Project Information

2005 Proposal Number: 0055

Proposal Title: **Creating Conservation Partnerships, Research, and Incentives to Benefit Farmers and Ecosystem Restoration in the Sacramento Valley**

Applicant Organization Name: **The CSU, Chico Research Foundation**

Total Amount Requested: $**5,457,960**

ERP Region: Sacramento Region

Short Description

This projuect proposes research, monitoring, implementation, and regulatory compliance in order to provide up−to−date information on what conservation and agricultural practices are benefiting MSCS−covered species.

Executive Summary

Creating Conservation Partnerships, Research, and Incentives To Benefit Farmers and Ecosystem Restoration in the Sacramento Valley

Executive Summary The Butte and Colusa Basins and the Sacramento River are home to some of the richest agricultural land in the world and one of the richest and most diverse habitat areas in California. However, prolonged use of natural resources by agriculture, urban areas, and large scale infrastructure has altered the biological, chemical, and physical components of the ecosystem. In response to habitat reduction and water, soil, and air pollution the government has enacted regulations. This has led to a fear of environmental laws by farmers who live and work in environmentally sensitive areas. If farmers implement practices that are not environmentally friendly, it may attract the attention of regulatory agencies. Increased government regulations create a large disincentive to

implement projects that help endangered species. Farmer disincentive leads to non−participation in research, data collection and recovery. If the farmer does decide to participate in a project, they must apply for a permit which may increase regulatory requirements and restrictions on agricultural operations. This project is the first step in creating incentives for farmers to participate in research to determine what agricultural and conservation practices help preserve the environment and Multiple Species Conservation Strategy (MSCS). This project is designed to provide alternative practices and regulatory tools to farmers to help avoid disincentives. CSUC research that benefits agricultural operations and MSCS−covered species will directly contribute to CALFED and local community goals by 1) Evaluating current farming practices and research how they are benefiting MSCS−covered species and water quality 2) Research new agricultural and conservation practices that benefit MSCS−covered species and reduce water quality impacts 3) Reduce disincentives to farmers by creating a coordinated permitting process and Safe Harbor Agreements for species known to benefit from implementing beneficial agricultural and conservation practices 4) Match CALFED funding with federal programs and Agricultural Research Initiative funds to implement agricultural and conservation practices identified by researchers 5) Provide outreach and education to farmers within the project area, conduct professional conferences and submit publications 6) Provide an adaptive management and cooperative model for future projects that benefit agriculture and the environment and 6) Provide economic analysis on the cost and benefit of implementing environmentally sound practices. The College of Agriculture, CSU, Chico will coordinate and partner with the Butte, Colusa and Glenn County Resource Conservation Districts, River Partners, Sustainable Conservation, and Point Reyes Bird Observatory to research, document current farming practices that benefit the ecosystem, create regulatory incentives for farmers to implement conservation and agricultural practices that benefit MSCS−covered species. Project participants have committed to a high level of cooperation to create solutions, alternatives, and incentives to meet this challenge.

Agricultural And Conservation Activities That Benefit Farmers And Ecosystem In The Sacramento Valley

College of Agriculture Research Proposal

Creating Conservation Partnerships, Research, and Incentives to Benefit Farmers and Ecosystem Restoration in the Sacramento Valley

Introduction

This project is a collaborative effort between three Resource Conservation Districts, three conservation non-governmental organizations, and three academic colleges. This consortium will provide farmers in the Colusa and Butte Basins and along the Sacramento River technical, regulatory, and financial assistance in implementing conservation and agricultural practices. The benefits include protecting and restoring habitat and native biotic communities of threatened and endangered species known to inhabit farmland.

The project will address the following priorities with projects that: Contribute to understanding the relative effectiveness of different conservation-based farming practices and systems and their contribution to larger restoration efforts; develop and implement agricultural activities that benefit MSCS-covered species; provide pilot scale implementation and research that conserve giant garter snake; and facilitate permitting and regulatory assurances that support agricultural activities benefiting MSCS-covered species.

This project's three components are: (1) research and monitoring, (2) implementation, and (3) regulatory compliance. CSU, Chico (CSUC) will provide up-to-date information on what conservation and agricultural practices are benefiting MSCS-covered species on farmland. Resource Conservation Districts and River Partners will use information gathered by CSUC to guide planning and regulatory compliance for implementation projects. CSUC will then monitor implementation projects to determine the actual costs/benefits of implementing these practices.

The information from literature reviews, research, and monitoring compiled by CSUC will help guide RCDs and River Partners in planning, meeting regulatory compliance, and implementing projects that benefit MSCS-covered species. Resource Conservation District (RCDs) directors and staff put a high value on their ability to work with the local landowners by gaining their trust and keeping that trust as a top priority. RCDs continually strive to obtain landowner input to keep the District's projects and USDA Farm Bill programs focused on local conservation priorities.

River Partners is a leader in ecosystem restoration in the Sacramento Valley and has worked closely with RCDs and local landowners to help restore the physical and biological components of river ecosystems. Sustainable Conservation is a leader in Safe Harbor and Coordinated Permit projects in California. Sustainable Conservation will work with all partners to support the development of a coordinated permit for conservation practices and safe harbor agreements. PRBO is a leader in surveying bird species in California. PRBO has been working in the Central Valley providing monitoring and analysis for bird species on private land for many years. PRBO will continue to provide this service to this project.

A. Project Description

1. PROBLEM

Farmers face significant challenges to efficient use of available resources to earn profit in a highly competitive marketplace. They are also increasingly encouraged to maintain a working landscape that supports habitat for diverse species of plants and animals. In addition, California is among the top 20 states in terms of its rate of prime farmland loss. Most of California's high quality farmland areas are also in areas with high rates of development (American Farmland Trust, 2005).

