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: Cory Overton – UC Davis

Mailing Address: 1403 Tulane Dr

Davis, CA 95616

Principal Investigator: Cory Tyler Overton

Title: Ph.D. Candidate Institution: University of California, Davis & USGS

Telephone: 707-678-0682 x 683 Email address:coverton@usgs.gov

Grant Administrator: Cory Tyler Overton

Telephone: 707-678-0682 x683 Email address: coverton@usgs.gov

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PROJECT INFORMATION

RFP Study Topic # 9

Project Title California Clapper Rail Population Ecology in San Francisco Bay

Funding Request per year $ 15,000 Number of years: 2

Confirmed in-kind or matching contributions: $ 33,000/yr

Source of in-kind or matching contributions: USGS

Purpose and Objectives: Graduate support for research on California clapper rails to inform SBSPRP 2008 RFP Research Priorities 2, 4, and 6; to inform SBSPRP Objectives 1a, 3 and 5; to inform the SBSPRP Adaptive Management Plan; and to inform USFWS Species Recovery Plan. Objectives include developing models of population dynamics, habitat use models, improving survey methodology, and identifying limiting factors to population including impacts of disturbance and predation.

Proposed starting date: Sept 2009 Estimated completion date: June 2012

Signature : _____ Date: _____
Principal Investigator

Signature : _____ Date: _____
Grant Administrator

California Clapper Rail Ecology in San Francisco Bay

Abstract:

California clapper rails (*Rallus longirostris obsoletus*) is a federally and state listed endangered species endemic to San Francisco Bay and formerly central and northern California coastal salt marshes. California clapper rails are a species of management concern to the South Bay Salt Pond Restoration Project and expected to be a primary beneficiary of salt pond conversion to tidal marsh. Key uncertainties regarding rail habitat use, impact of disturbance, and population demography have been identified in planning documents for salt pond restoration. Beginning in the Fall 2009 quarter, I will begin a doctoral program at the University of California, Davis investigating clapper rail population ecology in San Francisco Bay under Professor Donald R. Strong. I will build on continuing U.S. Geological Survey-led studies using radio-marked clapper rails in South San Francisco Bay to inform adaptive management of the Salt Pond Restoration Project and species recovery targets in the revised Tidal Marsh Ecosystem Recovery Plan.

Background and Justification:

The California clapper rail (*Rallus longirostris obsoletus*) has undergone significant historic range contraction and population declines. Formerly abundant throughout San Francisco Bay and coastal estuaries from Tomales Bay to Elkhorn Slough, the species is now restricted mainly to isolated marsh fragments in the highly urbanized San Francisco Bay Area. Both State and Federally listed as endangered, the California clapper rail faces significant threats from a multitude of forces including habitat fragmentation and loss (Foin et al., 1997), environmental contamination (Schwarzbach et al., 2006), non-native predators (Harding et al., 2001) and invasive species (Baye, 2004).

Two major current impacts on rail habitat include salt pond restoration and invasive species (*Spartina*) eradication. However, our current understanding of rail habitat use and demographics is not sufficient to predict the effects or guide the implementation of these efforts. The adaptive management plan for the South Bay Salt Pond Restoration Project identifies key uncertainties regarding the current knowledge on California clapper rail habitat use, and the qualities of habitat benefiting rail survival and reproduction (SBSPRP 2007). Specific management triggers are outlined within the adaptive management plan for South Bay Salt Pond restoration activities, one of these triggers relates to estimated rail density falling below the threshold level of 0.2 birds per acre (SBSPRP 2007). The resultant management action may include studies addressing predation pressure on rails (SBSPRP 2007). Future species recovery goals will include metrics for population size, representation of available habitat, and population persistence (USFWS, unpublished). It is necessary to have a better understanding of population dynamics, including the impacts of human caused disturbance on rails and rail habitat if habitat restoration, social values, and conservation targets are to be met effectively (SBSPRP 2007). Significant gaps in understanding the population dynamics and habitat needs of California clapper rails can be addressed through proactive research aimed at future management needs. A current radio telemetry study in the South Bay is evaluating the impact of the Spartina control and generating baseline data to guide species and habitat management (USGS, unpublished data).

