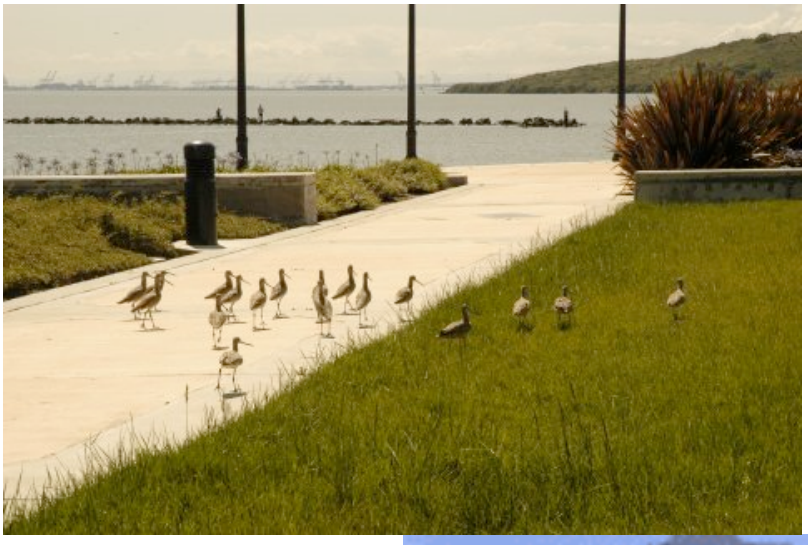
Study of Waterbird Response to Trail Use in the South Bay Salt Pond Restoration Project

Submitted by Lynne Trulio, Ph.D., Jana Sokale, and Kevin Lafferty, Ph.D.

December 5, 2008



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

Restoration Funding Application Cover Sheet

APPLICANT INFORMATION

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PROJECT INFORMATION

RFP Study Topic # 4

Project Title: Study of Waterbird Response to Trail Use in the SBSP Restoration Project

Funding Request per year: $18,000-$80,000 Number of years: 4

Confirmed in-kind or matching contributions: $21,500

Source of in-kind or matching contributions: 20% salary matches from PIs

Purpose and Objectives: This research will assess the response of waterbirds and people to trails in the South Bay Salt Pond Restoration Project area to help managers adaptively manage public access and wildlife interactions. These studies will provide predictive information on nesting and foraging shorebird and waterfowl responses to trails as well as species- and location-specific findings that managers can use throughout the Project area.

Proposed starting date: May 2009 Estimated completion date: 2013-2014

Signature : Lynne Trulio Date: December 5, 2008
Principal Investigator

Signature : Lynne Trulio Date: December 5, 2008
Grant Administrator

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Research Proposal: Study Waterbird Response to Trail Use in the South Bay Salt Pond Restoration Project

Submitted by Lynne Trulio, Ph.D., Jana Sokale, and Kevin Lafferty, Ph.D.

Abstract

We propose four studies assessing the response of waterbirds and people to trails in the South Bay Salt Pond Restoration Project area that will help managers adaptively manage public access and wildlife interactions. Most public access will occur near ponded habitats used by foraging and nesting waterbirds. The study of shorebird and waterfowl response to newly introduced and sustained trail use will provide important predictive information managers can use to design, locate and manage trails near waterbird habitat. A study of nesting snowy plovers, a federally-listed species, will evaluate the flight responses of plovers to newly-introduced trail use so that managers will have information on protective buffer distances. The third study evaluates potential effects of trail use near nesting birds using new islands at reconfigured pond SF2, to assess the effectiveness of island design in preventing trail impacts and to assist in the design of similar projects. Finally, we propose a trail user satisfaction study to learn the activities, views, and needs of trail users. Together, these studies will provide managers information on bird responses and public interests that can be used to design and manage public access to minimize or avoid impacts to foraging migratory waterbirds and nesting shorebirds.

Research Overview

The South Bay Salt Pond Restoration Project Managers have requested information on these priority study questions in order to adaptively manage public access and wildlife interactions:

1. Will landside public access significantly affect birds or other target species on short or long timescales?
2. What is the effect of trail use on waterbirds?
3. What is the response of waterbirds at sites before trails exist compared to after they are opened?

Providing public access and protecting the abundance and diversity of nesting and foraging waterbirds in the Project area are both important Project Objectives (SPBP FEIS/R 2007), but are potentially-competing goals. A major focus of the Project's first phase is to develop a number of new trails and amenities, such as overlooks and interpretive displays, and enhance some existing trails. To avoid impacts to tidal marsh species, trails are located on levees next to ponded habitat used by foraging and nesting waterbirds. Thus, these species, including federally threatened western snowy plovers (*Charadrius alexandrinus nivosus*), have the greatest potential to experience negative effects of new and enhanced trails. Also during Phase 1, ponds SF2 and A16 will be reconfigured with numerous nesting islands to increase nesting bird productivity in the Project area. Ponds E12 and 13 will be reconfigured to increase densities of foraging shorebirds. Trails will be located around these ponds with the potential to impact the animals. In addition to understanding species' responses, managers need information on the public's use of trails that can be dove-tailed with the bird data to adaptively managing the public access-wildlife interaction. To provide a comprehensive picture of bird and human responses to public access, we propose the 4 studies described below. These studies will provide predictive information on waterbird response to trails as well as species- and location-specific findings that managers can use throughout the Project area. By integrating the species response and public interest findings, we will provide comprehensive recommendations for adaptive management of public access that benefits waterbirds and people.

Study 1. Shorebird and Waterfowl Foraging Study

Background and Justification. Most new trails and public access features will be near shorebird or waterfowl foraging habitat, so from a spatial standpoint, public access will have the greatest effect on these species. This study will provide information that can be used to predict the immediate and sustained response of foraging shorebirds and waterfowl species to trail use.

Frid and Dill (2002) developed a theoretical framework in which human-caused disturbance is viewed as analogous to predation-risk. Their conceptual model outlines how animals' behavioral responses to human disturbance, as with response to predator avoidance, can result in effects from lost energy intake to reduced reproductive success and lower population sizes. Their model produces a number of testable hypotheses, such as the prediction that flight initiation distances increase with direct approach, that underlie research proposed here. Indeed, several studies evaluating the effects of trail use on shorebird behavior, numbers, and species richness in foraging habitat, show birds move or fly away from disturbances. However, rates and types of human disturbance do not completely explain bird reactions, indicating that habitat factors must be considered. For example, Gill, et al. (2001) and Yasue (2005, 2005) found local or landscape-level factors, such as habitat quality or predation risk, were more important than trail use to shorebird presence and foraging. In a study of shorebird response to beach activities, Lafferty (2001) found that, although human activity varied primarily between weekdays and weekends, bird density varied most strongly with season and tide. At 3 tidal locations around the San Francisco Bay, Trulio and Sokale (2008) found that, despite major differences in the level of human activity at trail versus non-trail sites, there were no negative effects of trail use on the number of shorebirds, species richness, or proportion of shorebirds foraging, either overall or by season. When comparing weekdays to weekend days, the number of shorebirds decreased somewhat with increasing use at trail sites. These studies provide good information on foraging shorebird responses to sustained trail use. However, information is needed on shorebird response to new trail use at sites not previously open to the public. It is also important to quantify the rates at which shorebirds are disturbed by new trail use.