With 288 listed threatened or endangered species, California trails only Hawaii's list of 312. As urbanization occurs, it is recognized that valuable habitat functions may be lost along with the disappearing agriculture land (Robinson et al., 2001). It has been found that the extent of the habitat functions provided by agriculture can vary considerably with the cultural practices and the kind of crops grown (Atkinson, 2004; Benton et al., 2003; Moorcroft et al., 2002) as well as chemical use (Saiki et al., 1993). However, it has been suggested that the management of farmland can provide opportunities to enhance bird species (Wilson et al., 2005) as well as other threatened or endangered species.

A lack of knowledge inhibits opportunities for production decisions that could support targeted species populations. In rice production areas, most giant garter snakes have been reported in the irrigation canals, not in the rice fields. In the case of the giant garter snake, populations have declined with the spread of rice production, and little is known about management practices that might stem this trend. Wylie et al. (2000) suggest that minimal canal maintenance may be the most effective approach to supporting habitat.

Farmers are frequently cautious about entering into monitoring or conservation agreements that could impinge on their production decisions and inhibit economically expedient management. Given the array of diverse management and environmental conditions in the area, identification and validation of current management practices that support habitat functions for endangered species are greatly needed.

Research Needs

Approximately 90% of the Central Valley's historic wetlands have been lost (Frayer et al. 1989, Kempka et al. 1991). Despite extensive habitat loss and degradation, the managed wetlands, agricultural fields, and evaporation ponds that replace the natural habitat support an abundance of bird populations. Wetland habitats of California's Central Valley support a large diversity of aquatic and terrestrial wildlife (Knopf et al. 1988). The Central Valley is recognized internationally as one of the most important wintering areas for waterfowl in North America (USFWS and CWS 1986). For numerous non-waterfowl species it is similarly important yet less well recognized. In winter and spring, the Central Valley supports more shorebirds than any other inland site, and in winter is one of only two inland sites that supports tens of thousands of shorebirds (Shuford et al. 1998). Likewise, valley riparian forests are known to support a diverse and concentrated population of neotropical song birds (Gaines 1977).

Birds—In California, riparian areas have been identified as the single most important habitat for the protection and conservation of songbirds (Manly and Davidson 1993, Davidson 1995), yet they have declined dramatically over the past 150 years (RHJV 2004). While no estimates exist for the total historical extent of riparian habitat in California, there were at least 60,000 miles of streams in the state that were capable of supporting this type of vegetation (Warner and Hendrix 1984). Current estimates of remaining riparian habitat in the state range from 2% to 7% for the Central Valley (Katibah 1984, Dawdy 1989). The loss of riparian habitats may be the most important cause of population decline among landbird species in western North America (DeSante and George 1994).

Salmon—The floodplains, sloughs and seasonal tributaries of large rivers are known to be important in the life history of both fish and aquatic invertebrates (Junk et al. 1989, Bayley 1995, Benke et al. 2000, Benke 2001, Sommer et al. 2001a, b., Limm & Marchetti 2005. Salmon play a key role in riverine systems as they are top predators and provide a vital input of marine derived nutrients to the system when they expire. Previous work has suggested that the juvenile stage of

the salmonid lifecycle is an appropriate arena for management actions (Sommer et al. 2001a, Limm and Marchetti 2005).

The Giant Garter Snake and Western Pond Turtle. The giant garter snake (GGS), a federal threatened species, once ranged throughout the wetlands of California's Central Valley from Kern County north to the vicinity of Chico. The species appears to have been extirpated from most of the San Joaquin Valley and is identified as a key MSCS species in the Sacramento Valley. GGS has been documented in small numbers throughout the Colusa, Butte and Sutter Basins. This aquatic species requires wetlands for foraging, upland areas for basking, upland burrows as summer shelter, and higher elevation uplands for winter hibernacula. GGS are active April-September and seek winter refuge in October. The USFWS recognizes 13 GGS populations, including populations in the Butte, Colusa and Sutter Basins. The USGS is active in GGS research in the Colusa NWR, but little is known about GGS populations and habitats in the surrounding agricultural lands.

The Western Pond Turtle, (WPT) is California's only native aquatic turtle, and is state and federally listed as a species of special concern. The WPT spends most of its life in wetland habitats but also requires terrestrial habitats for nesting (Holland 1991). The limited data available for Central Valley populations indicate favorable demographic characteristics such as fast growth rates (Germano & Bury, 2001) and large adult size (high fecundity) (Lubke, unpub.; Kelly, unpub.), however these populations appear to have low recruitment indicating senescent populations (Spinks et al., 2003). Implementation of beneficial ag practices could transform Central Valley WPT populations from senescent and declining to vibrant and healthy.

Valley Elderberry Longhorn Beetle—There is ample evidence that anthropogenic changes and land management practices have affected the historical abundance of the valley elderberry longhorn beetle (*Desmocerus californicus* dimorphus) (VELB). VELB populations (Collinge et al., 2001; Lang et al., 1989). Of the 10 MSCS-covered species listed in the PSP, the VELB is the only invertebrate and the only species entirely dependent on a single food source, Elderberry (*Sambucus* spp.). The fullest possible knowledge of the life cycle and factors affecting population levels in VELB is critical for proper management strategies assuring its recovery. Like other members of the Longhorn Beetle family, VELB completes its life cycle by boring into the host plant during the larval stage. After 1-2 years as larvae, the beetles undergo pupation. Adults emerge via distinct exit holes in spring and consume elderberry foliage until about June, when they mate. Eggs are laid in crevices in the bark. After hatching, larvae tunnel into the pith or heartwood of the elderberry tree (Barr, 1991).

Extensive replanting of Elderberry in restoration areas has not immediately resulted in recovery of VELB, suggesting that the mere presence of the host plant is insufficient for viable VELB populations (Collinge et al., 2001). Ecosystem and agricultural management practices doubtless affect the viability of VELB populations. Additional information on its population ecology will be useful for integrating agricultural activities with VELB as part of a successful ecosystem restoration plan.