Two methods are currently used to index California clapper rail population size; call surveys (Albertson and Downard 2004) and winter high tide counts. Neither survey has been evaluated for efficacy or accuracy. Call counts in particular are used to index breeding population numbers, but require assumptions (e.g. concerning calling rate) that have never been validated and have a high likelihood of being incorrect (Conway et al., 1993). Many management options and conservation targets are contingent on the results from these surveys (SBSPRP 2007). Correct use of these indices requires an objective assessment of their relationship to population and habitat characteristics. We have initiated a preliminary assessment of survey techniques using current radio telemetry data.

A lack of quantitative information on current habitat conditions and demographics rates, and incomplete understanding of basic rail ecology hamper effective management of the California clapper rail. Hornaday

and Bloom (2006) highlight the challenges of multi-species conservation plans (Tidal Marsh Ecosystem Recovery Plan) faced with insufficient information regarding target species. The research program outlined in this proposal will fill important gaps in our understanding. This proposal will build on an existing radio telemetry study in the South Bay, evaluating the impact of the Spartina control (USGS, unpublished data), and generate baseline data to guide species and habitat management. This will enable more directed conservation efforts, and focus the goals and implementation of management plans toward the most efficient use of resources to achieve species recovery objectives outlined in the draft Tidal Marsh Ecosystem Recovery Plan and the Adaptive Management Plan for the South Bay Salt Pond Restoration Project.

Study Objectives:

Produce information on clapper rail population dynamics including: metapopulation dynamics, survival and recruitment estimates, limits to population growth, and impacts from disturbance in order to enhance management options.

Provide land managers with rail habitat requirements and guidance for salt marsh restoration and maintenance.

Provide managers with an assessment of current population survey techniques and potential refinement and/or analysis changes to increase certainty of estimates.

Contribute to establishing more precise and accurate population density estimates for San Francisco Bay regions (North, Central, South and Suisun Bay).

Identify and incorporate issues of local and regional concern into research scope of interest to address immediate, opportunistic, and emergency needs for information.

Study Areas:

Proposed work will include existing field sites located in South San Francisco Bay and future sites yet to be determined. Existing locations include 4 tidal salt marshes with varying habitats, elevations, and management history. These 4 marshes are: Laumeister Tract, Colma Creek Marsh, Arrowhead Marsh, and Cogswell Marsh (Figure 1). Habitat characteristics in these marshes provide a continuum of vegetation types, density of channelization, and frequency of inundation. Two marshes are relics of historic salt marsh habitat in San Francisco Bay. One marsh is a restored salt pond. The remaining marsh represents a marsh habitat almost completely converted to fill-in development, but reconstituted largely by non-native Spartina. Similarly, the matrix environment surrounding these marshes encompasses a variety of public and private uses, urban-industrial businesses to residential subdivisions.

Future site selections will incorporate factors not present in the current sites. Examples include but are not limited to: lower density rail populations, representation of other Bay-regions (San Pablo, Suisun Bays), recent restoration sites, and dominant vegetation or habitat characteristics underrepresented in current sites.

Approach:

Tasks:

- Conduct radio telemetry studies to investigate movement patterns and dispersal in multiple marshes representing North, Central, and South San Francisco Bay regions.

- Use radio-marked birds to estimate survival rates and identify predators.

- Use radio-marked birds and nest search techniques to investigate reproductive rates.

- Develop habitat use models from radio telemetry locations to assist in salt marsh restoration actions and species recovery goals.

- Use radio-marked bird locations to evaluate the efficacy of call count and winter high tide surveys and provide recommendations for survey analysis.

- Assess contamination levels of mercury in California clapper rails and potential impacts to survival and recruitment related to contaminant loads.

- Synthesize all above tasks to develop models of population dynamics and provide recommendations for species and habitat management and recovery efforts.

Procedures:

Telemetry – Species recovery efforts require the information available from detailed movement, demographic and dispersal rates. Radio telemetry is a valuable tool to identify animal movement patterns, habitat use, survival information, and as an aid in nesting and recruitment studies. California clapper rails fitted with backpack radios in January 2007 have provided abundant and previously unavailable information on dispersal potential (45 Km movement between South Bay and North Bay marshes). Results from the current telemetry effort will inform the removal efforts for invasive Spartina on potential impacts. We will gather additional radio telemetry information to identify and compare habitat use and movement patterns in marshes representing the North and Central Bay regions and Suisun Bay. This will compliment the current South Bay telemetry study and help inform salt marsh restoration efforts. We will use telemetry to provide data on survival rates through Known Fate models using Program MARK and to identify and monitor the fate of nests from radio marked birds. Additionally, we will assess the impact of human caused disturbance (e.g. hiking trails) on radio marked rails at the human-wildlife interface. We will also evaluate both pre-breeding season call count and winter high tide survey techniques using known locations of radio marked birds to assess the efficacy and reliability of these surveys. Current invasive spartina eradication efforts may warrant the potential translocation of effected rails and in the event this is necessary, radio marked individuals will be crucial to the evaluation of such a program. We will contrast the movements, territory establishment, and demographic rates of trans-located rails with that of the resident population.

Mark–Recapture – We will assess the efficacy of using mark-recapture studies to estimate population size and validate the breeding season call survey population estimates. Modified drop door traps allow for greater trapping efficiency in much of the available habitat for the California clapper rail than traditionally used trapping techniques (airboat capture, spotlights). Capture and recapture rates from winter trapping in the South Bay during 2007 appear to equal those of Light-footed clapper rails (Zembal and Massey, 1983) suggesting this method may be a valid option to obtain precise estimates of population size. Population estimates from mark recapture may be used in conjunction with radio telemetry information to evaluate and refine the analysis or implementation of call surveys.

Contaminants – Mercury contamination has been implicated as a potential component of the relatively low nesting success in California clapper rails (Schwarzbach et al., 2006). Mercury, especially methylmercury levels, strongly affect the hatchability of clapper rail eggs and was the only trace element consistently elevated in failed egg samples from San Francisco Bay (Schwarzbach et al., 2006). We will expand the current knowledge of mercury contamination in California clapper rails, and assess the level and implication of mercury load on recruitment rates. We will also investigate isotope signatures and contaminant load in California clapper rail prey items. Prey species communities often change along predictable habitat gradients within the San Francisco Bay salt marshes (Neira et al., 2005; Levin et al., 2006). It may be possible for us to develop risk analysis for mercury contamination in rails based on prey availability and habitat types.

Data archiving procedures:

Locational data on clapper rails and information on habitat characteristics will be maintained in a Microsoft Access database at the U.S. Geological Survey field station in Dixon, California. Spatial data will be located in GIS electronic format (shapefiles, geodatabases). All data, analyses, and reports will be stored electronically, backed up, and maintained according to USGS protocol. Data will be made available to the SBSP Restoration Project for use on website and project database.

Work Schedule:

		Fieldwork						Academic Milestones			Analysis				Synthesis
Season	**Year**	Capture	Telemetry	Nesting/ Recuitment	Eval.Survey Methods	Habitat Char.		Qualifying Exams	Dissertation Defense		Movement/ Habitat Use	Contaminants	Survival		
Fall	2009	X													
Winter	2010	X	X		X	X		X							
Spring	2010		X	X	X			X				X			
Summer	2010		X			X									
Fall	2010	X	X								X		X		
Winter	2011	X	X		X	X									
Spring	2011		X	X	X							X			
Summer	2011		X			X									
Fall	2011		X								X		X		
Winter	2012		X		X	X									
Spring	2012								X		X	X	X		
Summer	2012														X

Expected Products:

- Progress Report: June 2010 (This will detail findings from all major tasks outlined in the study proposal and relevant to draft "Tidal Marsh Ecosystem Recovery Plan". This will include current year expenditures and future projections of expenses.)

- Website with project description and recent findings (hosted by USGS) – December 2009.

- Final Report June 2011. Summarizing accomplishments to date. This will contain a financial statement comparing funds received to expenditures.

- Presentation of findings at SBSP Restoration Project Symposia, workshops, and conservation meetings relevant to the ecology and health of the San Francisco Bay Estuary. (Copies will be provided to the SBSP Restoration Project)

- Minimum of 2 Peer Reviewed Publications

- Graduate Dissertation

Literature cited:

Albertson, J.D. and Downard, G., 2004. Draft clapper rail protocol for the San Francisco Estuary large-scale population surveys. US Fish and Wildlife Service, Don Edwards National Wildlife Refuge, Fremont, CA.

Baye, P.R., 2004. A review and assessment of potential long-term ecological consequences of the introduced cordgrass Spartina alterniflora in the San Francisco Estuary: San Francisco Estuary Invasive Spartina Project.