There are fewer studies of trail use effects on waterfowl, but those that exist show these species move large distances away from trails in response to human use. Many waterfowl are subject to sport hunting and have reason to be wary of humans. Pease, et al. (2005), studied 7 species of dabbling ducks and found they all responded to different trail uses, especially to walking and biking. At 4 locations in the South Bay, White (unpublished data) found that diving ducks moved between 106m and 140m away from levees when trail walkers passed ponds where trail use had not existed. At distances up to 120m from a levee with a trail, the number of birds and species richness were much lower after a trail walkers passed by compared to before the human disturbance. More complete information on waterfowl response to new trail use is needed as is information on waterfowl response to sustained visitor use and disturbance rates of birds in response to trail use.

To provide managers on these data needs, we will address these questions:

1. How do shorebirds and waterfowl respond to exposure to new trail use--as measured by abundance, species richness and behavior—before trail use as compared to after experimental trail use?
2. How do waterfowl respond to sustained trail use--as measured by abundance, species richness and behavior--at pre-existing trail sites compared to non-trail sites both before and after experimental trail use?
3. What is the rate of waterbird disturbance, as measured by flight responses, to trail use at newly opened (shorebirds) and newly opened and pre-existing trails (waterfowl)?

Study Objectives. This study will produce the following outcomes:

1. Buffer distances, i.e., distances birds of different species stay from in-use trails.
2. Amount of impacted versus non-impacted habitat as determined from buffer distances.
3. Rates at which birds exhibit flight responses at various distances from trail users.
4. Response to sustained trail exposure, such as habituation, versus new trail use.
5. Changes in bird response over the migratory season.
6. Specific information on waterbird response to newly constructed trails at SF2.
7. Recommendations that can be used to design and manage trails next to foraging shorebird and waterfowl habitat throughout the Project area.

Study Areas. We will collect data on shorebirds and waterfowl at 10 locations with no public trail use and at 10 locations where trail use already exists. Shorebirds and waterfowl forage in different ponds in the Project area (USGS 2006), so studies of these two classes of birds will occur at different locations.

Waterfowl response to new trail use disturbance, created experimentally by 2 walkers (question 1, above), was measured at ponds A9, A10, A11, and A3W by White (unpublished data) (Figure 1). These data are available for us to use, reducing the amount of new data and associated funding needed for this study. We will need to collect comparable data at 6 additional locations where waterfowl feed in ponds near levees without public trails. For waterfowl response at pre-existing trails (question 2), we will collect data at 10 locations such as at ponds used by waterfowl in the Alviso complex that have existing trails (Figure 1). Based on field visits, we will select the most useful locations for this study. When SF2 is reconfigured (expected in 2010), we will add this pond to our study locations.

Shorebird response to experimental trail use (question 1) can be studied at many ponds regularly used by shorebirds. Such ponds have included E14, E1C, and E3C in Eden Landing and A5 and A7 (Figure 1) in Alviso (USGS 2006). Shorebirds have regularly used E12, E13 and SF2 (USGS 2006)—slated for reconfiguration and trails. Based on site visits, these or other ponds will be included in as locations. The response of shorebirds in the Bay area to sustained trail use along levees next to foraging habitat (question 2) was recently studied by Trulio and Sokale (2008); given the findings of this study, we suggest there is no need to collect additional data on shorebird response at existing trails. However, since the Trulio and Sokale (2008) data were collected at tidal locations, we will reanalyze these data to assess shorebird responses when the tide was in, providing conditions comparable to ponds.

Approach. We will collect data on bird numbers, species richness, and behavior at all study locations 1 time/month for 6 months over 1 migratory season, roughly August to April for shorebirds and October to March for waterfowl. At the locations without trails, we will experimentally simulate a newly opened trial with a pair of walkers to produce data on "before and after" trail use conditions, which will allow managers to predict bird responses to new trails. True "before and after" trail opening locations in the Project area are either already being studied (A3W), will be included in this study (SF2), or will not occur in time for this proposal (A16, E12/13). At locations with existing trails, we will record the number of trail users and their behaviors through direct observation. For waterfowl, hunting could be included as a factor as it may affect species responses to trail use. However, the number of hunted locations may be too limited to assess this effect. We will select appropriate locations for this factor if needed. To avoid habituation or sensitization, we will collect data only once per day at any location.

Data collection sessions to address questions 1 and 2 will include observing birds before, during, and after creating a trail disturbance and each session will require, on average, 2 hours

for completion. Data will be collected by 3 observers during high tides (±3 hours) in the Bay, as birds are more likely to be in the ponds at this time. For waterfowl, we will follow the methods White (unpublished data) employed to assess waterfowl response to new (experimental) trail use.

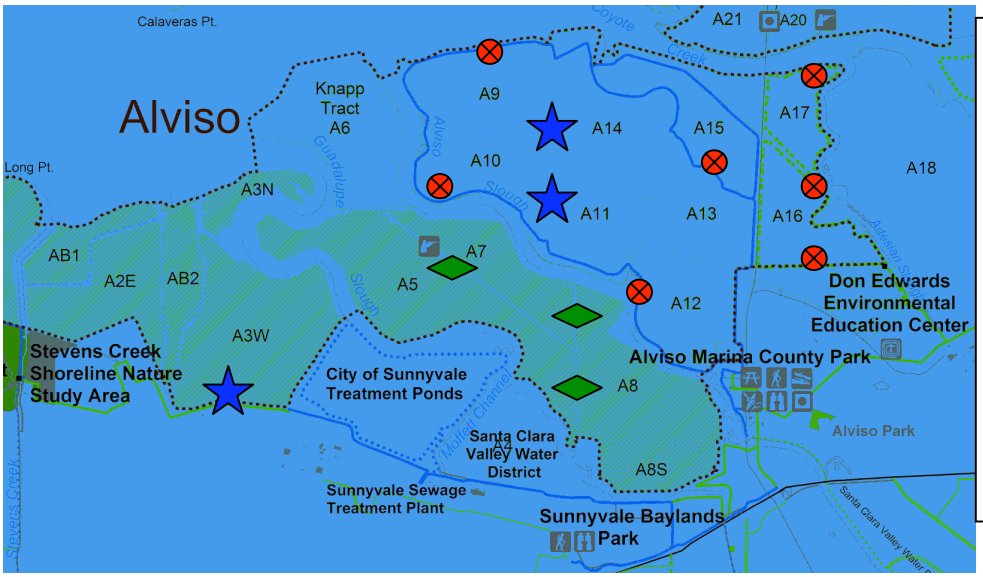

Figure 1. Non-trail locations where waterfowl data were collected (blue stars), locations of existing trails for potential waterfowl data (red circles), and potential non-trail locations to study shorebird response (green diamonds) (map from SBSP FEIS/R 2007).

We will measure the response of birds at in 40m wide bands in the ponds as measured from the trail use levee, in which plastic poles in the pond delineate bands 40m wide bands. There will be 6 bands ending at a distance of 200m from the levee (Figure 2). At ponds without trails, we will count birds by species, noting behavior, in each 40m-distance bands before we create the trail use disturbance. Then, we will count the birds in each band again after each experimental disturbance. Comparing the distributions before and after a disturbance will indicate whether birds shift their distribution away from a trail in response to human use. As we walk the levee, we will stop at 5 predetermined locations and, using a range finder, measure the distances of birds nearest the levee, to determine the distances birds stay away from active trails. These data are useful for determining buffer distances. At ponds where trail use exists, we will follow the same procedures. However, during the counts before and after we walk the levee, we will also count trail users and record their behaviors. At these ponds, birds will be affected by the existing trail use, to which we will add our 2-person disturbance.