Populations of VELB appear most viable in large patches of elderberry, and the beetles complete development most often in healthy plants with stems above a minimum diameter (Collinge et al., 2001). However, our knowledge of the range of factors influencing choice of host plant by females and the likelihood of brood success is far from clear. It is very likely nutrient quality, as well as quantity, plays a critical role in limiting growth and reproduction in the VELB, as it does in other stem-boring longhorn beetles and in many herbivorous insects in general (Dixon, 1970; Haack and Slansky, 1987). Such food sources as heartwood have an

especially low nitrogen content (Slansky and Scriber, 1985); accordingly, many species of wood-boring longhorn beetle (such as VELB) may require more than one growing season to complete development (Powell and Hogue, 1979). Stressed elderberry plants may be more attractive to adult VELB than unstressed plants (Barr, 1991) although it is not clear whether in this case host plant quality or defense plays the more important role in mediating colonization by VELB.

Although adult VELB are aposematically colored and presumably gain protection from predators by possessing elderberry-derived cyanogenic glucosides (USFWS, 1984), juvenile mortality of VELB may be an important factor in its decline. A potentially significant source of juvenile mortality is the invasive Argentine ant, *Linepithema humile*, a known egg predator on a eucalyptus-feeding longhorn beetle related to VELB (Way et al., 1992). The range of the Argentine ant is spreading in riparian habitats in California, posing a risk to the VELB. Huxel (2000) demonstrated a negative association between Argentine ants and VELB but a positive association between native ants and VELB. Thus, invasive species, as well as habitat modifications, are likely implicated in the decline of VELB.

Implementation problems

The problem that faces farmers and those promoting agricultural and conservation practices that benefit the environment is the lack of incentive to implement costly practices. Many of the programs that help farmers provide from 75% to 50% cost share. Farmers, unless there is a direct benefit to them (such as hunting or aethetics) or addresses an on-going cost, the farmer does not see the benefit of providing ¼ to ½ of the cost to implement practices that benefit a public good. This project will look at matching Ecosystem Restoration Program (ERP) funding with USDA Farm Bill program (and others if they apply) to provide for the implementation of wildlife friendly conservation practices on selected sites. Farm Bill Programs administered by the Natural Resources Conservation Service such as the Environmental Quality Incentive Program (EQIP; 50% cost share) and the Wildlife Habitat Incentive Program (WHIP; 75% cost-share) will be utilized along with the Landowner's in-kind contribution when applicable. In 2005 the Sacramento Stone Corral (a.k.a. Colusa Basin) and Lower Butte (a.k.a. Butte Basin) Watershed were selected by the United States Department of Agriculture as two California watersheds to participate in the NRCS's Conservation Security Program (CSP). This project will help farmers add to their CSP contract. The conservation benefits gained will help farms and ranches be more environmentally and economically sustainable.

Farmers and wildlife will both benefit through the support of sound research and educational outreach endeavors and by resolving the disincentives that hinder the integration of agriculture and ecosystem restorations. To truly assist farmers in integrating ecosystem restoration practices with agriculture on a more common basis, four of the following elements must be demonstrated: 1) a benefit to the agricultural producer; 2) protection from further regulatory actions; 3) ease of implementation requirements; and 4) a total activity cost which does not exceed the benefit to the farmer over an acceptable amount of time.

Ecosystem restoration that would typically benefit a farmer includes practices that control erosion and prevent the loss of farmable ground and infrastructure, remove noxious weeds, conserve water and/or address water quality, decrease production and maintenance expenses, increase production yields, and enhance wildlife habitat that could potentially provide economic opportunities and/or enjoyment to the landowner. However, the majority of the agricultural community views the enhancement of wildlife habitat as a benefit to the public good and fears exposure to disincentives that could be detrimental to the farming operation.

Regulatory problems

Habitat degradation for endangered species in the Butte and Colusa Basins has been associated with the removal of native vegetation in order to maximize yields and reduce pest species on agricultural lands and additional land use regulations intended to safeguard the presence of endangered species. In order to alter the present condition of streams and wetlands to help solve this problem, environmental permits need to be acquired. This creates a major disincentive for individual farmers because of the cost, time, and expertise needed to acquire those permits.

Because increasing populations of endangered species on private property unfairly burden landowners with additional Endangered Species Act and land use regulations, the implementation of Safe Harbor Agreements will provide participating landowners with legal assurances that no additional restrictions will be imposed as a result of voluntary conservation activities. Sustainable Conservation, in partnership with private property owners, RCDs, CSUC College of Agriculture, River Partners, and the US Fish and Wildlife Service, will facilitate the development of programmatic Safe Harbor Agreements for the Giant Garter Snake (*Thamnophis gigas*), the Valley Longhorned Elderberry Beetle, and possibly other federally and state listed species in Butte and Colusa Counties, in the Basin and along the Sacramento River.

2. GOALS AND OBJECTIVES

- **Goal 1.** Identify relationships of site characteristics and management with target species populations.
  Objective 1: Identify baseline conditions for 30 sites in each of three land use categories (90 sites total): rice, orchard and range.
  Objective 2: Monitor management practices and target species populations. Monitor populations of relevant target species at the same sites.

This goal is to identify correlations between site characteristics and targeted species populations. Documentation of baseline information regarding environmental characteristics (including soil, hydrology, landscape features, etc.), the management (including irrigation, pests, soil, etc.), and target species populations is an essential first objective. This will be followed by ongoing monitoring of the same parameters. Goal 1 is a critical complement to the first four ERP goals.

- **Goal 2.** Enhancement of management practices to promote target species populations
  Objective 1: Implementation of agricultural and conservation practices
  Objective 2: Adaptive management

Based on work related to the first goal, Goal 2 will focus on enhanced management practices to promote habitat and support targeted species populations. Again, this directly coincides with the first four ERP goals.