Conway, C.J., Eddleman, W.R., Anderson, S.H., and Hanebury, L.R., 1993. Seasonal-Changes in Yuma Clapper Rail Vocalization Rate and Habitat Use: Journal of Wildlife Management, v. 57, no. 2, p. 282-290.

Foin, T.C., Garcia, E.J., Gill, R.E., Culberson, S.D., and Collins, J.N., 1997. Recovery strategies for the California clapper rail (Rallus longirostris obsoletus) in the heavily-urbanized San Francisco estuarine ecosystem: Landscape and Urban Planning, v. 38, no. 3-4, p. 229-243.

Harding, E.K., Doak, D.F., and Albertson, J.D., 2001. Evaluating the effectiveness of predator control: the non-native red fox as a case study: Conservation Biology, v. 15, no. 4, p. 1114-1122.

Hornaday, K., and Bloom, V., 2006. Multispecies Recovery Planning: Benefits and Challenges.: Endangered Species Update, v. 23, no. 2, p. 10-11.

Levin, L.A., Neira, C., and Grosholz, E.D., 2006. Invasive cordgrass modifies wetland trophic function: Ecology, v. 87, no. 2, p. 419-432.

Neira, C., Levin, L.A., and Grosholz, E.D., 2005. Benthic macrofaunal communities of three sites in San Francisco Bay invaded by hybrid Spartina, with comparison to uninvaded habitats: Marine Ecology-Progress Series, v. 292, p. 111-126.

Schwarzbach, S.E., Albertson, J.D., and Thomas, C.M., 2006. Effects of predation, flooding, and contamination on reproductive success of California Clapper Rails (Rallus longirostris obsoletus) in San Francisco Bay: Auk, v. 123, no. 1, p. 45-60.

South Bay Salt Pond Restoration Project (SBSPRP), 2007. Final Environmental Impact Statement/Report. Volume 1. Prepared by: EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, Geomatrix. Submitted to U.S. fish and Wildlife Service, California Department of Fish and Game.

Zembal, R., and Massey, B.W., 1983. To Catch A Clapper Rail - Twice.: North American Bird Bander, v. 8, no. 4, p. 144-148.

Cory T. Overton, USGS Western Ecological Research Center, Wildlife Biologist. University of California, Davis, Ph.D. Candidate

Position: Ph.D. Candidate

Responsibilities: Coursework, Field Data Collection, Data Analysis, Manuscript Preparation.

Qualifications:

Experience:

2004 − present. Wildlife Biologist, USGS, Western Ecological Research Center, Dixon Field Station, Dixon, CA Duties: Telemetry and habitat analysis on California clapper rails, greater sage grouse, satellite telemetry on band−tailed pigeons.

2003 − 2004. Wildlife Science Contractor, Johnson Controls Inc., Cape Canaveral, FL. Telemetry on greater sage grouse.

1999 – 2003. Biological Science Technician, USGS, Western Ecological Research Center, Dixon Field Station, Dixon, CA. Telemetry on waterfowl and band−tailed pigeons. Habitat analysis of band−tailed pigeons. Development of a population survey technique for Pacific Coast band−tailed pigeons.

Education:

B.Sc. 1998 Colorado State University, Ft. Collins, CO – Wildlife Biology

M.Sc. 2004 Oregon State University, Corvallis, OR – major; Wildlife Science, minor; Statistics

Publications:

Cassazza, M. L., C. T. Overton, J. Y. Takekawa, T. Rohmer, and K. Navarre. 2008. Breeding behavior and dispersal of radio-marked California clapper rails. Western Birds 39:101-106.

Overton, C. T., M. L. Casazza, and R. A. Schmitz. 2006. Linking landscape characteristics to mineral site use by band−tailed pigeons in western Oregon, USA: Coarse−filter conservation with fine−filter tuning. Natural Areas Journal 26:38−46.

Casazza, M. L., J. L. Yee, M. R. Miller, D. L. Orthmeyer, D. R. Yparraguirre, R. L. Jarvis, and C. T. Overton. 2005. Evaluation of current population indices for band−tailed pigeons. Wildlife Society Bulletin 33:606−615.

Overton, C. T., R. A. Schmitz, and M. L. Casazza. 2005. Post−precipitation bias in band−tailed pigeon surveys conducted at mineral sites. Wildlife Society Bulletin 33:1047−1054.