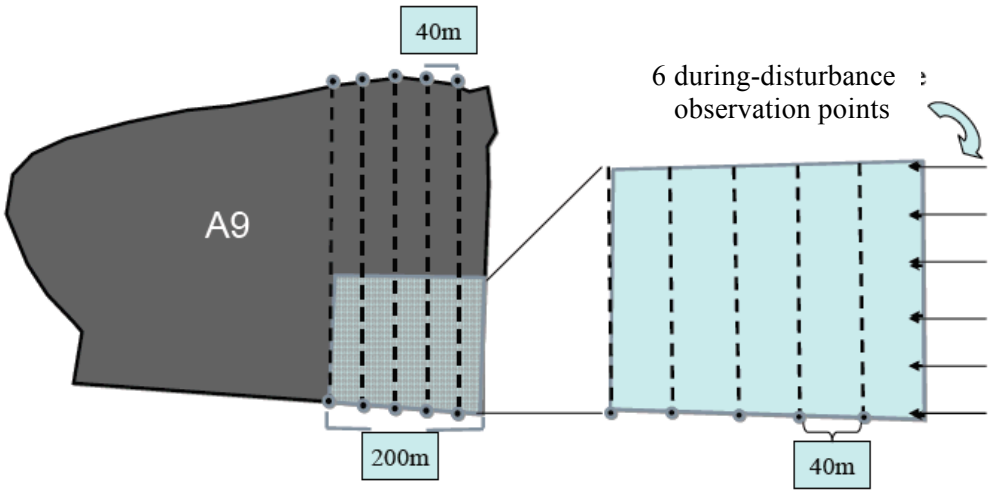

Figure 2. 40m band arrangement for collecting waterfowl data before, after, and during a trail disturbance.

We will collect data on the response of shorebirds to new trail use, as simulated by 2-person experimental trials, on levees without public use. Building on the methods of Trulio and Sokale (2008), we will set up 31.5 × 31.5m squares marked by plastic poles next to the levee. We will count the birds by species, noting behavior, in the squares before and then after we conduct experimental trail use. As we walk the levee, we will stop at 6 predetermined locations and, using a range finder, measure the distances of birds nearest the levee, to determine the distances birds stay away from active trails.

For question 3, we will determine the rate at which birds are disturbed by trail users at locations where we create the disturbance and at locations with pre-existing trails (waterfowl only). We will divide the trails into segments 50-100m long, using markers that can be seen from a distance. As trail users (both experimental and uncontrolled), enter a segment, observers will record the number of birds (of the total birds present) that were disturbed and how far the birds were from the trail users when they were disturbed. These data will provide disturbance probabilities at various trail user distances and levels of trail use in response to new and sustained use.

We will also determine the flight initiation distance for individual birds, a measure of bird sensitivity to human activity, for the 10 most common species in the study area. It can vary by species, breeding condition, habituation, human behavior and environmental context (Blumstein et al. 2003). For instance, Ikuta and Blumstein (2003) have demonstrated that flight initiation distance is shorter (birds are less sensitive) where birds are behind fences. The observer will identify a focal bird in the water (the nearest of the species under study), note its spatial position and begin moving toward it, using a rolling measuring wheel to measure distance. The observer notes the distance traveled at the points when the bird first looks at observer, becomes agitated, stops foraging, moves, and flies. The observer will continue walking to the original position of the bird. We will aim for between 10 and 30 flight initiation distances per species with the expectation of testing for a difference between sites near existing trails and sites without trails. These data will be collected during the sessions in which we collect the data for questions 1 and 2. This information is valuable for understanding and managing levels of trail use in a way that keeps impacts to an acceptable level.

The data produced will be analyzed with statistical tests such as general linear models, linear mixed models, and repeated measures ANOVA. GIS will be used to analyze and display buffer distance information and amount of impacted area. Rates of disturbance by distance will be estimated as species-specific cumulative probability distributions, allowing managers to assess the tradeoff between buffer distances and disturbance frequency.

Work Schedule. We expect this study to take approximately two years from start to final report (see Appendix 1). Milestones include site selection and field set up (months 1-3), data collection and entry (months 4-12), analysis (months 12-16), and report writing (months 16-20). Data collection at all locations without trails can begin as soon as the 2009-2010 migratory season. Data from locations with existing trails can also be collected in 2009-2010, except for data at E12/13 and SF2, which must await trail construction.

Study 2. Snowy Plover Nesting Bird Response Study

Background and Justification. This threatened species nests in several ponds in the SBSP project area and new trails have the potential to affect nesting birds (Robinson 2007). Snowy plovers use crypsis to avoid predators and do not readily flush from disturbance. However, once birds flush, their eggs and newly-hatched chicks are susceptible to predation and exposure to weather

(Page and Stenzel 1981). Protection from disturbance can increase breeding success (Lafferty et al. 2006).

Each year, snowy plovers nest from approximately March through August in seasonally dry ponds in the Project area. While nesting ponds can change from year to year, birds nest primarily in the Eden Landing complex (Figure 3) where there are currently few public access trails. In 2007, birds also nested in ponds Alviso ponds A8, A22 and A23, and Ravenswood ponds SF2, R1, R3, R4 (Robinson, pers. comm.). Robinson (2007), biologist with SFBBO, collected data on the distances at which plovers flushed when approached directly by researchers. Based on 24 approaches, she found birds flushed at an average distance of 175m (SE=45m). The study proposed here will assess the response of nesting birds to tangential approach, as occurs with trail use on levees. We will compare flight initiation distances (i.e. birds looking at walker) of snowy plovers exposed to experimental trail use relative to birds at locations where we do not create trail use disturbances and with respect to data on direct approach collected by SFBBO. This study will address this question: What is the flight and nesting response of nesting snowy plovers to trail use versus no trail use around seasonally-dry ponds where birds nest?

Study Objectives. Outcomes of this study will include:

1. Buffer distances for snowy plover disturbance response from a trail use disturbance.
2. Rate of snowy plover flight response during trail compared to non-trail conditions.
3. Buffer distances for other nesting birds in response to trail use.
4. Management and design recommendations for trails near snowy plover nesting habitat.

Study Areas and Approach. We will coordinate with researchers from the San Francisco Bay Bird Observatory (SFBBO), who, each year, locate nesting snowy plover nests (using GPS) and monitor their nesting success. Based on their information, we will select up to 7 ponds for experimental trail use and 7 without such use (control), where nests are located within 100m of the levee. We will collect data 2 times a month for 4 months at each nesting pond and control location. If the numbers of experimental or control locations are below 7, the study will continue for a second year to increase the number of locations to 7 each.

At experimental locations, we will introduce a trail use disturbance, (2 people walking the levee). Because snowy plovers are more sensitive to disturbance when they are nesting, we will note whether individuals are nesting, roosting, or herding chicks. An observer with a scope will record which birds respond to the walker. To avoid negative impacts on snowy plover nesting, the flight initiation distance will be recorded when a bird first looks at the observer. At that point, we will stop the exposure (i.e., before any actual disturbance) and we will estimate the distance between the observer and the plover with a range finder. At control locations, we will collect data on snowy plover movement continuously for the average length of time it takes for walkers to traverse a levee, as measured at the experimental sites. Analyses, such as ANOVA and general linear models, will be used to assess the effects of trail use on bird response.

Work Schedule. Data collection would start in the 2010 breeding season and may extend into the 2011 breeding season, if more locations are needed. If there are enough study locations, we expect the nesting snowy plover study to take approximately one year from start to final report, including data collection, entry, and analysis. See Appendix 1 for time line.