- **Goal 3.** Enhance existing farmer incentives and create new incentives associated with implementing conservation practices
  Objective 1: Provide producers with cost/benefit information associated with conservation practices
  Objective 2: Outreach
  Objective 3: Regulatory support

Through economic, outreach, and regulatory support, this goal is an important complement to achievement of the first four ERP goals.

3. CONCEPTUAL MODEL (SEE APPENDIX G)

The model outlines how the research and implementation parts of the project interact. The researchers will look at different physical systems and how agricultural production and conservation practices affect environmental characteristics that enhance or discourage the presence of Multiple Species Conservation Strategy (MSCS)-covered species that are targeted by this project and water quality. This will help researchers and RCDs know what practices to promote to reach farmer and CALFED goals and will lead towards integrating agriculture with ecosystem restoration.

Adaptive management and feedback loops of this model demonstrate how one element of the project will benefit other elements and lead to the implementation of practices. CSUC will manage the project and subcontract out to all the partners. Research done by CSUC College of Agriculture and Natural Sciences will help guide RCDs and River Partners in what agricultural and conservation practices benefit targeted species. RCDs will use the information to guide financial assistance that is given to farmers. Sustainable Conservation will develop a Safe Harbor Agreement and help the RCD develop a coordinated permit for implementing conservation practices. CSUC faculty and students will monitor project effectiveness on increasing target species populations and benefit to the participating farmer. CSUC faculty will then analyze environmental and economic data to correlate the assumptions about the practice implemented with expected outcome and make recommendations to alter practices if needed. That data and analysis will be provided to the RCDs to alter financial and technical assistance.

4. APPROACH AND SCOPE OF WORK

Below are the approaches and Scope of Work for the research, implementation, and regulatory components of the proposal. Please see Appendix D for tasks and deliverables.

Goal 1. Identify relationships of site characteristics and management with target species populations.

Environmental parameters will include hydrologic, water quality, soil, and landscape features. Soil and water samples will be collected for laboratory analysis. Each site will be analyzed for both inorganic and organic compounds. Inorganic analysis will only be performed on water samples. Analytes measured will include Se, Mo, Hg, As, Cr, electrical conductivity, HCO_3^{1-}, CO_3^{2-}, SO_4^{2-}, Cl^{1-}, NO_3^{1-}, PO_4^{3-}, B, Ca, Mg, K, Na, Cu, Zn, Fe, and Mn. Both soil and water will be analyzed for organic compounds. An initial sampling will be performed on all sites, followed by more intense sampling on those sites warranting greater sampling because of higher concentrations of contaminants. Organic profile analysis of water and soil will include both a pyrethrin and an organo-phosphate screen to identify pesticides of regional and national concern (individual pesticide compounds to be provided).

Baseline values for the inorganic constituents will be established using pristine sites within the multi-county sampling sites. If necessary, pristine sampling sites will be used outside of the counties. Sites will be ranked (low probability to high probability) based on positive findings of organic constituents. If available for pesticides of concern, aquatic life criteria levels (Larsen et al., 1997) will be used to help gauge biotic significance. All inorganic and organic compounds will be initially correlated to surrounding agricultural and other land-use activities. The intensity and type of activities will be quantified for this statistical analysis. These correlations will help to identify human and natural sources for these constituents. The findings will be reported.

Additional evaluations and statistical correlations will be based on the identification of indicators for wildlife, fish, and ecosystem health by researchers performing other aspects of this project.

Methodologies to assess GGS, WPT, bird, and VELB populations are discussed below:

Giant Garter Snake and Western Pond Turtle. This portion of the overall project will assess the relative benefits of various farming practices for preserving habitats and fostering healthy populations of two wetland-dependent species of conservation concern, the giant garter snake (GGS) and western pond turtle (WPT). Data collected from this project will specifically address no fewer than 14 of the management goals (goals 1.2, 1.3, 1.5, 1.7, 2, 2.4, 2.5, 4.1, 4.2, 4.3, 4.4, 4.5, 4.7, 4.8 see Appendix D) required by the USFWS Recovery Plan for the Giant Garter Snake (Miller and Hornaday, 1999). GGS is the primary focus of the project while WPT will be used as a model of how conservation strategies designed for one focal species affect non-focal species with similar habitat requirements in a Multi Species Conservation Strategy approach. WPT uses habitats that are crucial for GGS but uses these habitats in different ways and at different times of year, and thus may be affected very differently by the same agricultural practices in very different ways.

We predict that sites with beneficial management practices will harbor greater densities of GGS and that populations at these sites will show signs of healthy demographics such as high survivorship, balanced sex ratios and high individual fecundity. We will test the hypothesis that agricultural practices that benefit GGS also benefit WPT because of shared habitat requirements.

We will establish a baseline assessment for presence/absence, distribution, and relative abundance of GGS and WPT at the 30 rice land study sites (10 per county) selected in cooperation with Project Principal Investigators (PIs) and Resource Conservation Districts in Colusa, Butte and Glenn counties. This baseline assessment of species presence and project wide assessment of farming practices allows identification of a suitable subset of farming practices and sites (~6 per county) for long-term monitoring in tasks 2 and 3. This task will be completed during year one of the project.

Reconnaissance and baseline establishment of GGS will require a combination of visual searching and aquatic trapping with floating modified minnow traps. State and federal collecting permits require that traps be checked daily. During year 1 of the project, a minimum of 500 traps will be deployed as 10 50-trap transects during the peak of the snake's active season. Following established protocols, the location of transects will be changed every 2-3 weeks to allow equal sampling across all sites and sampling of multiple habitats within each site. The GGS project budget is based on one full time crew deployed for 2 months Reconnaissance and baseline establishment of WPT will be based solely on trapping using using a modified funnel trap design that increases trapping efficiency and is safe even if left unattended for many days from March – July (spanning the reproductive and most active seasons) and check traps at each site once/week. The WPT budget is based on rotating staff through one crew of two five days per weeks.