Overton, C. T. 2003. Habitat characteristics associated with abundance of band−tailed pigeons and use of mineral sites in the Pacific Northwest. Thesis, Oregon State University, Corvallis, OR. 82pp.

Narrative:

Mr. Overton has been a wildlife biologist with the USGS since 1998. His research focus includes population parameter estimation, development of abundance survey methods, and analysis of space-use and movements. He has extensive experience using radiotelemetry techniques. Technical specialties employed during research activities include use of geographic information systems and analysis using information theory, multivariate, point process, and linear and logistic regression statistical methods. His studies include ecology of California clapper rails, ecology of sage grouse, population

survey development, spatial analysis, and habitat use analysis for Pacific Coast band-tailed pigeons, and winter ecology of waterfowl.

Michael L. Casazza, USGS Western Ecological Research Center, Senior Wildlife Biologist.

Position: Co−PI

Responsibilities: Project Design and Development, Field Supervision, Manuscript and Report Preparation

Qualifications:

Experience:

1993 - present. Wildlife Biologist, National Biological Survey/USGS, Western Ecological Research Center, Dixon Field Station, Dixon, CA

1989 - 1993. Wildlife Biologist, U.S. Fish & Wildlife Service, Division of Wildlife Research, Northern Prairie Wildlife Research Center, Dixon Field Station, Dixon, CA

Education:

M.Sc. 1995 Recreation Administration, California State University, Sacramento, CA.

B.Sc.1988 Wildlife Biology, University of California, Davis

Selected Publications:

Haukos, D.A., M.R. Miller, D.L. Orthmeyer, J.Y. Takekawa, J.P. Fleskes, M.L. Casazza, W.M. Perry, and J.A. Moon. 2006. Spring Migration of Northern Pintails from Texas and New Mexico, USA. Waterbirds 29:127-136.

Miller, M. R., J. Y. Takekawa, J. P. Fleskes, D. L. Orthmeyer, M. L. Casazza, D. A. Haukos, and W. M. Perry. 2005. Flight speeds of northern pintails during migration determined by satellite telemetry. Wilson Bulletin 117(4): 364-374.

Wylie, G.D., M.L. Casazza, and M. Carpenter. 2003. Diet of bullfrogs in relation to predation on giant garter snakes at Colusa National Wildlife Refuge. California Fish and Game 89(3): 139-145.

Miller, M. R., J. P. Fleskes, J. Y. Takekawa, D. L. Orthmeyer, M. L. Casazza, and W. M. Perry. 2001. Satellite tracking of northern pintail spring migration from California, USA: the route to Chukotka, Russia. Casarca 7: 229-233.

Casazza, M. L., G. D. Wylie, and C. J. Gregory. 2000. A funnel trap modification for surface collection of aquatic amphibians and reptiles. Herpetological Review 31(2), 91-92.

Casazza, M. L. and M. R. Miller. 2000. The Northern Pintail. In: Goals Project 2000. Baylands Ecosystem Species and Community Profiles: Life histories and environmental requirements of key plants, fish, and wildlife. Prepared by the San Francisco Bay Area Wetland Ecosystem Goals Project. P.R. Olofson, editor. San Francisco Bay Regional Water Quality Control Board, Oakland, Calif.

Narrative:

Mr. Casazza has been a wildlife biologist with the Dixon Field Station of the Western Ecological Research Center for over 10 years. He has a diversified research background, conducting studies on a variety of species in varying landscapes. He has had extensive experience using radio telemetry techniques to address research questions on

multiple species, with an emphasis in habitat utilization and movement/migration studies. He has participated in many ecological studies within the San Francisco Bay Estuary including the San Francisco Bay Area Wetlands Ecosystem Goals Project, authoring a "Species Profile" on northern pintail. His research interests in the Bay region continue to focus on wetland habitats with a special emphasis on threatened and endangered species. He has served as a research team leader on multi-agency projects studying waterfowl, greater sage-grouse and band-tailed pigeons. Much of his research has been oriented towards species management, with one example being the development of the methodology for a population index for Pacific Coast band-tailed pigeons recently adopted by the Pacific Flyway.

Dr. John Y. Takekawa, USGS Western Ecological Research Center, Research Wildlife Biologist.