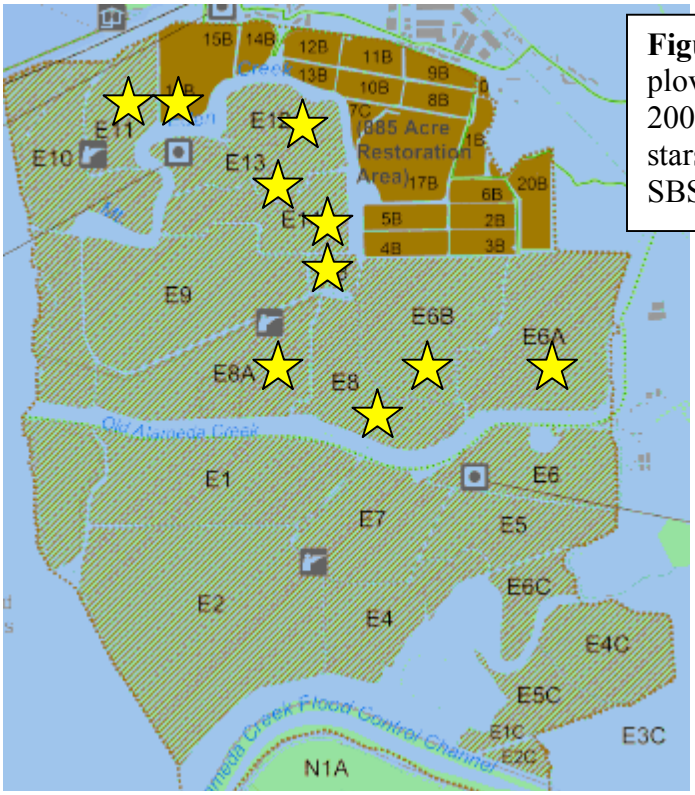

Figure 3. Snowy plover nesting ponds, 2005-2007 (yellow stars) (map from SBSP FEIS/R).

Study 3. Nesting Bird Response at Pond SF2 *Study*

Background and Justification. Many species nest on islands in the South Bay, including avocets (*Recurvirostra Americana*), black-necked stilts (*Himantopus mexicanus*), Forster's terns (*Sterna forsteri*), California gulls (*Larus californicus*). By restoring ponds to tidal marsh, the Project will reduce the amount of ponded habitat and nesting opportunities. SF2 will be reconfigured with new nesting islands to attract and increase the nesting density and success of nesting species, except California gulls. Trails are planned around two sides of the pond. There is ample evidence that nesting birds are vulnerable to disturbance by walkers, tourists, and researchers (Carney and Sydeman 1999). Effects include a range of impacts from birds temporarily leaving nests to complete nest abandonment. Based on the literature, the SF2 islands will be located at a distance from levee trails and overlooks expected to avoid trail impacts to nesting birds. The purpose of this study is to determine whether the islands in SF2 were indeed located at an adequate distance from trails to avoid appreciable negative impacts. These findings can be used to modify SF2 if needed and help design future island experiments at A16 and E12/13. This study addresses this question: Do trails and overlooks affect the nest density, species composition, or reproductive success of birds on islands near trails compared to: islands near non-trail areas, pre-public use of the trails, or islands at further distances from the trail?

Study Objectives. Outcomes of this research will include:

1. Buffer distances for other nesting birds in response to trail use
2. Management and design recommendations for A16 and other island experiment ponds

Study Area and Approach. We will assess the effect of trail use on nest density, nesting species composition, and reproductive success of birds at SF2, including snowy plovers. Once the

islands are completed, birds should be allowed to nest for 2 seasons before the trail is opened. Once the trail is open, we will collect data on levels and types of human use along the trails for 4 hours per day on 1 weekday and 1 weekend day per month for 7 months, from March through September for 2 years. Data on nest density, nesting species composition, and reproductive success before and after the trail is opened will be collected by another team of researchers studying the effects of island size and density on nesting parameters (Study 3 in this RFP). We will coordinate with this team to ensure they collect data for birds nesting on islands nearest trail and non-trail locations and at varying distances away from these locations, to determine the extent of trail effects. We will also request information specifically on snowy plovers. Analyses, such as linear mixed models and logistic regression, will be used to assess whether nesting parameters changed as a result of the trail opening or varied in response to the distance from an active trail.

Work Schedule. This study of nesting bird response to trails at reconfigured pond SF2 will be timed to coincide with the construction of the islands, expected to be completed in 2011 (see Appendix 1). Before data collection can start, a substantial number of nesting pairs must occupy the islands, which may occur quickly or take a year or more. We will collect data for 2 seasons on trail use and nesting bird parameters (from other researchers) after the trail is opened, and will need nesting data for 2 years before the trail opens (other researchers). This study is expected to take 5 years for completion, from beginning of data collection to final report. This study may be started during the period of this contract (2009-2012) but not completed, requiring a contract extension. Construction at A16 is not expected to occur within the contract period. Data can be collected later at this location, using the methods described here, and added to the data set.

Study 4. Trail User Satisfaction Study

Background and Justification.

Trails and trail amenities, including interpretive displays and viewing platforms, will be installed at each of the three pond complexes during Phase 1 of the Project. As part of the waterbird response to trail use research, we propose to collect data on trail users, their activities during their visits, and their level of satisfaction with their public access experience. This study will help managers understand what experiences and/or amenities are sought by the public and how these interests can be integrated into an overall plan to provide public access and protect species.

Data from the National Survey on Recreation and the Environment (2000) indicates that 87% of adults in the United States participated in trail/street/road activities during 1999-2000. Over 80% of Americans reported walking and 40% stated they went bicycling (Cordell et al. 2004). Locally, Santa Clara County Parks and Recreation Department survey found 65% residents regularly walked, jogged or bicycled (2003). The proposed Phase 1 public access trails should be well used by residents and visitors.

The unique habitat of the Project ponds and marshes and the use of these natural resources by millions of migrating shorebirds and waterfowl on the Pacific Flyway will attract visitors interested in outdoor activities beyond hiking and bicycling. The National Survey on Hunting, Fishing and Wildlife-Associated Recreation found that more than 6.3 million California residents and visitors participated in wildlife watching activities in 2006. Of these participants, 4.5 million observed birds within 1 mile of home (3.3 million) or on trips throughout the state (2.5 million). Non-consumptive wildlife viewing continues to grow in popularity as an outdoor associated recreation (U.S. Department of Interior, 2006).

A number of studies evaluating visitor satisfaction with recreation facilities have helped agencies with long-range planning, to focus public agency financial resources on desired capital

improvements and operations and maintenance activities (Carter, 2004), to ascertain the public's willingness to entertain user fees (Bowker, et al. 1999), and to understand behaviors of visitors relative to habitat concerns (Taylor and Knight, 2003). For example, studies show trail users are frequently most dissatisfied with trail cleanliness and signage (Gobster and Westphal, 2004, Lynn and Brown, 2003, Shafer, et al. 1999). Specifically, trail users want to know trail conditions, distances at the trailhead and information at trail junctions. Trail users most used and enjoyed short trails or loop trails close to home or work (Gobster, 1995).

A trail user survey will be able to ascertain whether the Project is meeting its public's expectation for access and services and could compare finding to experience of trail users at other existing Bayside trails. We will craft a survey instrument to gather information on visitor perceptions and level of satisfaction with the public access features and address these questions:

1. What is the level of trail user satisfaction with trail layout relative to access and viewsheds, trail surfacing, trail amenities, comfort services and signage?
2. Are trail users satisfied with the trail information posted at the site and/or available through websites or guidebooks?
3. What is the overall level of satisfaction with the trail experience including access, enforcement and maintenance?
4. How would trail users prioritize future capital improvement projects?
5. What the characteristics and the demographics of the trail users?