Data from each snake or turtle will include GPS location, sex, maturity, weight, various measurements of length, a digital photograph for morphometric analysis, and samples for genetic analyses. All individuals will be permanently identified with PIT tags released at the point of capture. Gravid females of will be x-rayed to estimate fecundity (Hinton et al. 1997).

This sampling strategy will provide data needed to establish a species baseline and to identify sites for continued study.

Additional data will be collected on recapture rate, growth rate and survivorship of individuals between years 1 and 2. In years 2 and 3 radio-telemetry will be used at a minimum of one site per farming practice to monitor snake and turtle habitat use across the entire

landscape. Radio transmitters will be implanted in minimum of five snakes and affixed to five turtles of mixed gender. Upon capture, snakes large enough for implantation (>150g) will be taken to the Sacramento Zoo for surgeries once appropriate sites are identified. These animals will be monitored a minimum of three days per week during the active season and once weekly during the dormant season. A maximum of 30 individuals per species will be radio-monitored altogether.

Bird Populations—An agronomist/orchardist and a field biologist will assess the land sites identified in Objective 1. The agronomist/orchardist will work closely with the landowner to provide a detailed description of his/her agricultural practices. Management practices that may impact target species (e.g. dormant sprays, fall flooding, cover crops, hedgerow, etc.) will be emphasized. The field biologist will determine the proper survey protocol and the locations of survey points. Separate standardized methods will be used to survey wetlands and un-flooded terrestrial habitats. Point count methodology designed to assess passerine usage of bird species will be used in riparian and other un-flooded habitats. Point count route locations will be designed to be representative of the existing habitat. We will establish the maximum number of point count locations on most properties and a sub-sample of points on very large properties.

Point count data will be used to calculate the population parameters of abundance, species richness, and diversity. These surveys will be conducted in accessible habitat patches following nationally standardized protocol (Ralph et al. 1995). Counts will be of five-minute duration and all birds detected within 10-meter bands from the census station will be recorded separately from those at greater than 100 meters. All birds detected (by sight, song, or call note) and type of detection will be recorded. All transects will be surveyed three times between April and July by experienced observers able to identify all birds by sight or sound. Surveys visits will be at least 3 weeks apart and will be completed within 4 hours of sunrise, and all birds seen or heard will be recorded. Distances to all birds within 100 meters will be determined using range finders. Birds flying over the count circle will be noted separately. Evidence of breeding (e.g. observations of nest building, completed nests, food for nestlings, fledglings) will also be documented.

Vegetation data will be collected at all point count stations, following nationally standardized protocol (Ralph et al. 1993). In summary, cover class, relative abundance, and species for all vegetation within 50 meters of each station will be recorded. Vegetation characteristics (measured at each point count station) will be related to changes in bird species composition and abundance across sites. These data can be used to evaluate the quality of existing habitat and help guide the implementation of restoration to improve habitat conditions for songbirds. Vegetation measurements will be completed in June and July.

Wetland counts will be conducted at both semi-permanent and seasonal wetlands. Counts will be conducted at any time of the day between April and August (breeding season) as well as during the fall/winter post-agriculture harvest season. All bird species seen or heard using the wetland, including those aerial feeding, will be recorded. Wetlands will be surveyed approximately every three weeks. Evidence of breeding will be noted. All broods will be counted and the development stage of the young noted. Wetlands will be visually scanned from as many points necessary to count all birds present (survey times thus vary according to number of birds). Multiple wetlands will be surveyed on a single property whenever possible.

For each wetland survey we will record a series of habitat conditions including the percent vegetative cover (including tall and short emergents), shallow and deep water, bare ground and mud. The number of islands will be noted as well as the surrounding land use.

Some properties will have hunting activities and thus wetland bird site counts will be conducted on a schedule as permitted by landowners. PRBO will work with habitat program managers to employ monitoring methods that will minimally disturb birds on the properties.

Valley Elderberry Longhorn Beetle— This portion of the proposal seeks to investigate the extent to which agricultural practices in rice, orchard, and range lands are correlated with the presence and viability of VELB populations. The Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus* or VELB) is listed as a MSCS Covered species in the CALFED Proposal Solicitation Package (PSP); hence, VELB is a "species for which the CALFED program could reasonably be expected to undertake all or most of the actions necessary" for its recovery. An entomologist will survey agricultural lands for Elderberry and VELB. Once located, an agronomist/orchardist will document agricultural practices adjacent to the VELB habitat. The entomologist will classify the density of any Elderberry patches as follows: "isolated" (1-3 bushes at least 200 m from the next nearest patch, "scattered" (4-10 bushes spaced 30-50 m apart), and "clumped" (> 10 bushes occurring in groves) (Collinge et al., 2001). The rarity and threatened status of VELB do not permit experimental manipulation of the beetle. However, VELB populations can be successfully censused by counts of exit holes in Elderberry. Therefore, all elderberries located will be scanned for VELB exit holes immediately following the emergence period in June-July. A flashlight will be used to classify exit holes as "recent" (those from which VELB adults have emerged in the same season as the survey) or "old." Recent holes are identified by the presence of frass, wood shavings, and light-colored wood inside and will be considered to indicate the presence of extant VELB populations. A Trimble Global Positioning System (GPS) unit will be used to determine the latitude and longitude within 1 m accuracy of all elderberry plants with and without recent VELB exit holes in each study site. In this study, bushes with exit hole(s) will be designated treatment plants; the nearest two neighbors lacking exit holes, the controls.

