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

Restoration Funding Application
Cover Sheet

APPLICANT INFORMATION

Name of Organization(s) Requesting Funding: **US Geological Survey and San Francisco Bay Bird Observatory**

Mailing Address: **USGS UC-Davis Field Station, University of California**

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Federal Employee Identification Number: **53-0196958**

Principal Investigator: **Dr. Josh Ackerman**

Title: **Research Wildlife Biologist** Institution: **US Geological Survey**

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Grant Administrator: **Cindy Lu, Agreements Management Specialist**
Telephone: **(916) 278-9480** Email address: **Clu@usgs.gov**

PROJECT INFORMATION

RFP Study Topic # **8**

Project Title: **Impact of Salt Pond Restoration on California Gull Displacement and Predation on Breeding Waterbirds**

Funding Request per year **$111,310 and $106,655** Number of years: **2**

Confirmed in-kind or matching contributions: **$ 40,397**

Source of in-kind or matching contributions: **SFBBO and USGS**

Purpose and Objectives: **The objectives of this proposal are to evaluate California gull predation on snowy plover nests and Forster's tern chicks, and determine the likely distribution of California gulls after colony displacement.**

Proposed starting date: **Apr. 2009 or 2010** Estimated completion date: **Apr. 2011 or 2012 depending on contract approval date**

Signature : _____ Date: 12/4/08
Principal Investigator

Signature : _____ Date: 12/4/08
Grant Administrator

Impact of Salt Pond Restoration on California Gull Displacement and Predation on Breeding Waterbirds

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ABSTRACT:
The California gull (*Larus californicus*) population in San Francisco Bay has increased from <200 in 1982 to >46,800 in 2008, and may be negatively affecting nesting waterbirds through harassment, encroachment on nesting sites, and predation on eggs and chicks. The California gull colony at Pond A6 is the largest (>26,000) and is expected to be displaced when this salt pond is restored into tidal marsh during the implementation of the South Bay Salt Pond (SBSP) Restoration Project. As salt ponds are reconfigured and gulls relocate to new nesting sites, gulls may displace other breeding waterbirds and increase predation rates. We propose to build on our prior California gull study findings to (1) examine gull predation on nesting snowy plovers and Forster's tern chicks, (2) determine likely gull nesting sites after displacement from A6 using color-marked gulls, (3) continue our gull colony and landfill surveys to document current population size, and (4) use our salt pond survey data to model the expected distribution of gulls based on future island and salt pond configurations. These data will provide managers an assessment of the current impact of California gulls on breeding waterbirds and their likely future impact as the SBSP Restoration Project is implemented.

BACKGROUND AND JUSTIFICATION:
The California gull (*Larus californicus*) population in the South San Francisco Bay (hereafter South Bay) has increased from fewer than 200 breeding gulls in 1982 to over 46,800 in 2008 (Strong et al. 2004; San Francisco Bay Bird Observatory, unpublished data; Figure 1). Yet breeding populations of California gulls at other areas, such as Mono Lake, have not increased over the same time period (Wrege et al. 2006). The exponential increase in San Francisco Bay may be closely related to their use of landfills and other anthropogenic sources of food, as there are at least 3 landfills within short flight distance of the main breeding colonies.

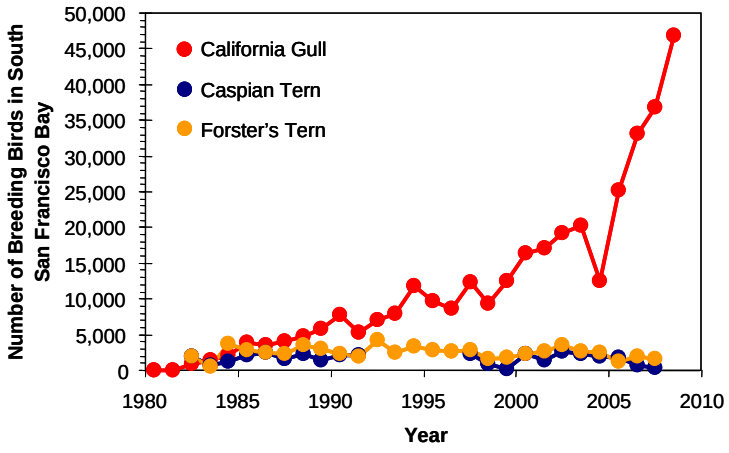

Figure 1. California gull breeding populations in the South San Francisco Bay have increased rapidly overly the past two decades while Caspian tern and Forster's tern populations have declined. Data from Strong et al. 2004 and SFBBO.

The expanding California gull population may negatively affect other ground nesting birds in the South Bay through harassment (Kakouros 2006), encroachment on nesting sites (Strong et al. 2004), and predation on eggs and chicks (Ackerman et al. 2006a). For example, in 2005 and 2006, we documented that California gulls depredated at least 61% of avocet (*Recurvirostra americana*) and 23% of stilt chicks (*Himantopus mexicaus*, Ackerman et al. 2006a), and 12% of avocet nests (Herring et al., in review). Although these data clearly indicate that California gulls are depredating breeding waterbirds and potentially reducing overall reproductive success, those studies were focused on avocets and stilts because we had large matching funds to study their mercury levels (Ackerman et al. 2007, 2008a,b).

Yet, there are two other species that are common breeders in the South Bay that may be impacted by gulls to a larger degree due to their nesting habits. The federally threatened western snowy plover (*Charadrius alexandrinus nivosus*) and Forster's tern (*Sterna forsteri*) both nest on salt pond islands and pannes, in areas with limited vegetation that is useful for concealment from aerial predators. About 7% of the Pacific Coast population of snowy plovers breed in San Francisco Bay and, in 2007, 43% of the nests found in San Francisco Bay were depredated (Robinson et al. 2007). This estimate of apparent nest success is biased considerably low, because only successful nests are typically found during nest searches (e.g., Mayfield 1961, 1975). Anecdotal evidence suggests that California gulls may be important nest predators of snowy plovers in the South Bay (Robinson et al. 2007), as they are on breeding snowy plovers at Mono Lake (Page et al. 1983), but no quantitative data exists in San Francisco Bay. California gulls may also be negatively affecting breeding Forster's terns. Tern populations have been slowly declining over the past two decades (Strong et al. 2004), coincidentally as California gull populations have increased dramatically (Figure 1). Further, Kakouros (2006) found that more than 90% of all predator intrusions on Forster's tern colonies were by California gulls, and she observed three instances where gulls depredated tern chicks and one time where gulls depredated a tern nest. Moreover, there is anecdotal evidence that an entire tern colony was abandoned in response to gull predation and harassment (Kakouros 2006). Therefore, the impact of gull predation on snowy plovers and Forster's terns should be assessed to more fully document the impact of gulls on breeding waterbirds.