Study Objectives. These methods will produce the following outcomes:

1. Assessment of trail user satisfaction with new public access improvements provided by the Project and with existing nearby trails and public access amenities.
2. Trail user activities, especially in relation to waterbird disturbance and trail maintenance.
3. Trail user demographics.
4. Trail user priorities for future capital improvements expenditures and/or services.
5. Recommendations for providing quality public access while protecting species.

Study Areas. To assess trail user satisfaction, we will interview visitors at all 3 pond complexes. Data will initially be collected at 3 of the 5 new Phase 1 trails and later at the remaining 2 if completed within the span of this study and if additional data are desired based upon preliminary findings. The 3 new trails and visitor amenities include the trail extending from Sunnyvale to Stevens Creek along Pond A3W, the trail from Eden Landing to the Bay along Mt. Eden Creek and the existing route to the new interpretive display at Pond R4. The other two sites for possible future study include the trail along the edge of Pond E12/13 and the trail extending around the eastern and southern edge of Pond SF2. We will also survey trail users at 3 existing trails in or near the Project, which may include the Bay Trail at the north edge of Eden Landing, Charleston Slough next to pond A1, the Bay Trail approach to Dumbarton Bridge along Pond SF2, Crittenden Marsh near Pond A1, and Ponds A9-17 at Alviso. Through field visits, we will select locations that have a levee trail next to marsh/pond habitats representative of Project conditions.

Approach. We will develop a survey that can be administered in the field to collect data on trail user demographics, recreational preferences, facilities use, satisfaction, short and long-term expectations for public access, and visitor suggestions. We will submit the survey instrument to Project Managers for review prior to pilot testing. This will help to ensure the most current public access issues facing the Project are captured in the study.

Researchers will collect data for 1 year at least 2 times a season, one weekday and one weekend day, for approximately 4 hour sessions during peak trail use times (lunch hour and after work on weekdays and midday on weekends). The survey instrument will be modeled after other

successful surveys (Carter, 2004), but tailored to the unique site conditions and SBSP Restoration Project goals. The study design, survey instrument, and statistical approach will be vetted through peer review and methods will be pilot tested. The majority of the questionnaire would be closed end with a range of responses identified. The final aspect of the survey would be open ended so that visitors could share unique information, if desired. The survey will be prepared in both English and Spanish.

Visitors will be randomly selected to participate in the survey. Based upon similar work with trails along the Bay (Trulio and Sokale 2008), we anticipate that visitor use may reach between 100 to 140 visitors per day, even in fairly remote locations. Surveys would be collected at each of the locations to develop data on the demographics and views of the people who visit the Project area. The actual number of surveys will be based upon trail user counts at the locations prior to conducting the research (pre-survey counts), but we anticipate collecting at least 7 surveys per field day (56 surveys per location per year) for a total of 336 surveys. Additional surveys will be performed at other Phase 1 trails as they open to the public if additional data are desired for further investigation of the preliminary findings. We will coordinate pre-survey counts and subsequent surveys with the waterbird research, described above, to maximize research time and minimize study costs.

The data gathered through the survey will be analyzed using descriptive statistics and tests such as frequency tables (cross tabulations). Continuous data will be analyzed using ANOVA and general linear models. Qualitative responses will be documented in an appendix.

Work Schedule. This study is expected to take 18 months from start to final report, including development of the survey instrument, data collection, data entry and analysis (see Appendix 1). Data collection at existing trails can begin in 2009. Data from some Phase 1 trail locations proposed for development must await trail construction. This is the case with the trail extension at Pond SF2 and loop trail at Pond E12/13. Data can be collected later at these locations, using the methods described here, and added to the data set for later, if desired.

Data Archiving Procedures for All Studies

All data will be entered into Excel spreadsheets and, if needed, Access databases for analysis. Data will be checked for accuracy by both research assistants and a Principal Investigator, and will be stored at two different locations for safety. After analysis, we will make the compiled data and reports available through the SBSP website or other feasible means.

Expected Products for All Studies

The data collected for each of these studies will be analyzed using appropriate techniques and results will be interpreted in light of the most recent and relevant literature. Findings will describe how the information adds the field of recreation-wildlife interactions but, most importantly, will provide detailed information that will help the South Bay Salt Pond Restoration Project managers design, site, and manage trails to minimize or eliminate trail impacts to nesting and foraging waterbirds.

Information from all these studies will be presented at appropriate conferences such as the San Francisco Bay Estuary Conference, Restore America's Estuaries, and The Wildlife Society meetings. We will present findings to the PMT at their request and will present our results at the Science Symposia held by the Project. We will prepare the results of the waterfowl and shorebird foraging study for publication and will seek publication of the other studies as appropriate. Target journals include *Waterbirds*, *Environmental Management*, and the *Journal of Wildlife Management*.

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Qualifications of Investigators.

LYNNE A. TRULIO, Ph.D.

Department of Environmental Studies
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CONTRIBUTION TO THE PROJECT

Dr. Trulio will be the primary project lead, involved in all aspects of the project. She will help design the study methods, help select, train and direct the field crew, check data for quality, and assist with analysis. She will be the primary author of presentations, reports and updates.

EDUCATION

Ph.D., Ecology, *University of California, Davis*. Received June, 1988.
- Dissertation: Evolutionary significance of infanticide in California ground squirrels

B.A., Biological Sciences, *Goucher College*, Towson, MD. Received June, 1979.

CURRENT POSITIONS

Professor, *San Jose State University*, Department of Environmental Studies, August 2006-Present.
Overview of Duties: Teach undergraduate and graduate courses; participate in department, college, and university level committees and department governance; chair department as needed; contribute to local community; conduct a program of research.

Associate Professor, *San Jose State University*, Department of Environmental Studies, May 1997-August 2006.

Assistant Professor, *San Jose State University*, Department of Environmental Studies, August 1991-May 1997.

Lead Scientist, *South San Francisco Bay Salt Pond Restoration Project*, State Coastal Conservancy. 2003-2007. Lead Science Team Member, 2008.
During planning phase, lead 12 scientists in developing scientific direction for restoration. Developed the adaptive management plan and associated scientific documents for the ecological restoration of 15,100 acres of salt ponds.

CURRENT RESEARCH

Public assess and wildlife interactions, 1996-present.
- Designed and conducted a study of the effects trail use on the diversity, abundance, and behavior of shorebirds in foraging habitat adjacent to trails. Co-PI: Jana Sokale, Environmental Consultant.
- Projects with MS students include research on the effects of boats on harbor seals at Corkscrew Slough, Bair Island and the effects of trail use on waterfowl in the South Bay.

Population biology and conservation of the western burrowing owl (*Athene cunicularia*) in California, 1992-2006.
- Quantified habitat conditions supporting burrowing owls in urban settings in California through research in the South San Francisco Bay Area.

RECENT REFEREED PUBLICATIONS

Trulio, L. and J. Sokale. 2008. Foraging Shorebird Response to Trail Use around San Francisco Bay. Journal of Wildlife Management 72:1775-1780.

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Marine Science Institute, University of California, Santa Barbara, CA 93106
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CONTRIBUTION TO THE PROJECT

Dr. Lafferty will assist with study design and data analysis with particular focus on snowy plover responses to disturbance.

EDUCATION

Ph.D., Ecology, *University of California, Santa Barbara*. Received December, 1991.
B.A., Aquatic Biology, *University of California, Santa Barbara*, Received June, 1985.

CURRENT POSITIONS

GS-15 Ecologist, US Geological Survey

Adjunct Professor, Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara.

Principal Investigator, Marine Science Institute, University of California, Santa Barbara.