Host plant stem width at the exit holes, height of holes above the ground, and diameter of holes will be recorded. Diameter of exit holes will be taken as a correlate of beetle size and, therefore, relative fitness. It is well-established that size is a proxy for fecundity in female insects. Because male and female beetles differ significantly in size (Barr, 1991), a bimodal distribution of exit hole diameters is expected. Only those holes identified as representing female beetles will be used in estimates of beetle fitness.

Core samples of pith, as well as samples of foliage, will be taken with an auger from both treatment and control bushes. The cores will be extracted from stems bearing the exit holes at least 1 m from the hole itself. This approach ensures samples representative of the intact host plant tissue, while avoiding tissue excavated by the larval VELB. Each bush or clump of bushes will be treated as an independent sample. Core and foliage samples will be shipped to an agricultural laboratory for quantitative analysis of moisture content, nitrogen, phosphorus, potassium, sulfur, and zinc. A regression analysis will be used to test the hypothesis that beetle size (hence, fitness) is dependent on host plant quality (nitrogen content). Estimates of the minimum level of nitrogen in plants acceptable by VELB will also be made.

Surveying for the invasive Argentine ant will be accomplished two ways. First, a bait of honey in patches 10 cm wide by 2 cm high will be applied at the base of treatment and control bushes. All insects visiting the bait will be identified at least to order; ants will be collected with a brush or aspirator and identified to species. Second, the stems, leaves and flowers of study bushes will be inspected for ants; any ants observed will be collected and identified to species.

Monitoring will be carried out biweekly immediately following the emergence period of VELB, June-July.

The monitoring plan will be as follows: All new exit holes appearing in years 2 and 3 in the study sites will be recorded and measured as above. Any changes in exit hole position and abundance will be recorded and used to construct spatial maps. Interim reports will be prepared based on results following years 1 and 2, in advance of the final report. Estimates of dispersal distance will be inferred from calculating the average distance between newly colonized elderberry shrubs and the nearest source shrub within the census zone (McLeish et al., 2003). An Index of Aggregation for elderberry shrubs within census zones will be calculated. This index will be tested statistically for deviation from a random distribution (Sokal and Rohlf, 1995). The result will allow characterization of the dispersion of colonized shrubs as random, regular, or clumped. Thus, critically important estimates of dispersal and spatial structure of existing VELB colonies will be gained.

Growth and Rearing of Salmon—This portion of the overall project will monitor the use of agricultural aquatic habitat (sloughs and drainages) by salmonids and assess the ecology of best agricultural management practices efforts. This work will build on data collected and methods developed by Limm and Marchetti (2005) in the upper Sacramento River. Based on our previous work (Limm & Marchetti 2005), we propose to examine growth and habitat use of juvenile Chinook salmon in agricultural aquatic habitats under different management practices. Previous work in the agricultural habitat of the Yolo Bypass (Sommer et al. 2001a, 2001b) suggests that slow-water habitat improves juvenile Chinook salmon growth and survival when compared with the mainstem river. We hypothesize that agricultural best management practices will create betters aquatic habitat for juvenile Chinook salmon and will provide improved growth and rearing over agricultural areas that do not follow best management practices.

We will determine daily growth rates of juvenile fall run Chinook salmon using otolith microstructure daily incremental growth rate analysis (Neilson & Geen 1982, Campana & Neilson 1985, Campana & Thorrold 2001, Limm and Marchetti 2005). During the winter and spring, juvenile fish will be collected across a series of management sites in Glenn, Colusa and Butte counties over a three-year period. Otoliths will be removed from the fish and juvenile salmonid growth rates will be determined. In addition, we will examine mechanisms responsible for changes in growth by characterizing the diet of the juvenile salmon and assessing feeding selectivity (Sommer et al. 2001, Limm & Marchetti 2005). We will also quantify the relative abundance of aquatic marcroinvertebrates (food items) that exist across series of management areas. We hypothesize that aquatic macroinvertebrate abundance (fish food) will be higher in areas with best management practices than those without.

Salmon Morphologic Differences—In conjunction with salmonid collection we will examine the fish for potential differences in morphometric characteristics between fish in the management sites vs those in the non-management sites. Fishes exhibit continuous growth; they do not achieve a permanent adult body size and their bodies grow in response to environmental factors like temperature and food availability. It is therefore our hypothesis that we will see morphological differences among fish collected in the different management areas. We will assess this possibility using a new statistical technique called geometric morphometrics, which allows us to examine morphological variation using pictures of the organisms under scrutiny.

IMPLEMENTATION

Goal 2. Enhancement of management practices to promote target species populations

Research on agricultural and conservation practices can quantify the benefit, acknowledge conservation practices that are beneficial to certain wildlife, and provide data to support the economic value of agriculture's contributions to the ecosystem. It could also indicate what agricultural landowners could do to further contribute to ecosystem restoration and environmental quality.

The implementation of conservation practices will also play a vital role in assisting farmers integrate ecosystem restoration with agriculture. RCDs put a high value on getting conservation on the ground and are currently working with landowners interested in implementing conservation and restoration practices on their agriculture property. These landowners want to enhance wildlife habitat along riparian corridors in agricultural landscapes that could benefit species of concern. The selected project sites will install practices such as native riparian vegetation, weed control and erosion control practices in waterways, and establish permanent perennial vegetation for wildlife habitat, as well as other conservation practices. Species of concern that could benefit from these projects include Giant Garter Snake, Valley Elderberry Longhorn Beetle, Chinook salmon, Swainson's Hawk, Willow Flycatcher, Western Yellow-Billed Cuckoo, Bank Swallow and Western Pond Turtle.