In addition to their impact on breeding waterbirds via predation, there is also concern that California gulls may displace other breeding waterbirds from preferred nesting sites as their population grows. In particular, the California gull colony at Pond A6 (Figure 2) is the largest in the San Francisco Bay and is expected to be displaced when the salt pond is restored to tidal marsh within the next few years. In 2008, there were 26,366 California gulls nesting within the dry pond bed of A6 (J. Ackerman & J. Bluso-Demers, unpublished). It is unknown where gulls that occupy A6 will disperse to breed after A6 is

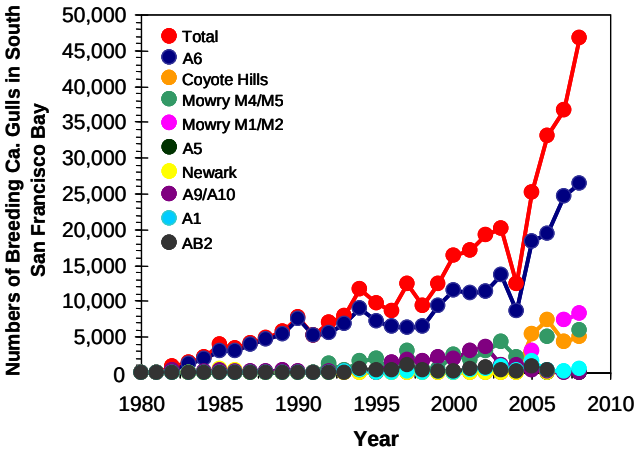

Figure 2. Growth of several California gull colonies in the South San Francisco Bay since 1982.

restored, but it is likely that many gulls will nest in nearby salt ponds containing suitable island nesting sites that are close to landfills, such as Pond A16. Additionally, core-use areas of radio-marked California gulls in 2007 and 2008 encompassed the Newby Island and Tri Cities Landfills, as well as several adjacent salt ponds where gulls presumably roosted between meals (Figure 3; J. Ackerman, unpublished). Therefore, gull movements, and potentially colony relocation sites, may be largely dictated by landfill locations. Unfortunately, Pond A16 currently provides nesting habitat for one of the largest breeding populations of avocets and Forster's terns in San Francisco Bay (Ackerman et al. 2006a). Thus, understanding where gulls are likely to relocate is also critical to the success of a key restoration project objective of the South Bay Salt Pond (SBSP) Restoration Project to maintain habitat value for nesting waterbirds.

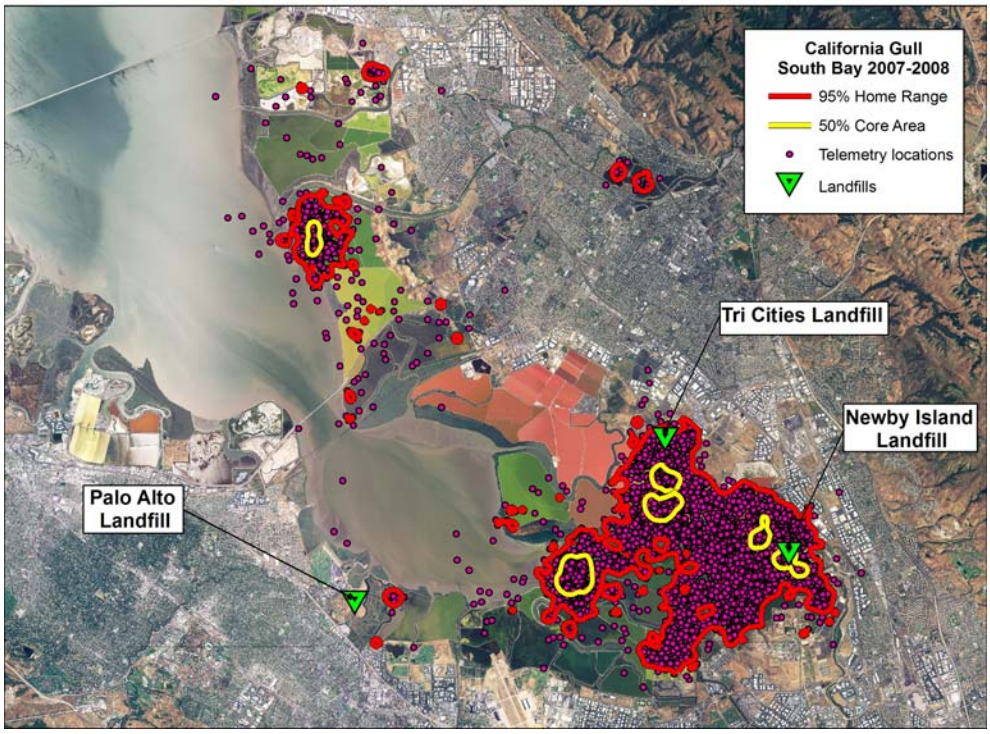

Figure 3. Radio-telemetry locations of California gulls tracked during the 2007 and 2008 breeding seasons. Ackerman et al., unpublished.

STUDY OBJECTIVES:

We propose to build on our prior gull research findings to directly address the questions raised by the SBSP Restoration Project and the Request for Proposals to better understand how gulls will affect the potential for restoration success. Specifically, we will:

1) Determine the impact of gulls on breeding snowy plovers and Forster's terns.
2) Color-mark California gulls at A6 to determine nesting distributions after displacement from A6.
3) Continue our California gull colony and landfill surveys to document current population size.
4) Use our salt pond survey data to model the expected distribution of gulls based on island distribution and salt pond configuration.

STUDY AREA:
The primary intensive study area will be within the Don Edwards San Francisco Bay National Wildlife Refuge, but specific sites will depend on study tasks (Figure 4). We will assess predation on snowy plover nests in Eden Landing Ecological Reserve (Ponds E6A, E6B, E8, E8A, E12, E14, and E16B) and Ravenswood (Pond R1 and SF2), but sites will depend on nesting distributions (Robinson et al. 2007). We will assess predation on Forster's tern chicks at two colony sites, Pond A16 and Pond A1. These colonies represent an area with potentially high predation rates due to proximity of nesting gulls and flight-paths to landfills (A16) as well as an area with potentially low predation rates since it is not near a large gull colony or active landfill (A1). Based on our telemetry results, California gulls spend much more time at A16 than at A1 (Figure 3). We will color-mark gulls at Pond A6 and re-sight gulls at the other main breeding colonies at Coyote Hills and Mowry. California gull colony counts will be conducted at A1, A5, A6, A9/A10, Coyote Hills, and Mowry. Landfill surveys will be conducted at Tri-Cities and Newby Island Landfills. Finally, we will use salt pond complex-wide survey data (Alviso, Moffett, Ravenswood, Newark, Mowry, and Eden Landing Ecological Reserve salt pond complexes) to model the expected distribution of California gulls.