CURRENT RESEARCH

Multiple projects related to conservation biology and infectious disease biology (94 peer reviewed publications)

PUBLICATIONS RELATED TO AVIAN CONSERVATION

Ferren, W. J., P. L. Fiedler, R. A. Leidy, K. D. Lafferty, and L. A. K. Mertes. 1996. Wetlands of California, part II: A method for their classification and description. Madroño **43**:S125-S182.

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CONTRIBUTION TO THE PROJECT

Ms. Sokale will help design the study methods, especially the trail user satisfaction study, as well as coordinate field set-up, help select, train and direct the field crew, check data for quality, assist with analysis and prepare updates and reports for all studies.

EDUCATION

Ed.M., Administration, Planning and Social Policy, *Harvard University Graduate School of Education*, Cambridge, MA. Received June, 1989.
Sc.B., Biology, *Brown University*, Providence, RI. Received May, 1984.

CURRENT RESEARCH

Public Access and Wildlife Interactions

- Designed and conducted a study of the effects trail use on the diversity, abundance, and behavior of shorebirds in foraging habitat adjacent to non-motorized trails. Co-PI: Lynne Trulio, Ph.D.
- Evaluated literature to develop avoidance and minimization mitigation measures for trails adjacent to California spotted owl, northern goshawk and osprey habitat.
- Evaluated literature to develop minimization mitigation measures to support dog access on trails. Mitigation included both design and operational measures.

SURVEY INSTRUMENT DESIGNS

Stevens Creek Trail User Survey designed for City of Mountain View to meet Bay Area Air Quality Management District (BAAQMD) grant requirements. Survey evaluated trail users mode of travel, reason for trail use, access to other alternative modes of transportation linked to the trail (Light Rail, CalTrain and VTA bus routes) and trail user demographics.

Sunset Stables Restoration and Resource Management Plan Public Access Survey designed for California Department of General Services and the California Tahoe Conservancy to document existing informal recreational uses and site access along the Upper Truckee River. Survey results were used to inform the design of the restoration and public access plan.

CURRENT PROJECTS

Principal Planner - Stevens Creek Corridor Master Plan & Restoration Plan, Cupertino, CA

Prepared park master plan and restoration plan incorporating an 800-person group picnic area with a 350-car permeable parking lot (formerly a 4,000-person group picnic area with 1,100 spaces), a creekside trail, sports facilities and an environmental education center. The restoration plan included eliminating park and maintenance facilities to allow for the realignment of a portion of the stream to enhance habitat for federally threatened steelhead. The restoration included installation of more than 7,000 locally collected and contract grown riparian and oak grassland plant species. Project included preparation of an Initial Study/Mitigated Negative Declaration (IS/MND) to evaluate the project. The success of the project is also attributed to close and early coordination with ACOE, NOAA Fisheries, RWQCB and CDFG. Numerous grant applications were prepared to assist in funding the transformation of the site from a commercial picnic facility to a community park celebrating the natural environment of Santa Clara Valley. Opening planned for July 2009.

Principal Planner - San Tomas Aquino/Saratoga Creek Trail Master Plan, County of Santa Clara
Prepared a master plan and cost estimates for a $17 million, 12-mile pedestrian and bicycle trail along San Tomas Aquino Creek and Saratoga Creek from San Francisco Bay to Prospect Road. The trail intersects CalTrain, Light Rail and passes beneath four State Highways. This interdisciplinary project involves balancing the concerns of homeowners and multiple agencies with the desires of the citizens' sponsored trail advocacy group. Project includes interpretive art at each trail underpasses. Concrete form liners allow the interpretive relief murals to be integrated into each retaining wall and floodwall. Developed 6 18' x 2' arched interpretive overlooks and 32 2' x 3' directional signs with the trail map and interpretive element. Developed sign program, text and graphics content. The final of 6 trail reaches to open in 2009.

Environmental Planner - Alviso Marina Master Plan EIR, County of Santa Clara, CA
The EIR details the baseline conditions, impacts and mitigations resulting from the development of a public boat launch ramp and associated park facilities at Alviso Slough, which flows, to San Francisco Bay. The report required the incorporation of biological, hydrological, geotechnical data and acceptance by numerous public agencies with permitting authority over wetlands, sensitive species and development adjacent to San Francisco Bay. Prepared associated Mitigation and Monitoring Plan to comply with CEQA and to satisfy permit requirements. Phase 2 is design is 65% complete with permitting underway. Construction anticipated in 2009.

Environmental Planner - North Shore Trail, Lake Tahoe, CA
Identified alternative trail alignments and environmental mitigation measures to an existing 8.7-mile forest bike route plan. The route extends through the mixed conifer and riparian habitats of Lake Tahoe and connects Dollar Hill to Kings Beach. The trail is intended to provide an alternative to traveling along Highway 28. The trail will offer opportunities for muscle-powered transportation including walking, jogging, bicycling and cross-country skiing. Worked with numerous regulatory agencies to modify the existing trail plan to minimize impact to three sensitive species: California Spotted Owl, Northern Goshawk and Osprey. Alternative trail route is under design.

Principal Planner - Bay Trail, National Park Service, Golden Gate National Parks Association
Prepared pedestrian and bicycle circulation plan to provide access between Crissy Field and Golden Gate Bridge. Project includes identifying routes suitable for touring cyclists, bicycle commuters, and pedestrians that comply with ADA Accessibility Guidelines for Outdoor Developed Areas. Balancing accessibility standards in areas of steep topography with historic resources and sensitive species has posed many challenges to the design. Providing access to a heavily visited site of national significance has also posed user conflict and bridge security concerns. Portions of pathway system constructed in 2005. Other elements are still underway.

Principal Planner - Stevens Creek Trail and Wildlife Corridor, Mountain View, CA
Developed conceptual plan and cost estimates for constructing a $12 million, 6-mile pedestrian and bicycle trail and restoring riparian habitat. The trail is intended to provide an alternative transportation system by linking employment centers and neighborhoods with transit systems and offer a creek-side recreational experience. The project involved balancing the concerns of multiple agencies, the desires of trail users and the environmental issues associated with sensitive habitats. Currently, providing fund development, environmental review and design coordination services. Final reach of trail is under design. Construction anticipated in 2010.

Principal Planner - East Palo Alto Park, Recreation and Open Space Plan, The Trust for Public Land - Developed park, recreation and open space recommendations for the Open Space and Conservation of Natural Resources Elements of the East Palo Alto General Plan. Conducted needs assessment, coordinated public outreach and prepared mapping and site-specific recommendations for developing additional facilities. Work product incorporated into General Plan Updat

Budget and Staff Allocations (See Appendix 2 for detailed breakdown of hours)
Principal Investigators (PIs): Lynne Trulio and Jana Sokale = $80/hr; Kevin Lafferty = $95/hr
Research Assistant (RAs: TBA) = $35/hour
Research Supporter (RSs: TBA) = $15/hour

NOTES:

- **BUDGET MATCH:** Trulio and Sokale charge $100/hour for their time, but have reduced their rate to $80/hour to provide a 20% hourly rate match. This match totals $19,000. Lafferty's hourly rate includes benefits and overhead. Lafferty will provide a 20% match by contributing 35 additional hours for analysis and report writing. This contribution totals $3,325.00. In addition, the study utilizes data collected by Heather White for the shorebirds and waterfowl foraging study. This research also leverages previous shorebird study data conducted by Trulio and Sokale (2008). Use of both data sets provide significant additional costs savings.
- **OBSERVERS:** We will seek skilled observers from our other studies as Research Assistants. Less skilled field workers for Research Supporter positions may be students or other members of local Audubon Societies.
- **EQUIPMENT:** Equipment, including scopes, binoculars, and range finders, will be supplied by the PI. All researchers will use their own vehicles to travel to and around field locations. We will ask USFWS for a boat and personnel to help us set up pole arrangements in USFWS ponds (Mruz, pers. comm.). We will work with DFG personnel to do the same in Eden Landing ponds. If agency staff are not available, we will set up the field sites ourselves.
- **STUDY 1 – HUNTING FACTOR:** The foraging shorebird and waterfowl study includes line items for adding hunting as a factor in the response of waterfowl to trail use. This assumes we are able to find 10 locations with existing trails next to hunted ponds. This additional fieldwork is an optional item to help managers understand potential interactions of hunting and trail use on waterfowl. If this option were selected, the budget would be scaled to reflect the number locations identified that meet the study design.