ERP funding will be matched with USDA Farm Bill program assistance to provide for the implementation of wildlife friendly conservation practices on selected sites. Farm Bill Programs administered by the Natural Resources Conservation Service such as the Environmental Quality Incentive Program (EQIP; 50% cost share) and the Wildlife Habitat Incentive Program (WHIP; 75% cost-share) will be utilized along with the Landowner's in-kind contribution when applicable. In 2005 the Sacramento Stone Corral (a.k.a. Colusa Basin) and Lower Butte (a.k.a. Butte Basin) Watershed were selected by the United States Department of Agriculture as two California watersheds to participate in the NRCS's Conservation Security Program (CSP). The Butte, Colusa and Glenn County RCDs' jurisdictions encompass the Sacramento Stone Corral and Lower Butte Watersheds. The CSP program is a voluntary conservation program that supports ongoing stewardship of private agricultural lands by providing payments for maintaining and enhancing natural resources, including wildlife enhancements. Some of the landowners are motivated by increased sport hunting opportunities and to increase CSP enhancement payments. Farmers who have CSP contracts may also become eligible to increase their incentive payments by applying additional conservation practices on their land ensuring that projects will be durable. However, the final selection of implementation sites will be dependent on Farm Bill program ranking criteria for the 2007, 2008, and 2009 program years, total funds allocated within the three counties, timing of contract approval, the implementation of practices, and the landowner's success in executing a contract with the NRCS. The conservation benefits gained will help farms and ranches be more environmentally and economically sustainable.

The Project Coordinators will participate in Stakeholder and Local Workgroup Meetings that will help define the criteria of the local Farm Bill programs. The RCDs are confident that the sites selected to participate in this project will receive priority ranking for inclusion in the Farm Bill programs. The RCDs' knowledge and experience in working within the constraints of the conservation programs, proximity to NRCS and the long-standing rapport with the NRCS will be vital in coordinating funding cycles with on the ground implementation activities.

Proceeds from this grant will enable the Butte and Colusa RCDs to hire Project Coordinators to provide services that will assist farmers in integrating ecosystem restoration with agriculture

in the Butte and Colusa Basins and along the Sacramento River. The Project Coordinators (PCs) will be housed in the Butte and Colusa NRCS/RCD offices. The RCD PC's work space, utilities, use of office equipment and a part-time vehicle will be furnished by the NRCS. The RCD District Mangers will provide assistance to the PC with landowner outreach activities. River Partners will provide technical assistance on ecosystem restoration to CSUC faculty and RCDs, as well as implement two demonstration sites on participating agricultural sites in each county.

The PC will solicit and enlist rice, orchard and rangeland agricultural producers to participate in CSUC research projects. The RCDs will obtain written agreements with interested farmers who will provide accessibility to the property and landowner assurance of confidentiality in exchange for their participation in the project. This condition is vital to the RCDs' ability to obtain participation from an agricultural community that is very concerned about possible ramifications of further regulatory actions. Research sites will be identified by a number which will not be released outside of the RCD and CSUC. The PCs will serve as go betweens for the Farmers and CSUC faculty and staff.

The PCs will solicit the participation of 6-8 farmers in the Butte and Colusa Basins to implement conservation practices on farmland. Implementation sites will be included in CSUC's study depending on timing and how well they fit into the research criteria. The PCs will work with the NRCS and other partners to select and assist participating farmers in the development of conservation plans, and provide technical assistance and project oversight throughout the implementation process. The RCDs will allocate a significant portion of the ERP grant funding to provide direct financial assistance to the landowners and will work with landowners to apply for EQIP and other Farm Bill money to match funding supplied through this grant.

River Partners will complete a site-specific plan for two demonstration sites in each county. Landowner input and consideration of the local setting will be important components of selecting the management practices. As a demonstration with potential effects that may ripple throughout the watershed, the plan will be an important communication tool. River Partners anticipates considerable consultation with local landowners and RCDs to gain a good understanding of local concerns and available resources. We believe this approach will yield solutions that meet landowner and watershed objectives and capitalize on local resources and knowledge.

The plan will: Briefly evaluate site conditions; Identify potential funding sources for implementation and maintenance; Develop conservation goals for the site; Identify and describe recommended conservation practices; Outline the implementation of practices; Identify the location and acreage of treated areas on the site; And detail monitoring efforts and long-term management practices.

Appropriate practices will originate from a variety of sources including the NRCS technical guides, the Department of Fish and Game's (DFG) *California Salmonid Stream Habitat Restoration Manual* (1994), practices developed by landowners and River Partners, and suggestions from the technical team. Recommended techniques will be selected based on ones that are likely to be successfully implemented based on goals and characteristics, landowner concerns, available local resources, CSUC research, and the available budget. Ultimately the selection and implementation of techniques will rest with the demonstration landowner.

River Partners will assist the landowner with the initial steps of implementation and train landowners so that they can embrace the long-term maintenance. River Partners will blend active restoration techniques, modern farming practices, and conservation science to effectively establish habitat enhancements.

The selection of sites will be developed in consultation with the RCDs, but some entities (such as irrigation districts, Rancho Llano Seco) have indicated a potential interest in participation. We envision a combination of demonstration areas for GGS and riparian enhancements. The budget anticipates the creation (at a minimum) of the following habitat types: 16,000 linear feet of revegetated canal or ditch bank (See Appendix F for diagram); And 20 acres of grassland, riparian, or wetland habitat.

Ideally these areas could be integrated to provide nodes of larger habitat along wildlife corridors. It is critical that these plantings enhance the agricultural operation. For example, the area along canals could be planted with native grasses (such as creeping wildrye or deer grass), and forbs (such as gumplant or mugwort) that would reduce erosion, improve water quality, and provide wildlife corridors without increasing (and perhaps reducing the need for) maintenance operations. Riparian habitat may be appropriate in "waste" areas or to protect orchards from debris, sedimentation, or erosion. River Partners completed a 3-acre project in 2001 (River Ranch in Glenn County) that may serve as an example of how riparian habitat can provide flood protection and enhance agricultural operations (See Appendix F).