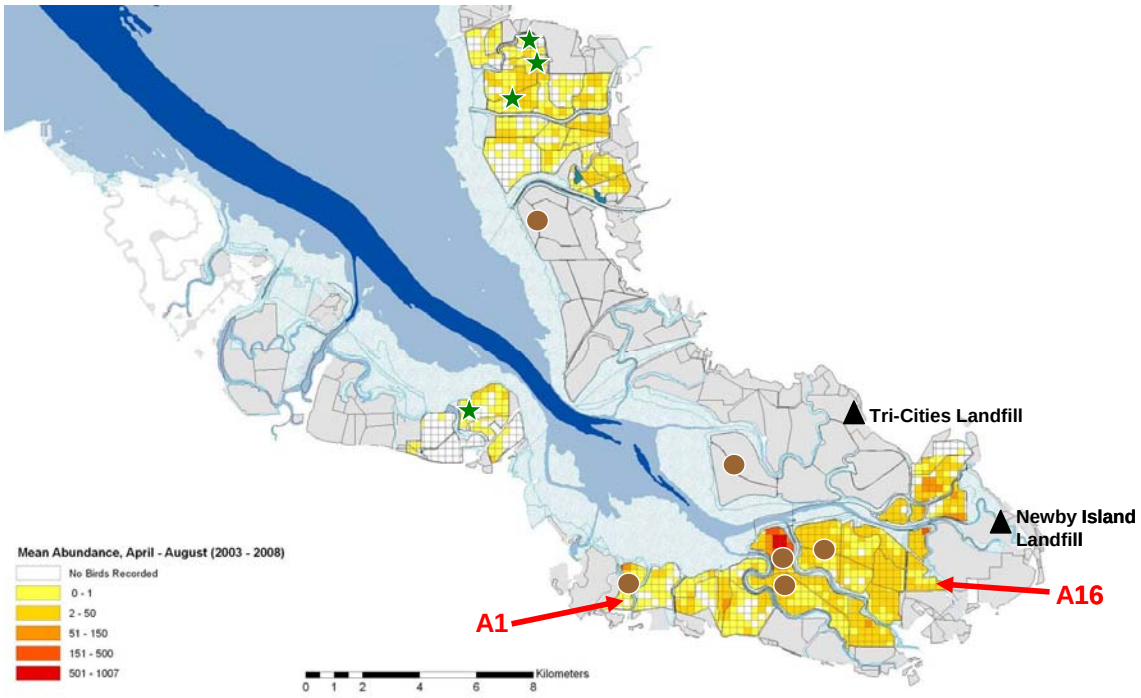

Figure 4. Study area map depicting the distribution and mean abundance (2003-2008) of California gulls in South San Francisco Bay salt ponds between April and August based on our waterbird surveys (Athearn and Takekawa, unpublished data). Green stars denote salt ponds where we will study predation on snowy plover nests. Red arrows denote salt ponds where we will study predation on Forster's tern chicks. Brown circles denote salt ponds where we will count California gull colonies. Black triangles show the locations of the two major landfills.

APPROACH:

Objective 1: Determine the impact of gulls on breeding snowy plovers and Forster's terns.

Snowy Plover Nest Predation-We will assess the impact of California gull predation on nesting snowy plovers by using remote digital camera systems placed near snowy plover nests. We will use infra-red video camera systems similar to those developed and used for snowy plover nest studies by Mark Colwell's lab (Humboldt State University). Each camera system will consist of a security camera (with infra-red night vision), portable DVR, DVR docking station, two marine batteries, and cables (e.g., Pierce and Pobprasert 2007). Security cameras will be concealed in army surplus ammunition canisters and placed approximately 15 m from plover nests to reduce any potential disturbance. Ammunition boxes and cables will be spray-painted with camouflage paint. Each camera will be connected to portable DVRs with Direct Burial RG59 cable. Additionally, sand and other local substrate materials will be attached to the boxes and cables with spray adhesives to camouflage them and reduce any potential effects on nesting behavior. DVRs will be stored in pelican cases and powered by two sealed marine batteries, connected in series. Pelican cases and batteries will be stored in plastic bins and concealed with camouflage netting. The DVR and battery station will be located >50 m from the nest, but initial observations will be conducted to determine the distance that causes the least disturbance to plovers. For example, we can move the DVR and battery station up to 130 m away from the nest. Initial camera set-up will take <20 min, with most of the time spent at the DVR and battery station located >50 m from the nest. The batteries will require changing and the DVR will need to be downloaded approximately once per week. Camera maintenance will coincide with concurrent nest monitoring activities (C. Robinson) at nearby nests to minimize disturbance. All camera recordings will be processed, and nest predators will be identified. If possible, additional behavioral data may be gathered on snowy plover behavior (e.g., incubation bouts). In total, we will purchase five camera systems to monitor nests and will focus effort at Eden Landing Ecological Reserve to maximize our potential for data collection. In 2007, the last year of data available, SFBBO monitored 80 nests at Eden Landing (Robinson et al. 2007). Of the monitored nests, nearly half were depredated (46%). We expect to monitor 20-25 nests during the breeding season, suggesting we will capture approximately 10-12 depredation events. Therefore, if California gulls are significant predators of snowy plover nests, we expect to document this behavior.

Forster's Tern Chick Predation-We will use radio-telemetry methods to determine predators of Forster's tern chicks. Radio-tracking tern chicks will be necessary to determine predator types because although leg banded birds can be recaptured to estimate survival, predators causing mortality cannot be identified. Also, observational data is too limited; for example Kakouros (2006) observed three instances where gulls depredated tern chicks but she observed colonies for over 60 hrs to make these limited predation observations. Following methodology developed for avocet and stilt chicks (Ackerman et al. 2008a), we will hand-capture tern chicks at hatching (one chick per clutch) and affix tiny radio transmitters containing thermistor switches (e.g., Model BD-2T, Holohil Systems Ltd., Carp, Ontario, Canada) to the dorsal midline of chick's backs with sutures (Ethicon® Vicryl FS-2, 3-0, Ethicon Inc., Piscataway, New Jersey) and knots will be secured with super-glue (Loctite 422, Henkel Corp., Rocky Hill, Connecticut). We will use very small transmitters to reduce the potential for transmitter effects on behavior or survival, following our methodology and positive results for avocet and stilt chicks (Ackerman et al. 2008a). We will weigh chicks with a spring scale (±1.0 g with a 100-g Pesola® spring scale,

Pesola Ag, Baar, Switzerland), and we will measure exposed culmen length and short tarsus length with digital calipers (±0.01 mm with Fowler® electronic digital calipers, Newton, Massachusetts) and flattened wing length with a wing rule (±1.0 mm). Immediately after attaching transmitters (<20 min), we will return radio-marked chicks to their nest sites.

Thereafter, we will track radio-marked tern chicks from trucks equipped with dual 4-element Yagi null-peak antenna systems (AVM Instrument Co., Livermore, California), using biangulation to determine locations (e.g., Takekawa et al. 2002, Ackerman et al. 2006b). We will locate chicks daily from the time of radio attachment until their fate (depredated, dead, fledged) is determined. We will track during the cool morning and evening hours to help differentiate the chick's temperature from the ambient temperature and determine mortality status. Chicks that go missing from the colony will be searched for daily until they are found (e.g., typically carried away by avian predators) or until the transmitter was estimated to have quit working (about 30 days). If we think the chick has died as indicated by the thermistor (mortality) censor, we will use hand-held Yagi antenna systems and receivers to find the transmitter and chick within 24 hours and identify the predator using location (e.g., gull colony), mammal bite marks, and nearby raptor roosts.