Position: Co−PI

Responsibilities: Project Design and Development, Field Supervision, Manuscript and Report Preparation

Qualifications:

Experience: federal research biologist in California for 20 years; research specialty ecology of migratory waterbirds with technical specialty in application of radio telemetry; studies focused on the Pacific Rim, California, and San Francisco Bay; established the San Francisco Bay Estuary Field Station of the U. S. Geological Survey located on San Pablo Bay in 1995.

Education:

PhD 1987, Iowa State University, Ames, Iowa; Animal Ecology/Statistics minor,
MS 1982, University of Idaho, Moscow, Idaho; Wildlife Resources,
BS 1979, University of Washington, Seattle, Washington; Wildlife Science/Forestry.

Selected Publications:

Takekawa J. Y., Woo I., Spautz H., Nur N., Grenier J. L., Malamud−Roam K., Nordby J.C.,Cohen A. N., Malamud−Roam F., Wainwright−De La Cruz S.E. In press. Environmental threats to tidal marsh vertebrates of the San Francisco Bay estuary. In Greenberg R. G., Maldonado J. E.,Droege, S., McDonald M.V., eds. Terrestrial Vertebrates of Tidal Marshes: Ecology, Evolution, and Conservation. Studies in Avian Biology.

Miller, M. R., J. Y. Takekawa, J. P. Fleskes, D. L. Orthmeyer, M. L. Casazza, and W. M. Perry. 2005. Spring migration of northern pintails from California's Central Valley wintering area tracked by satellite telemetry: routes, timing, and destinations. Canadian Journal of Zoology 83(10): 1314−1332.

Takekawa, J. Y., N. Warnock, G. M. Martinelli, A. K. Miles, and D. C. Tsao. 2002. Waterbird use of bayland wetlands in the San Francisco Bay estuary: movements of long−billed dowitchers during the winter. Waterbirds 25: 93−105.

Warnock, S. E., and J. Y. Takekawa. 1996. Wintering site fidelity and movement patterns of western sandpipers Calidris mauri in the San Francisco Bay estuary. Ibis 138:160−167.

Narrative:

Dr. Takekawa has been a federal research biologist in California for 20 years. His research specialty is the ecology of migratory waterbirds, with a technical specialty in application of radio telemetry for which he is recognized as an international expert. His studies have focused on the Pacific Rim, California, and San Francisco Bay. He established the San Francisco Bay Estuary Field Station of the USGS located on San Pablo Bay in 1995.

Dr. Donald R. Strong, Department of Evolution and Ecology, University of California-Davis.

Position: Co−PI; Academic Advisor

Responsibilities: Project Design and Development, Oversight of Graduate Student, Analysis and Manuscript Preparation.

Qualifications:

a. Professional Preparation

B.S. University of California, Santa Barbara, 1966, BS Zoology, with Honors
M.S. Biology, University of California, Irvine, Biology, 1968.
Ph.D. Biology, University of Oregon, Ecology and Limnology, 1972.
Postdoctoral: University of Chicago, Ford Foundation, 1972−1973.

b. Appointments

Professor, Section of Evolution and Ecology &Bodega Marine Laboratory, University of California, Davis, 1991−present.
Assistant Professor (1973), Associate (1977), then Professor (1983−1991), Florida State University, Tallahassee, Florida, Department of Biological Science.
Visiting Professor. Swedish University of Agriculture, Uppsala,1989 &1990.

c. Publications

Strong, D. R. and D. A. Ayres. in press. Spartina Introductions and Consequences in Salt Marshes: Arrive, Survive, Thrive, and sometimes Hybridize. in Silliman, B. R. and Grosholz, T., Eds. Anthropogenic Modification of North American Salt Marshes. University of California Press.

Christina M. Sloop, Heather G. McGray, Michael J. Blum, and Donald R. Strong. in press Characterization of 24 additional microsatellite loci in Spartina species (Poaceae). Conservation Genetics 6:1049−1052.

Ayres DR, Zaremba K, and DR Strong. 2004. Extinction of a Common Native Species by Hybridization with an Invasive Congener. Weed Technology 18:288−1291.

Davis, H.G, Taylor, C. M, Lambrinos, J. G. and Strong, D. R. 2004. Pollen Limitation Causes an Allee effect in a Wind−pollinated Invasive Grass (Spartina alterniflora). PNAS 2004 101: 13804−13807.

