ballard, G., V. Toniolo, D.G. Ainley, C.L. Parkinson, K.R. Arrigo, P.N. Trathan. 2010. Responding to climate change: Adélie penguins confront astronomical and ocean boundaries. Ecology 91(7):2056-2069.

Blight, L.K., D. G. Ainley, S. F. Ackley, G. Ballard, et al. 2010. Fishing For Data in the Ross Sea. Science 330: 1316.

Dugger, K.M., D.G. Ainley, P.O'B. Lyver, K. Barton and G. Ballard. 2010. Survival differences and the effect of environmental instability on breeding dispersal in an Adélie penguin meta-population. PNAS; www.pnas.org/cgi/doi/10.1073/pnas.1000623107.

Lescroël, A., G. Ballard, V. Toniolo, K. J. Barton, P. R. Wilson, P.O'B. Lyver, & D.G. Ainley. 2010. Working less to gain more: when breeding quality relates to foraging efficiency. Ecology 91(7):2044-2055.

SYNERGISTIC ACTIVITIES

Member of the Landscape Conservation Cooperative Science & Informatics subcommittees, California Department of Fish and Game Climate Stakeholders Working Group; delegate to USGS National Climate Change and Wildlife Climate Science Center organizational workshop (2009) and USFWS CA Landscape Conservation Cooperative organizational workshops (2010/11); leader of the Avian Knowledge Alliance (2007-2008); Co-founder and board member, Oikonos, ecosystem knowledge (www.oikonos.org).