Objective 2: Color-mark California gulls at A6 to determine nesting distributions after displacement from A6.

We will capture and band 500 California gulls nesting in Pond A6 with alpha-numeric color-bands (Haggie Engraving, Crumpton, Maryland) in the first year of the project. We will capture gulls using baited noose mats placed at the A6 colony. We refined this capture method in 2008 and succeeded in capturing and color-marking 277 California gulls at A6. With this proposal, we will have increased our population of color-marked gulls to nearly 800. We will re-sight color-marked gulls during annual colony counts and monthly landfill surveys during the breeding season. Additionally, during the breeding season (May-July), observers will conduct weekly re-sighting surveys at four California gull colonies (A1, A6, Mowry, and Coyote Hills) using spotting scopes and binoculars from vantage points on levees. Not only will this data provide immediate information about gull movements among colonies and landfills, but we will be able to determine where A6 gulls move to breed after they are displaced by the future A6 restoration. In particular, we will address what proportion of A6 gulls disperse to other established colonies or newly created habitat by the SBSP Restoration Project.

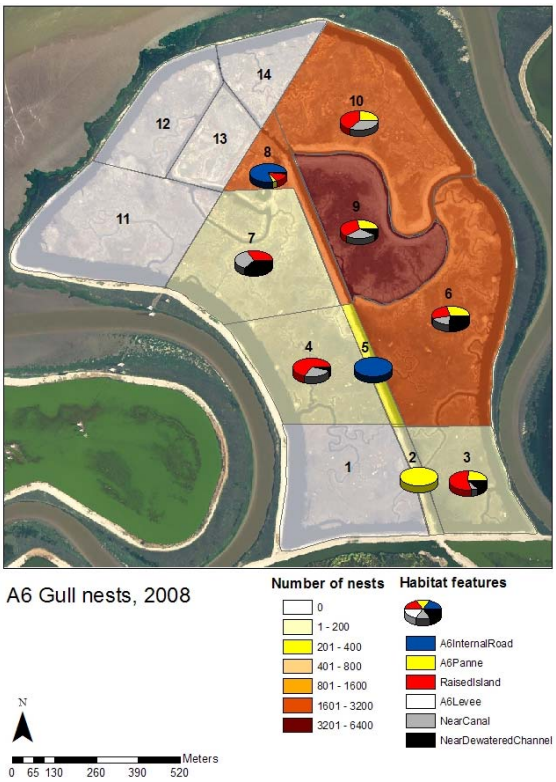

Figure 5. Distribution and abundance of California gull nests at Pond A6 in 2008.

Objective 3: Continue our California gull colony and landfill surveys to document current population size.

Gull Colony Counts-We will count all California gull nests at the A1, A5, A6, A9/A10, Coyote Hills, and Mowry gull colonies by coarse identifiable features, including levee, panne, island, and near water (Figure 5). During peak nesting in each year, we will enter each colony once and count all nests containing eggs. Nest counts will be sub-totaled by each coarse identifiable habitat feature.

Gull Surveys at Landfills-We will conduct gull surveys at Newby Island Landfill and Tri-Cities Landfill one day per month from April through August each year. During each survey, we will estimate the number of gulls using all areas of the landfill and the behaviors of gulls. We will collect the following data 4 times during each survey separated by ≥1 hour:

1) Count the number of gulls flying either <30 m or >30 m above the ground.
2) Count the number of gulls on the ground at exposed, partially exposed, and non-refuse areas.
3) Conduct 10-minute flyover counts to determine the number of gulls flying to and from the landfill and the direction(s) gulls travel.
4) Conduct behavioral surveys on 10 gulls from each of exposed, partially exposed, and non-refuse areas of the landfill, assigning each gull a behavior (foraging, maintenance, loafing, alert, aggressive).
5) Record any color-marked gulls observed during surveys.

Objective 4: Use our salt pond survey data to model the expected distribution of gulls based on island distribution and salt pond configuration.

Understanding the spatial distribution of California gulls across the South Bay salt ponds is critical for identifying areas of greatest potential impact to other nesting waterbird species. Our salt pond waterbird datasets comprise monthly complete pond counts (Alviso, Eden Landing, Mowry, Newark, and Ravenswood systems) within 250 m x 250 m (6.25 ha) bird counting blocks (Takekawa et al. 2005, 2006). These high tide surveys have been conducted since 2002, and are funded to continue through at least September 2009 (we are not requesting any funds through this RFP for these bird surveys). Bird counting blocks within each pond are uniquely identified within ArcGIS (ESRI, Inc., Redlands, CA) shapefiles. These existing shapefiles can be used to spatially display bird count data as an ArcGIS map (e.g., Figure 4; Athearn and Takekawa 2006), but they can also be used to generate spatially-based data such as the proportion of island area within grid blocks and the distance from grid block centers to the nearest landfill, pond island, or pond levee. We will extract these data from the GIS environment and construct regression models (SAS Institute 1990) to represent the relationship between these parameters and summer (April-August) gull counts, and we will use Akaike's Information Criterion (AIC) to select the best models (Burnham and Anderson 1998). To map potential future gull distributions throughout the South Bay, we will overlay grid blocks with shapefiles of potential future island distribution scenarios, and then apply the model to the same grid cells with the adjusted spatial parameters. The model output, potential gull abundance per grid block, will then be scaled so that area totals equal those for past data so that similar display will clearly show how the distribution of the same number of California gulls may change with altered island configuration in the salt ponds.

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

WORK SCHEDULE:
Work will commence from final signature of the agreement for a period of two years (spanning parts of 3 calendar years) with an annual report delivered at the end of year one and a final report delivered at the end of year two. Plover and tern predation studies will be conducted during the breeding season from April-August each year. Gull color marking will occur during March-April of the first year. Gull colony surveys will occur once in May or June of each year. Gull landfill surveys will occur during the breeding season from April-August. Data analysis and report writing will occur during summer and fall of the second year, with a draft report due in December of the final year, and a final report delivered in May of the final year. Below is a timeline for each task.

Timeline by quarter	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Plover nest predation		x	x			x	x					
Tern chick predation		x	x			x	x					
Gull color-marking		x										
Gull colony surveys			x				x					
Gull landfill surveys		x	x			x	x					
Gull modeling								x	x			
Data Entry			x	x			x	x				
Data analysis								x	x			
Report writing									x	x		

EXPECTED PRODUCTS:
Annual briefings and presentations will be provided to the Science Program and given at the South Bay Science Symposium. Annual progress reports and a final report will be delivered to the SBSP Restoration Project's Lead Scientist and Project Team. Additional presentations and scientific papers will be prepared for appropriate outlets. Expected journal paper topics include: California gull predation on plover nests and tern chicks, and movements of California gulls in response to displacement.