Strong, D. R. Evolving Weeds and Biological Control. 2004. Keynote Paper in: Proceedings of the XI International Symposium on Biological Control of Weeds (eds Cullen, J.M., Briese, D.T., Kriticos, D.J., Lonsdale, W.M., Morin, L. and Scott, J.K.) pp. 27. CSIRO Entomology, Canberra, Australia.

Narrative:

Dr. Strong is an internationally recognized expert on Spartina invasion with considerable experience investigating worldwide and local invasions. He has investigated Spartina

hybridization, population dynamics and ecological impacts of invasion in salt marshes. In addition to Spartina and general salt marsh ecology, his research includes trophic ecology and biological control. He is the current Editor-in-Chief of *Ecology* and *Ecological Monographs*.

South Bay Salt Pond Restoration Project
Selected Monitoring and Applied Studies

Project Budget Worksheet*

Timeframe: September 2009 - August 2011**

Budget Categories	Total Project Budget		Total Grant Request		Total Proposed From Other Sources *(please specify the source, if known)*
	Year 1	Year 2	Year 1	Year 2	
Labor					
Consultant fees/ Contractual Services					
Travel					
Project specific equipment, supplies/materials			3000	2000	
Overhead (not to exceed 10%)					
Other: ***Graduate Fellowship, tuition and fees***			12000	13000	
TOTAL			15,000	15,000	

Date Created: 12/2/2008

* This form is meant to assist you in developing a proposed grant budget, summarizing the use of all grant funds on a single page. Should you need to add line-items—or additional work sheets to delineate budgets for multiple projects within the proposal—please do so. A detailed budget will be required if approved for funding.

** Please indicate the timeframe which this budget covers (for example: May 2009 - April 2010)

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

List of potential reviewers:

Joy Albertson
U.S. Fish and Wildlife Service
Don Edwards San Francisco Bay National Wildlife Refuge
9500 Thornton Ave
Newark, CA 94560

Mark Ricca
U.S. Geological Survey
Davis Field Station
1 Shields Avenue, UC Davis
Davis, California 95616-5224

Tobias Rohmer
University of California, Davis
2109 Espana Ct.
Davis, California 95616

Assessments, certifications, and permits:

All fieldwork will be coordinated with on-going U.S. Geological Survey studies. All employees, technicians, and volunteers must obtain appropriate USGS mandated safety training and/or certification prior to conducting field work. Permits for existing studies include:

Federal:

- Federal Fish and Wildlife Threatened and Endangered Species Permit #TE020548-9 authorizing capture and marking of California clapper rails
- Master-Station Federal Bird Marking and Salvage Permit Number 21142 including authorization for T&E species (clapper rail) banding and auxiliary marking
- Refuge Special Use Permit #11640-2007-005 authorizing studies on Don Edwards San Francisco Bay National Wildlife Refuge

State:

- Memorandum on Understanding amendment dated August 18, 2006 authorizing capture and marking of California clapper rails
- Scientific Collecting Permit SC-008090 with attachment authorizing capture and marking of California Clapper Rails

Animal care and use certification:

Fieldwork will be conducted using wild California clapper rails. Approved ACUC protocols are used in on-going USGS studies for which authorization from the ACUC committee has been obtained. Clapper rails will be captured, weighed, measured, banded, blood drawn, attached with either a 3 gram band-mounted, or 10 gram backpack mounted radio-transmitter, and released. Not to be handled again. Feathers and blood (contaminant and stable isotope analyses), and diet samples (regurgitation stimulated by tartar emetic) will be collected. Birds will be kept in a dark box for 20 minutes to collect diet samples and allow birds to recover, and released at the capture site. Birds will be handled and processed as quickly as possible to reduce stress.