Trulio's Hours by Study

	Foraging Birds	*Nesting Plovers*	*Nesting at SF2*	*User Satisfaction*
Study Design	12	8	8	8
Protocols	12	4		
Site Selection	24	8		12
Recruit & Select Field Crew	8			
Field Set-up	26			
Data Collection	34	8	16	16
Data Collection with Hunting	24			
Analysis	40	10	30	24
Draft Report	48	8	16	16
Final Report	24	8	16	8
Annual Update	8	4	4	4
Project	24	12	16	

Management				
TOTAL HOURS	260	70	106	88
COST ($80/hour)	$20,800.00	$5,600	$8,840	$7,040
TOTAL with Hunting Factor	284			
TOTAL COST ($80/hour)	$22,720.00			

Sokale's Hours by Study

	Foraging Birds	*Nesting Plovers*	*Nesting at SF2*	*User Satisfaction*
Study Design	4			32
Protocols	18			
Site Selection	24			12
Recruit & Select Field Crew	16	8	4	
Field Set-up	26			
Data Collection	34	8	16	16
Data Collection with Hunting	24			
Analysis				24
Draft Report	24	4	8	24
Final Report	8	4	8	16
Annual Update				
Project Management	24		8	8
TOTAL HOURS	178	24	44	132
COSTS ($80/hr)	$15,130.00	$1,920.00	$3,520.00	$10,560.00
TOTAL with Hunting Factor	202			1
TOTAL COST	$16,160.00			

Lafferty's Hours by Study

	Foraging Birds	*Nesting Plovers*	*Nesting at SF2*	*User Satisfaction*
Study Design	16	8	8	
Protocols	6	4		
Analysis	40	10	30	
Draft Report	8	4	8	
Final Report	8	4	8	
TOTAL HOURS	78	30	54	
COST ($95/hr)	$7,410.00	$2,850.00	$5,130.00	

RA Hours by Study

	Foraging Birds	*Nesting Plovers*	*Nesting at SF2*	*User Satisfaction*
Field set up	52	8		
Data Collection	400	208	80	160
Data Collection with Hunting	240			
Data Entry			35	100
Data Checking	40	8		
Project Management	48	8		
TOTAL HOURS	540	232	115	
COSTS ($35/hr)	$18,900.00	$8,120.00	$4,025.00	$9,100.00
TOTAL with Hunting Factor	780	232	115	
TOTAL COST	$27,300.00	$8,120.00	$4,025.00	$9,100.00

2 RS Hours by Study

	Foraging Birds	*Nesting Plovers*	*Nesting at SF2*	*User Satisfaction*
Data Collection	936	224		
Data Collection with Hunting	576	448		
Data Entry	100			
Data Entry with Hunting	50			
TOTAL HOURS	1036	672		
COSTS ($15/hr)	$15,540.00	$10,080.00		
TOTAL with Hunting Factor	1662	672		
TOTAL COST	$24,930.00	$10,080.00		

Travel to Study Sites

	Foraging Birds	*Nesting Plovers*	*Nesting at SF2*	*User Satisfaction*
Travel to Field	$4,300.00	$3,000.00	$500.00	$1,000.00
Travel to Field for Hunting	$2,500.00			

TOTAL by STUDY

	Foraging Birds	*Nesting Plovers*	*Nesting at SF2*	*User Satisfaction*
PI Costs	$43,340.00	$10,370.00	$17,490.00	$17,600.00
RA	$18,900.00	$ 8,120.00	$ 4,025.00	$ 9,100.00
RS	$15,540.00	$10,080.00	0	0
Travel	$ 4,300.00	$3,000.00	$500.00	$1,000.00
TOTAL COST	$82,080.00	$28,570.00	$21,515.00	$26,700.00
TOTAL Hunting Factor Cost	$24,130.00			
TOTAL with Hunting Factor	$106,210.00			

TOTAL by YEAR

	Foraging Birds	*Nesting Plovers*	*Nesting at SF2*	*User Satisfaction*
2009	$38,000.00	$3,000.00	0	$6,700.00
2010	$47,000.00	$21,000.00	0	$12,000.00
2011	$5,080.00	$4,570.00	0	$8,000.00
2012		0	0	0
2013	0	0	$10,000.00	0
2014	0	0	$11,515.00	0

List of Potential Reviewers

- John Takekawa, Research Wildlife Biologist, USGS; john_takekawa@usgs.gov
- Jules Evens, Principal, Avocet Research Associates; jevens@svn.net
- Daniel Blumstein, Associate Professor, Department of Ecology and Evolutionary Biology, UCLA; marmots@ucla.edu

Necessary assessments, certifications, and permits

We will obtain permits as required by the US Fish and Wildlife Service and Department of Fish and Game, such as permission to disturb snowy plover, USFWS Special Use Permits, and CDFG access permits.

Animal care and use certification

While no animals will be collected or manipulated for these studies, we will be conducting field research in which we expose birds to experimental trail use and observe birds at a number of sites. For the waterbird studies, we will obtain an Animal Care Protocol through the San Jose State University Animal Care Committee before research begins. We will also obtain a Human Subjects Research permit through San Jose State University for the trail user survey.

Study of Waterbird Response to Trail Use in the South Bay Salt Pond Restoration Project
Proposed Research Schedule

2009: May Jun Jul Aug Sept Oct Nov Dec
2010: Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
2011: Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
2012: Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
2013: Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
2014: Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
2015: Jan Feb Mar Apr May

Study 1 - Foraging Shorebirds and Waterfowl Study
- Finalize Study Design
- Site Selection
- Field Setup and Pilot Testing
- Data Collection - Shorebirds
- Data Collection - Waterfowl
- Data Entry
- Analysis
- Preliminary Results
- Draft Report
- Final Report

Study 2 - Nesting Snowy Plover Response Study
- Finalize Study Design
- Nest Site Identification
- Pilot Testing
- Data Collection
- Data Entry
- Analysis
- Preliminary Results
- Draft Report
- Final Report

Study 3 - Pond SF2 Nesting Bird Response Study
- Finalize Study Design
- Site Selection
- Field Setup and Pilot Testing
- Data Collection
- Data Entry
- Analysis
- Preliminary Results
- Draft Report
- Final Report

Study 4 - Trail User Satisfaction Study
- Finalize Study Design
- Site Selection
- Field Setup and Pilot Testing
- Data Collection at Existing Trails in 3 Pond Complexes
- Data Collection at New Phase 1 Trails
- Data Entry
- Analysis
- Preliminary Results
- Draft Report
- Final Report
- Data Collection at Phase 1 Trails Opening Later (if desired)