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BUDGET AND STAFF ALLOCATIONS:

We are requesting funds totaling $217,965 over a two year period to complete all 4 tasks, and we are providing direct matching funds totaling $40,397 with additional in kind contributions totaling more than $30,000 worth of research equipment (telemetry equipment, computers, boats, motors, spotting scopes). Our request includes funds for <6% time for each project PI. We are requesting approximately $55,000 total per year for technician time (1 technician @ 38% time, 1 @ 31% time, and 1 @ 18% time) to conduct field work and data entry, and about $23,000 total per year for PI salaries for coordination, field work, data analysis, and reporting. Funds for supplies include consumables such as nest markers and monitoring, chick marking, and office supplies. All salaries include benefits and administrative costs. A detailed budget follows:

South Bay Salt Pond Restoration Project

South Bay Salt Pond Restoration Project
Selected Monitoring and Applied Studies

Project Budget Worksheet*

Timeframe: April 2009-April 2011, or April 2010-April 2012 depending on contract approval

Budget Categories	Total Project Budget			Total Grant Request			Total Proposed From Other Sources *(please specify the source, if known)*
	Year 1	Year 2	Total	Year 1	Year 2	Total	
Labor-Salaries and Benefits (agency: annual %FTE requested)							
Ackerman (USGS: 4%,4%)	$10,775	$11,556	$22,331	$7,183	$7,704	$14,887	*$7,444 in kind contributed by USGS*
Bluso-Demers (SFBBO: 4%,4%)	$7,206	$7,350	$14,556	$3,603	$3,675	$7,278	*$7,278 in kind contributed by SFBBO*
Robinson (SFBBO: 13%,13%)	$8,960	$9,139	$18,099	$0	$0	$0	*$18,099 in kind contribution by SFBBO from funded plover habitat enhancement*
Demers (H.T. Harvey: 6%,6%)	$5,620	$5,845	$11,465	$5,620	$5,845	$11,465	
Eagles-Smith (USGS: 2%,2%)	$3,020	$3,239	$6,259	$3,020	$3,239	$6,259	
Athearn (USGS: 0%,4%)	$0	$9,009	$9,009	$0	$6,006	$6,006	*$3,003 in kind contributed by USGS*
Technicians (USGS: 38%,38% & 31%,31%)	$47,262	$49,406	$96,668	$47,262	$49,406	$96,668	
Technician (SFBBO: 18%,16%)	$9,911	$9,134	$19,045	$7,647	$6,825	$14,472	*$4,573 in kind contributed by SFBBO*
Consultant fees/ Contractual Services			$0			$0	
Travel - Field Vehicles and meetings	$6,000	$6,000	$12,000	$6,000	$6,000	$12,000	
Field Supplies	$2,000	$1,750	$3,750	$1,900	$1,750	$3,650	
Nest cameras (5 systems)	$8,000	$0	$8,000	$8,500	$0	$8,500	
Radio-transmitters (40 per year)	$8,000	$8,000	$16,000	$7,800	$7,800	$15,600	*>$30,000 in radio-telemetry and other equipment by USGS*
Overhead (not to exceed 10%)	$13,027	$8,864	$21,891	$12,775	$8,405	$21,180	
Other:			$0			$0	
TOTAL	$129,781	$129,293	$259,073	$111,310	$106,655	$217,965	*$40,397*

POTENTIAL REVIEWERS:

Cheryl Strong, San Francisco Bay National Wildlife Refuge Complex, 9500 Thornton Avenue, Newark, CA 94560; cell: 510-557-1271; email: Cheryl_Strong@fws.gov

Gary Page, PRBO Conservation Science, 3820 Cypress Drive #11, Petaluma, CA 94954; tel: 707/781-2555; email: gpage@prbo.org

David Shuford, PRBO Conservation Science, 3820 Cypress Drive # 11, Petaluma, CA 94954; tel: 707/781-2555; email: dshuford@prbo.org

Nils Warnock, Wildlife Health Center, University of California, Davis, CA 95616; tel: 530/752-5797; email: nwarnock@ucdavis.edu

NECESSARY PERMITS:

Birds will be monitored and handled and areas accessed under existing California Department of Fish and Game Scientific Collection Permits (SC000009, SC004741, SC007199, SC004857), Federal U.S. Fish and Wildlife Service Permits (MB173904, MB102896), U.S. Geological Survey Bird Banding Laboratory Permits (23564, 22911), SFBBO Bird Banding Lab Permit (22109), Eden Landing Ecological Reserve Access Permit (Letter of Permission from John Krause dated August 1, 2008), and Don Edwards San Francisco Bay National Wildlife Refuge Special Use Permits (11640-2008-003 and 11640-2007-077 [will be updated each year of the project]).

ANIMAL CARE AND USE:

All research will be conducted under approved study plans and guidelines of San Francisco Bay Bird Observatory and the U.S. Geological Survey, Western Ecological Research Center, Animal Care and Use Committee. We have extensive experience using nest cameras on avocets and stilts in the San Francisco Bay (Herring et al., in review), and have revised our methods to limit any effects on nesting birds and we will specifically be using nest cameras developed for use on nesting plovers. Plover cameras will be concealed and the batteries and recording unit will be located >50m away from the nest. All access to plover nests will be coordinated with ongoing plover nest studies (C. Robinson). We have successfully radio-marked several hundred avocet and stilt chicks with small (<1 g) transmitters with good success. Finally, we have successfully captured and banded hundreds of California gulls over the past two years and have refined our methodology to minimize stress to gulls.

QUALIFICATIONS:

This proposal is a collaborative effort among the US Geological Survey, San Francisco Bay Bird Observatory, and H. T. Harvey. Each of the Principle Investigators have been conducting applied research on waterbirds, especially California gulls, in the South Bay over the past 5 years. Please see the attached CVs for further details and project participation.

JOSHUA T. ACKERMAN

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

EDUCATION

Ph.D. Ecology. University of California, Davis (2002).
B.S. (High Honors) Wildlife, Fish, and Conservation Biology. University of California, Davis (1997).

RELEVANT EXPERIENCE TO THIS PROJECT

As a Principal Investigator with the USGS Western Ecological Research Center, I lead several research projects investigating waterbird ecology, avian reproduction, and mercury bioaccumulation in the San Francisco Bay Estuary. I have been conducting research on waterbirds in the South San Francisco Bay for five years and have led studies investigating (1) nesting ecology of avocets, stilts, and Forster's terns, (2) movements, habitat selection, and diet of avocets, stilts, and Forster's terns, (3) movements, diet, and predation by California gulls, and (4) mercury bioaccumulation and ecotoxicological effects of mercury on avian reproduction. Important to this proposal, I lead prior California gull studies assessing gull predation on avocet and stilt nests and chicks, gull diet, and gull movements in relation to landfills using radio-telemetry.

EXPECTED CONTRIBUTIONS TO THIS PROJECT

I will lead the research project, including coordinating data collection and summarizing, analyzing, and reporting project results.