CORY T. OVERTON

Wildlife Biologist
U.S. Geological Survey (USGS)
Western Ecological Research Center – Dixon Field Station
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Dixon, CA 95620
coverton@usgs.gov; 707-678-0682 x683

EDUCATION

2003 **M.S., Wildlife Science, Oregon State University, Corvallis, OR GPA 3.7**
1998 **B.S., Wildlife Biology, Colorado State University, Fort Collins, CO GPA 2.8**

EMPLOYMENT HISTORY

2004 - present. **Wildlife Biologist**, USGS, Western Ecological Research Center, Dixon Field Station, Dixon, CA
2003 - 2004. **Wildlife Science Contractor**, Johnson Controls Inc., Cape Canaveral, FL
1999 – 2003. **Biological Science Technician**, USGS, Western Ecological Research Center, Dixon Field Station, Dixon, CA
1998 - 1999. **Biological Science Technician**, USGS, Mid-continent Ecological Science Center, Fort Collins, CO

MAJOR RESEARCH INTERESTS

Ecology of rails, pigeons, grouse, and waterfowl; population dynamics, spatial aspects of habitat use; avian survey methodology; habitat management and effects of anthropogenic changes on habitat use.

SELECT PUBLICATIONS

Casazza, M. L., **C. T. Overton**, M. Farinha, J. Y. Takekawa, and T. Rohmer. In Press. Clapper rail ecology and multispecies recovery planning. Endangered Species Bulletin.

Casazza,M. L., **C. T. Overton**, J. Y. Takekawa, T. Rohmer, and K. Navarre. 2008. Breeding behavior and dispersal of radio-marked California Clapper Rails. Western Birds. 39:101-106.

Overton, C. T., R. A. Schmitz, and M. L. Casazza. 2006. Linking landscape characteristics to mineral site use by band-tailed pigeons in Western Oregon: Coarse-filter conservation with fine-filter tuning. Natural Areas Journal. 26(1): 38-46

Overton, C. T., R. A. Schmitz, and M. L. Casazza. 2005. Post-precipitation bias in band-tailed pigeon surveys conducted at mineral sites. Wildlife Society Bulletin. 33(3):1047-1054.

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SELECTED PRESENTATIONS

Overton, C. T., M. Casazza, J. Takekawa, and T. Rohmer. 2008. Tidal Influence on Home Range of an Endangered Salt Marsh Bird: The California clapper rail. The Wildlife Society,

Miami, FL. Western Field Ornithologists, San Mateo, CA.

Overton, C. T., R. A. Schmitz, and M. L. Casazza. 2003. Habitat characteristics associated with abundance of band-tailed pigeons and use of mineral sites in the Pacific Northwest. Student oral presentation. The Wildlife Society Conference, Burlington, VT.

Overton, C. T. 2003. Characteristics of mineral sites that affect band-tailed pigeon surveys. Student oral presentation. Joint annual meeting of the Northwest Section and the Oregon Chapter of The Wildlife Society, Eugene, OR.

Casazza, M. L., **C. T. Overton**, J. L. Yee, D. L. Orthmeyer, and M. R. Miller. 2002. Habitat use of band-tailed pigeons in northern California. Poster presentation. The Wildlife Society Conference, Reno, NV.

Casazza, M. L., J. L. Yee, D. L. Orthmeyer, M. R. Miller, **C. T. Overton**, and R. Schmitz. 2002. Development of a reliable population index for Pacific Coast band-tailed pigeons. Poster presentation. Pacific Flyway Symposium, Newport, OR,

Casazza, M. L., J. L. Yee, M. R. Miller, **C. T. Overton**, and R. A. Schmitz. 2002. Development of a reliable population index of band-tailed pigeons. Oral presentation. NA…….

PROFESSIONAL SOCIETIES

The Wildlife Society, 1996 – 1998, Colorado State University Student Chapter.
The Wildlife Society, 2000 – 2002, National Chapter, Western Chapter
The Natural Areas Association, 2004-2005

WORKSHOPS AND TRAINING

Information Theory, USGS WERC Short Course, Sacramento, CA January 2006
Analysis of Home Range and Resource Selection, The Wildlife Society Annual Conference, Anchorage, AK September 2006
Spatial Statistics, USGS WERC Short Course, Sacramento, CA January 2007
Developing skill with Structural Equation Modeling, USGS WERC Short Course, Sacramento, CA January 2008
Using Sensitivity Analysis of Population Viability Models to Guide Management Decisions, The Wildlife Society Annual Conference, Miami, FL November 2008


37
780
5
160
4
242
580
24
13
360
80
101
Arrowhead Marsh
205
280
238
South San Francisco
Cogswell Marsh
Colma Marsh
84
680
92
Laumeister Marsh
237
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Data U.S. Navy
30 km
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Google
10 S 584761.87 m E 4187257.23 m N
elev 305 m
Eye alt 103.06 km