Progress Reports and Workshop Participation
- Annual Reports
- Science Symposia

Appendix 2: Hourly Breakdown by Task for Each Study

Study 1. Foraging Waterbird Study

Field Tasks		
	Shorebirds	**Waterfowl**
Without-trail locations needed	10 locations Potential locations: SF2, E12, E13, E14, A5, A6, A7, R3, R4	6 locations Potential locations: A9, A10, A11, A3W, A1, A2W
Existing trail locations needed	-0-	10 locations Potential locations: A9-17, A2E, A3W
Trials/location	6 (1 per month)	6 (1 per month)
Total trials Without Trail Existing Trail	10 locations × 6 mo = 60 -0-	6 locations × 6mo = 36 10 locations × 6 mo = 60
Hunting (as an additional factor)		2 conditions (with and without)
Field hours (w/o hunting as a factor)	3 hours/trial × 60 = 180 hr	3 hours × 96 = 288 hr
Additional field hours (with hunting as a factor)		3 hours × 96 = 288 hr
Travel (w/o hunting)	RA+RS to field sites: (60 trials/2 trials per day) × 30mi (RT) × 3 RA/RS × 0.58/mi = $1,800	RA+RS to field sites: (96 trials/2 trials per day) × 30mi (RT) × 3 RA/RS × 0.58/mi = $2,500.00
Additional Travel (with hunting)		RA+RS to field sites: (96 trials/2 trials per day) × 30mi (RT) × 3 RA/RS × 0.58/mi = $2,500.00

Study Tasks	
Study Design	PI: 36 hr
Develop Protocols	PI: 36 hr
Site Selection	PI: 48 hr
Recruit, Select, Manage Field Crew	PI: 24 hr
Field Set-up	PI: 52 hr RA: 52 hr
Data Collection (w/o hunting)	PI: 68 hr RA: 400 hr RS: 468 hr RS: 468 hr
Data Collection (w/hunting)	PI: 48 hr RA: 240 hr RS: 288 hr RS: 288 hr

Data Entry—no hunting data --Additional hours for hunting data	RS: 100 hr RS: 50 hr
Data Checking	RA: 40 hr
Analysis	PI: 80 hr
Draft Report	PI: 80 hr
Final Report	PI: 40 hr
Annual Up-dates	PI: 8 hr
Project Management (administrative, control data quality)	PI: 48 hr RA: 48 hr

Study 2. Snowy Plover Study

Field Hours	
Experimental Trail Locations	7
Control Locations	7
Trials/month	2
Months	4
Total trials needed	14 locations × 2 trials/mo × 4mo = 112
Total field hours	2 hours/trial × 112 = 224 hr
Person hours--Experimental	224 hr × 2 people = 448 hr
Person-hours--Control	224 hr × 1 person = 224 hr

Other Tasks	
Study Design	PI: 16 hr
Site Selection	PI: 8 hr
Develop Protocols	PI: 8 hr
Recruit Field Crew	PI: 8 hr
Field Set-up	RA: 8 hr
Data Collection	PI: 16 hr RA: 208 hr RS: 448 hr
Data Entry	RS: 25 hr
Data Checking	RA: 8 hr
Analysis	PI: 20 hr
Draft Report	PI: 16 hr
Final Report	PI: 16 hr
Annual Report	
Project Management	PI: 18 hr RA: 8 hr
Travel--Experimental	RA+RS to field sites: (112 trials/2 trials per day) × 30 mi (RT) × 2 × \$0.58/hr = \$1,950.00
Travel--Control	RA to field sites: (112 trials/2 trials per day) × 30 mi (RT) × \$0.58/hr = \$ 975.00

Study 3. Nesting Birds at SF2 Study

Field Costs	
Months of study	14 (7 per year for 2 years)
Days per month	2 (1 weekend and 1 weekday)
Hours per day	4
Total field hours	14 × 2 × 4 hr = 112 hours

Other Costs	
Study Design	PI: 16 hr
Recruit RA	PI: 4 hr
Data Collection	PI: 32 hr RA: 80 hr
Data Entry	RS: 35 hr
Data Checking	RA: 20 hr
Analysis	PI: 60 hr
Draft Reports	PI: 32 hr
Final Report	PI: 32 hr
Annual Reports	PI: 4 hr
Project Management	PI: 24 hr
Travel	RA to field sites: 28 visits× 30 mi (RT) × $0.58/hr = $ 490.00

Study 4. Trail User Satisfaction Study

Field Hours	
Public Access locations	6
Visits per location	8 (1 weekend + 1 weekday/ season for 4 seasons)
Surveys/visit	7
Total people surveyed	6 × 8 × 7 = 336
Total field hours	4hr × 48 = 192 hr
Travel	RA to field sites: 48 visits× 30 mi (RT) × $0.58/hr = $1,000.00

Other Tasks	
Develop/Pilot Survey	PI: 40 hr
Site Selection	PI: 24 hr
Data Collection	PI: 32 hr RA: 160 hr
Data Entry	RA: 100 hr
Analysis and Data Checking	PI: 48 hr
Draft Report	PI: 40 hr
Final Report	PI: 24 hr
Annual Report	PI: 4 hr
Project Management	PI: 20 hr

Trulio_Topic4

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

Regarding your proposal:
Study of Waterbird Response to Trail Use in the SBSP Restoration Project

1. please provide a paragraph justifying the high travel budget
2. please provide a paragraph clarifying that SFBBO is on board for partnering with data collection/field studies

1. Travel budget:
Travel costs are included only for our visits to sites to collect data. We did not include the travel costs that would be incurred with site selection or site set-up. To develop the travel budget for site visits to collect data, we made a number of assumptions, as follows:

* Since field observers are not paid a high rate, we felt it was important to include travel to sites as part of their compensation.
* Observers collect two sets of data per trip, to reduce trips, whenever possible.
* We used the government rate of 0.58/mile as the rate for travel reimbursement.
* We estimated 30 miles per round trip.

The attachment shows our specific calculations for travel based on the number of site visits needed for each study. The information in the attachment is extracted from Appendix 2 of our proposal, which gives more detail on how we arrived at the number of site visits.

2. SFBBO Participation:
I asked Caitlin Robinson, at SFBBO, if she was going to continue collecting data on snowy plovers. She said she was funded through 2009, but didn't know about after that, although she would like to continue monitoring the plovers. The Snowy Plover study we proposed does assume that SFBBO will be willing to share their data on plover locations with us. This is the only assistance we need from SFBBO. We doubt it would be necessary, but if needed, we assume USFWS/DFG would make this request of SFBBO. We will need to coordinate with their monitoring program, of course, to be sure that we, and they, can achieve our respective study/monitoring goals.

We did not mention cooperating with any other specific agency, but for the SF2 Nesting Bird and Trail Use Study we do expect to use the data collected by the team researching RFP study question #3. Since that team will be collecting the nesting bird data we need, we would want to use those data rather than collecting more of our own, which would be a duplication of effort and add unnecessary expense. Of course, we would coordinate closely with that team to ensure they were collecting the data that we would need to address the effects of trail use on nesting

birds at SF2.

Caitlin Robinson just sent me this message about coordinating with her on the Snowy Plover and Trail Use Study:

"Hi Lynne, I just responded to your email and hotmail ate the email so I'm trying to write back from this account! Yes, we would love to be involved with this study! I am a little concerned about disturbing the plovers more than they already are but I think if we work together, we can both collect the data we need. I think coordinating this will involve us meeting you in the field each time, to make sure that other plovers are not disturbed while you're collecting data on a nest. Plover nests are really hard to find so it may work out best if we take you out there and show you the nest (and make sure no one is parked or disturbing any other nests). You also have to park ridiculously far away from the birds since they flush so easily – this also makes finding nests very challenging!"

Caitlin also had some very good thoughts on methodology for approaching the plovers, so she'll be a valuable resource for us!