PROFESSIONAL EXPERIENCE

Research Wildlife Biologist, USGS, BRD, WERC, UC Davis Field Station (2/04-present)
Post-doctoral Researcher, John Muir Institute of the Environment, UC Davis (8/02-2/04)
Doctoral Research, Dept. of Wildlife, Fish, and Conservation Biology, UC Davis (9/97-7/02)
Waterfowl Research Associate, California Waterfowl Association, Sacramento (10/99-4/00)

PUBLICATIONS:

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

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

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

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

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

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

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

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

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

Ackerman, JT, CA Eagles-Smith, JY Takekawa, JD Bluso, and TL Adelsbach. 2008. Mercury concentrations in blood and feathers of pre-breeding Forster's terns in relation to space use of San Francisco Bay habitats. Environmental Toxicology and Chemistry 27:897-908.

Ackerman, JT, JY Takekawa, CA Eagles-Smith, and SA Iverson. 2008. Mercury contamination and effects on survival of American avocet and black-necked stilt chicks in San Francisco Bay. Ecotoxicology 17:103-116.

Ackerman, JT, JY Takekawa, JD Bluso, JL Yee, and CA Eagles-Smith. 2008. Gender identification of Caspian terns using external morphology and discriminant function analysis. Wilson Journal of Field Ornithology 120:378-383.

Eagles-Smith, CA, **JT Ackerman**, TL Adelsbach, JY Takekawa, AK Miles, and RA Keister. 2008. Mercury correlations among six tissues for four waterbird species breeding in San Francisco Bay. Environmental Toxicology and Chemistry 27:2136-2153.

Ackerman, JT, CA Eagles-Smith, JY Takekawa, SA Demers, TL Adelsbach, JD Bluso, AK Miles, N Warnock, TH Suchanek, and SE Schwarzbach. 2007. Mercury concentrations and space use of pre-breeding American avocets and black-necked stilts in San Francisco Bay. Science of the Total Environment 384:452-466.

Mason, JW, GJ McChesney, WR McIver, HR Carter, JY Takekawa, RT Golightly, **JT Ackerman**, DL Orthmeyer, WM Perry, JL Yee, MO Pierson, and MD McCrary. 2007. At-sea distribution and abundance of seabirds off southern California: a 20-year comparison. Studies in Avian Biology 33:1-101.

Ackerman, JT, JY Takekawa, C Strong, N Athearn, and A Rex. 2006. California Gull distribution, abundance, and predation on waterbird eggs and chicks in South San Francisco Bay. Final Report, U. S. Geological Survey, Western Ecological Research Center, Davis and Vallejo, CA 61 pp.

Ackerman, JT, JY Takekawa, DL Orthmeyer, JP Fleskes, JL Yee, and KL Kruse. 2006. Spatial use by wintering greater white-fronted geese relative to a decade of habitat change in California's Central Valley. Journal of Wildlife Management 70:965-976.

Ackerman, JT, JM Eadie, and TG Moore. 2006. Does life history predict risk-taking behavior of wintering dabbling ducks? Condor 108:530-546.

Ackerman, JT, JM Eadie, ML Szymanski, JH Caswell, MP Vrtiska, AH Raedeke, JM Checkett, AD Afton, TG Moore, FD Caswell, RA Walters, DD Humburg, and JL Yee. 2006. Effectiveness of spinning-wing decoys varies among dabbling duck species and locations. Journal of Wildlife Management 70:799-804.

Bluso, JD, **JT Ackerman**, JY Takekawa, and JL Yee. 2006. Using morphological measurements to sex Forster's terns. Waterbirds, 29:511-516.

Blackmer, AL, RA Mauck, **JT Ackerman**, CE Huntington, GA Nevitt, and JB Williams. 2005. Exploring individual quality: basal metabolic rate and reproductive performance in Leach's storm-petrels. Behavioral Ecology 16: 906-913.

Ackerman, JT, AL Blackmer, and JM Eadie. 2004. Is predation on waterfowl nests density dependent? Tests at three spatial scales. Oikos 107:128-140.

Ackerman, JT, JY Takekawa, KL Kruse, DL Orthmeyer, JL Yee, CR Ely, DH Ward, KS Bollinger, and DM Mulcahy. 2004. Using radiotelemetry to monitor cardiac response of free-living tule greater white-fronted geese to human disturbance. Wilson Bulletin 116:146-151.

Ackerman, JT, J Adams, JY Takekawa, HR Carter, DL Whitworth, SH Newman, RT Golightly, and DL Orthmeyer. 2004. Effects of radio transmitters on the reproductive performance of Cassin's auklets. Wildlife Society Bulletin 32:1229–1241.

Blackmer, AL, **JT Ackerman**, and GA Nevitt. 2004. Effects of investigator disturbance on hatching success and nest-site fidelity in a long-lived seabird, Leach's storm-petrel. Biological Conservation 116:141-148.

Ackerman, JT, JM Eadie, GS Yarris, DL Loughman, and MR McLandress. 2003. Cues for investment: nest desertion in response to partial clutch depredation in dabbling ducks. Animal Behavior 66:871-883.

Ackerman, JT, JM Eadie, DL Loughman, GS Yarris, and MR McLandress. 2003. The influence of partial clutch depredation on duckling production. Journal of Wildlife Management 67:576-587.

Ackerman, JT, and JM Eadie. 2003. Current versus future reproduction: an experimental test of parental investment decisions using nest desertion by mallards. Behavioral Ecology & Sociobiology 54:264-273.

Ackerman, JT. 2002. Of mice and mallards: positive indirect effects of coexisting prey on waterfowl nest success. Oikos 99:469-480.

Ackerman, JT, MC Kondratieff, SA Matern, and JJ Cech, Jr. 2000. Tidal influence on spatial dynamics of leopard sharks in Tomales Bay, California. Environmental Biology of Fishes 58:33-43.

JILL BLUSO DEMERS

San Francisco Bay Bird Observatory, 524 Valley Way, Milpitas, CA, 408/946-6548, jdemers@sfbbo.org

EDUCATION

M.S. Natural Resources: Wildlife. Humboldt State University (2007).
B.A. Biology. Colby College (2002).

RELEVANT EXPERIENCE TO THIS PROJECT

As the Science Programs Director at San Francisco Bay Bird Observatory, I oversee research projects centered on the breeding, migratory, and wintering ecology of waterbirds in South Bay salt ponds. I have studied avian ecology in the San Francisco Bay estuary for 6 years and my research has focused on the spatial and reproductive ecology of Forster's Terns, Avocets, Stilts, the effects of landfills on California Gull reproductive and foraging ecology, and other aspects of avian biology related to the South Bay Salt Ponds Restoration.

EXPECTED CONTRIBUTIONS TO THIS PROJECT

I will oversee California gull color-banding studies and colony and landfill surveys. I will also assist with the snowy plover nest and Forster's tern chick predation studies. My responsibilities will include coordinating data collection efforts and summarizing, analyzing, and reporting project results.

PROFESSIONAL EXPERIENCE

Science Programs Director, San Francisco Bay Bird Observatory (8/08-present)
Biologist, USGS, BRD, WERC, UC Davis Field Station (7/07-8/08)
Graduate Researcher, Wildlife Department, Humboldt State University (8/04-07/07)
Biological Sciences Technician, USGS, BRD, WERC, San Francisco Estuary Field Station (02/03-08/04)

PUBLICATIONS: *I have authored 5 peer-reviewed journal papers, 1 popular article, 4 technical reports, and 24 scientific presentations. Below is a selected list of publications.*

Bluso-Demers, J.D., J.T. Ackerman, and J.Y. Takekawa. Colony Attendance Patterns by mated Forster's Terns using an automated data-logging receiver system. Ardea, submitted

Ackerman, J. T., **J. D. Bluso-Demers**, and J. Y. Takekawa. Postfledging Forster's tern movements, habitat selection, and colony attendance in San Francisco Bay. Condor, submitted.

Bluso-Demers, J.D., J.T. Ackerman, and J.Y. Takekawa. Habitat selection by Forster's Terns at multiple scales in San Francisco Bay: the importance of salt ponds. Auk, submitted

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

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

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

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

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

JOHN Y. TAKEKAWA

U.S. Geological Survey, Western Ecological Research Center, San Francisco Bay Estuary Field Station, 505 Azuar Drive, Vallejo, CA 94592, 707/562-2000, john_takekawa@usgs.gov

EDUCATION

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

RELEVANT EXPERIENCE TO THIS PROJECT

I established the San Francisco Bay Estuary Field Station of the USGS Western Ecological Research Center in 1995 to conduct research on waterbirds and their habitats in an ecosystem of international significance for migratory birds. My station has led several projects to examine the movements and habitat use of migratory species within the estuary. Our station has led a large part of the ongoing bird monitoring and adaptive study support for the South Bay Salt Pond Restoration Project, as well as for the Napa and Sonoma Marshes Restoration Project. I am a co-investigator on the recent studies of gull movements in the South Bay that were determined with radio telemetry.

EXPECTED CONTRIBUTIONS TO THIS PROJECT

I will participate in the research project as a co-investigator, focused on integrating this project with ongoing adaptive management, and participating in analyzing and reporting project results in publications.

PROFESSIONAL EXPERIENCE

May 2008-present: Research Biologist (GS-15), San Francisco Bay Estuary Field Station, Western Ecological Research Center, USGS, in Vallejo, CA; Oct 2004-Apr 2008: Research Biologist (GS-14), USGS WERC, Vallejo, CA; Oct 1997-Sep 2004: Research Biologist (GS-13), USGS WERC, Vallejo, CA; Aug 1995 - Sep 1997: Research Biologist, SFBE Station Chief, National Biological Service, California Science Center, Vallejo, CA; Jan 1995 - Aug 1995: Wildlife Biologist (Research), National Biological Service, California Pacific Science Center, Dixon, CA; Oct 1993 - Dec 1994: Wildlife Biologist (Research), National Biological Survey, California Pacific Science Center, Dixon, CA; Oct 1986 - Oct 1993: Wildlife Biologist (Research), USFWS, Northern Prairie Wildlife Research Center, Pacific States Ecology Field Station, Dixon, CA; Aug 1982 - Sep 1986: Wildlife Biologist, FWS, NPWRC, Upper Mississippi River Field Station, LaCrosse, WI; Aug 1983 - Jun 1986: Research & Teaching Assistant, Iowa State University, Department of Animal Ecology, Ames, IA; Jun 1979 - May 1982: Graduate Research Assistant, University of Idaho, Department of Fisheries and Wildlife, Moscow, ID.

PUBLICATIONS *ten selected publications*

Takekawa, J. Y., A. K. Miles, D. H. Schoellhamer, D. C. Tsao-Melcer, S. Fregien, and N. D. Athearn. *In press.* Dietary flexibility in three representative waterbirds across salinity and depth gradients in salt ponds of San Francisco Bay. Hydrobiologia.

Foxgrover, A. C., P. Dartnell, B. E. Jaffe, J. Y. Takekawa, and N. D. Athearn. 2007. High-resolution bathymetry and topography of south San Francisco Bay, California: U. S. Geological Survey Scientific Investigations Map 2987, 1 sheet. [http://pubs.usgs.gov/sim/2007/2987].

Takekawa, J. Y., A. K. Miles, D. H. Schoellhamer, N. D. Athearn, C. Jannusch, M. K. Saiki, W. D. Duffy, and S. Kleinschmidt. 2006. Trophic structure and avian communities across a salinity gradient in evaporation ponds of the San Francisco Bay estuary. Hydrobiologia 567: 307-327.

JOHN Y. TAKEKAWA

U.S. Geological Survey, Western Ecological Research Center, San Francisco Bay Estuary Field Station, 505 Azuar Drive, Vallejo, CA 94592, 707/562-2000, john_takekawa@usgs.gov

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

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

Williams, T.D., N. Warnock, J. Y. Takekawa, and M. A. Bishop. 2007. Flyway scale variation in plasma triglyceride levels as an index of refueling rate in spring migrating western sandpipers (Calidris mauri). Auk 124: 886-897.

Bishop, M.A., N. Warnock, and J. Y. Takekawa. 2004. Differential spring migration by male and female Western Sandpipers at interior and coastal stopover sites. Ardea 92(2): 185-196.

Warnock, N., J. Y. Takekawa, and M. A. Bishop. 2004. Migration and stopover strategies of individual Dunlin along the Pacific coast of North America. Can. J. Zool. 82: 1687-1697.

Poulton, V. K., J. R. Lovvorn, and J. Y. Takekawa. 2002. Clam density and scaup feeding behavior in San Pablo Bay, California. Condor 104: 518-527.

Frederick, R. B., W. R. Clark, and J. Y. Takekawa. 1992. Application of a computer simulation model to migrating white-fronted geese in the Klamath Basin. Pages 696-706 *in* D. R. McCollough and R. H. Barrett (eds.). Wildlife 2001: populations. Elsevier, NY.

SCOTT A. DEMERS

H. T. Harvey & Associates, Los Gatos, CA, 408/458-3242, sdemers@harveyecology.com

EDUCATION

M.S. Wildlife Department. Humboldt State University (2007)
B.S. - Natural Resources. University of Massachusetts (2000)

RELEVANT EXPERIENCE TO THIS PROJECT

I have a broad academic and professional background as wildlife ecologist, with a focus on avian and wetland ecology in the San Francisco Bay estuary. Prior to joining H. T. Harvey & Associates, I conducted my Master's research on shorebirds in the San Francisco Bay. My graduate work was part of a multi-disciplinary research team examining the bioaccumulation and ecotoxicological risk of environmental contaminants on waterbird reproduction in the estuary. My specific research included the space use and habitat selection of American Avocets. Prior to my graduate studies, I worked for the U.S. Geological Survey on a variety of avian research and wetland restoration projects in the region. My previous experiences working in western snowy plover habitat in the South San Francisco Bay will be beneficial to the success of the camera nest-monitoring project.

EXPECTED CONTRIBUTIONS TO THIS PROJECT

I will lead the western snowy plover nest camera monitoring. I will be responsible for obtaining the appropriate equipment, deploying the cameras, and determining the fate of camera-monitored nests.

PROFESSIONAL EXPERIENCE

Wildlife Ecologist, H. T. Harvey & Associates (10/07-present)
Graduate Research Assistantship, Humboldt State University (08/04-10/07)
Wildlife Biological Technician, Humboldt State University/U. S. Geological Survey (12/01-08/04)
Biological Technician, Platte River Whooping Crane Maintenance Trust, Inc. (03/01 –11/01)
Biological Research Assistant, University of Massachusetts/Harvard University (05/00-10/00)

PUBLICATIONS:

Demers, S. A., M. A. Colwell, J. Y. Takekawa, and J. T. Ackerman. 2008. Breeding stage influences space use of female American avocets in San Francisco Bay, California. Waterbirds 31: 365-371.

Ackerman, J. T, C. A. Eagles-smith, J. Y. Takekawa, **S. A. Demers**, T. L. Adelsbach, J. D. Bluso, A. K. Miles, N. Warnock, T. H. Suchaneck, and S. E. Swarzbach. 2007. Mercury concentrations and space use of pre-breeding American avocets and black-necked stilts in San Francisco Bay. Science of the Total Environment 384:452-466.

Demers, S. A., J. Y. Takekawa, J. T. Ackerman, N. Warnock, and N. D. Athearn. A spatial analysis of co-existing resident and migrant shorebirds: American avocets in San Francisco Bay. In Review.

Takekawa, J. Y., I. Woo, N. D. Athearn, **S. A. Demers**, R. J. Gardiner, W. M. Perry, N. K. Ganju, G. G. Shellenbarger, and D. H. Schoellhamer. Measuring sediment accretion in early tidal marsh restoration. Ecological Restoration and Management. In Review.

CAITLIN ROBINSON

San Francisco Bay Bird Observatory, 524 Valley Way, Milpitas, CA, 408/946-6548, jdemers@sfbbo.org

EDUCATION

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

RELEVANT EXPERIENCE TO THIS PROJECT

At San Francisco Bird Observatory, I oversee the Waterbird Program, which includes research projects on Western Snowy Plovers, California Gulls and waterbird use of salt ponds. My research focuses on avian conservation in the San Francisco Bay, and I conducted my Master's research on Western Snowy Plovers use of salt ponds managed as part of the South Bay Salt Pond Restoration Project.

EXPECTED CONTRIBUTIONS TO THIS PROJECT

I will coordinate snowy plover nest-camera predation study with the currently funded snowy plover nest monitoring studies I am leading (with DESFBNWR biologists). My oversight of the predation study will ensure efficient coordination between to the two research projects and reduce disturbance at snowy plover nest sites.

PROFESSIONAL EXPERIENCE

Waterbird Program Supervisor, San Francisco Bay Bird Observatory (07/07-05/08)
Biologist, San Francisco Bay Bird Observatory (07/07-05/08)
Field Biologist, San Francisco Bay Bird Observatory (10/05-11/07)
Environmental Educator, The New York State Department of Environmental Conservation, Hudson River Estuary Program/Student Conservation Association (10/2-08/03)
Piping Plover Steward, The Nature Conservancy (04/02-08/02)
Piping Plover Technician, Virginia Polytechnic Institute (5/02-8/02)

PUBLICATIONS:

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

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

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

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

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

COLLIN A. EAGLES-SMITH

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

EDUCATION

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

RELEVANT EXPERIENCE AND RESEARCH INTERESTS

For the past 5 years I have been conducting research on waterbird reproductive and foraging ecology in the San Francisco Estuary, focusing specifically on Forster's terns, American avocets, and black-necked stilts within the South San Francisco Bay. Additionally, I am finishing a stable isotope study evaluating the relative proportions of California Gull diet from landfills and waterbirds within South San Francisco Bay. I also am a collaborator on a study funded by the California Coastal Commission evaluating California Gull space use via radio telemetry. My primary research interests include trophic and food web ecology, waterbird reproduction, and the impact of non-native species on food web structure.

EXPECTED CONTRIBUTIONS TO THIS PROJECT

I will assist in coordinating and supervising the Forster's Tern chick objectives and California gull colony counts. I will also collaborate on summary, analysis, and reporting of project results.

PROFESSIONAL EXPERIENCE

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

PUBLICATIONS:

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

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

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

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

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NICOLE D. ATHEARN

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EDUCATION

Ph.D. Ecology. University of California, Davis (2011)

M.S. Wildlife Ecology; Certificate, Geographic Information Systems. Oklahoma State University, Stillwater (2002)

B.S. Wildlife, Fisheries, and Conservation Biology. University of California, Davis (1996).

RELEVANT EXPERIENCE TO THIS PROJECT

I have led the USGS salt pond ecology program at the USGS San Francisco Bay Estuary Field Station since 2002. I am particularly interested in the integration of science and management, and the focus of my current work is to develop models and tools that can be used for the management of salt ponds as bird habitat. I earned a certificate in Geographic Information Systems in 2002 and am experienced with conducting the GIS-based analyses needed for this study. Additionally, I am familiar with South Bay waterbirds and habitats as I have led the collection of monthly bird data and water quality data at all South Bay Salt Pond Restoration Project (SBSPRP) ponds since 2002.

EXPECTED CONTRIBUTIONS TO THIS PROJECT

I will conduct statistical and GIS-based spatial analyses required to use our salt pond survey data to model the expected distribution of gulls based on island distribution and salt pond configuration (objective 4).

PROFESSIONAL EXPERIENCE

Wildlife Biologist, USGS, BRD, WERC, San Francisco Bay Estuary Field Station (7/02-present)

PUBLICATIONS:

I have authored 8 peer-reviewed journal papers, 10 technical reports, and 32 scientific presentations. Below is a selected list of relevant publications.

Ackerman, JT, JY Takekawa, C Strong, **N Athearn**, and A Rex. 2006. California Gull distribution, abundance, and predation on waterbird eggs and chicks in South San Francisco Bay. Final Report, U. S. Geological Survey, Western Ecological Research Center, Davis and Vallejo, CA 61 pp.

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Takekawa, JY, DH Schoellhamer, AK Miles, GG Shellenbarger, **ND Athearn**, SE Spring, MK Saiki, and CA Jannusch. 2004. Initial biophysical changes after breaching a salt pond levee: final report on the Napa-Sonoma Wildlife Area Pond 3 breach. Unpubl. Progr. Rep., U. S. Geological Survey, Vallejo, CA. 42pp.

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Takekawa, JY, **ND Athearn**, BJ Hattenbach, and AK Schultz. 2006. Bird Monitoring for the South Bay Salt Pond Restoration Project. Unpubl. Final Prog. Rep., U. S. Geological Survey, Vallejo, CA. 74pp.

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