River Partners and RCDs will complete an End of Season Report and a Final Project Report. The reports will summarize activities on each of the implementation demonstration sites and help distill some of the information for outreach activities. Key functions of the reports are to: Communicate implementation activities to our partners; Describe the funding model used to implement the projects; Document the completion of project milestones; Present the monitoring results; Evaluate the effectiveness of field activities (including target species monitoring); Provide a cost estimate of practices; And recommend specific actions (adaptive management recommendations) to meet the project objectives.

Summarizing the project will allow us to communicate the project findings to participants. The reports will be written in such a manner to allow for easy translation into educational material for the workshops.

REGULATORY

Goal 3. Enhance existing farmer incentives and create new incentives associated with implementing conservation practices

This project will facilitate the increase of native habitat for endangered species by implementing and promoting an expedited permitting process for conservation practices and offering assurances to landowners that future Endangered Species Act regulations will not increase due to the increased presence of endangered species on their lands. The Butte-Colusa Permit Coordination Program will provide "one-stop shopping" for regulatory compliance to landowners willing to improve the natural resource conditions on their lands. Programmatic Safe Harbor Agreements in Butte, Glenn, and Colusa Counties will offer protection from future land use restrictions and increased endangered species regulations to participating landowners. This program will further promote stewardship among private landowners by removing major barriers to environmentally beneficial work – the time, cost and complexity of complying with multiple state and federal permits. The Glenn RCD will work with regulatory agencies to create a blanket permit or package permit for which landowners can apply. The RCD will then help landowners fill out and comply with permit requirements and also do long-term monitoring.

The Natural Resources Conservation Service (NRCS) and RCDs have long served as points of contact for technical advice and cost-sharing for restoration projects in Butte, Colusa, and Glenn Counties. This proposal builds on regulatory coordination initiatives currently underway

or completed by Sustainable Conservation and the NRCS in the Elkhorn Slough, Salinas River, Navarro River, and Morro Bay watersheds.

Safe Harbor Agreements (SHAs) are relatively new conservation tools designed to reward landowners who voluntarily create endangered species habitat on their property. A landowner enrolled in an SHA voluntarily commits to implementing enhancements and/or management practices that the Fish and Wildlife Service has determined will likely benefit the target endangered species and cause their population to grow. In return for this effort and commitment by private landowners, the US Fish and Wildlife Service authorizes incidental take rights related to implementation and maintenance of conservation projects, routine farming activities, and the return of the property to the condition it was in at the time the agreement was signed (baseline). Incidental take rights awarded to Safe Harbor landowners provide them the certainty that no additional ESA restrictions will be imposed due to any increase in the population of endangered species on their property.

Drafting an SHA is a collaborative and consensus-based process involving the Fish and Wildlife Service, local RCDs and other resource specialists, local landowners and Sustainable Conservation. The work begins by defining both the geographic scope of the agreement(s) and the species to be included. In the case of programmatic agreements, a master permit holder must be identified. Other elements such as the permit term, activities beneficial to the target species, and baseline, monitoring and reporting protocol must be agreed upon by all parties. Results from research outlined in this grant proposal will inform beneficial activities for inclusion in the SHA, as well as protocol for baseline surveys, compliance and biological monitoring, and reporting. Generally this work will be done through a series of in-person public and private meetings, phone calls and review/editing of draft documents. An SHA can be drafted in approximately 5 months to 1 year. Once agreement is reached on the elements in the agreement, the SHA is submitted to the FWS with an application for an Enhancement of Survival Permit. FWS review of the application will take approximately 5 months to 1 year, at which time the agreement is ready to be signed by the master permit holder and FWS.

Implementation of the SHA begins by conducting a public education and outreach campaign to increase the agricultural landowner's understanding about SHAs and how they work. Ultimately the goal of this work is to identify landowners interested in enrolling their property in the programmatic SHA. Outreach can be conducted through written materials, group meetings, education to RCD staff and others working directly with farmers. This first step of implementing the SHA can be undertaken concurrently with the FWS review of the SHA application.

After the agreement is approved and signed by FWS and the programmatic permit holder, individual property owners will be able to enroll their property in the SHA. At this time a selection of practices will be identified from a larger list of beneficial activities that are especially suited to a specific property. Next, baseline surveys will be conducted on each enrolling property to identify the condition of the property at the time the agreement is signed. A qualified biologist or resource specialist will conduct the surveys and the work will be supervised by Sustainable Conservation and/or local RCDs. Finally projects identified in the SHA to benefit the target species will be implemented by participating landowners. Yearly compliance monitoring and reporting and biological monitoring will take place for the entire agreement term.

The Glenn County RCD will hire a Permit Coordinator who will develop a coordinated permit for conservation practices identified through this project as being beneficial to the overall project goals and provide support for landowners participating in implementing practices through

this grant. The Permit Coordinator will work with permitting agencies and the NRCS to develop a permitting process that reduces implementation time and cost for farmers.

The Permit Coordinator will work with CSUC faculty, NRCS and River Partners to identify appropriate conservation practices that can be covered by a coordinated permit, provide a description of the practices with environmental and watershed information that will be needed for a permit, and organize and facilitate a series of permit workshops with regulatory agencies to develop a coordinated permit and environmental protection measures. The Permit Coordinator will also help acquire permits for Project Coordinators, River Partners, and farmers doing conservation practices funded through this grant. This will help get projects funded by this grant on the ground in a timely manner.

5. PERFORMANCE EVALUATION

Implementation Monitoring and Reporting Plan

Monitoring

We propose the following monitoring measures on each demonstration site:

- Establish photopoint locations to illustrate project progress (pre- and post-treatment photographs).
- Estimate plant cover and/or survivorship (i.e. using cover classes, or sampling of the number of plants).
- Conduct a time and material analysis to develop estimates for effectiveness, cost, and level of effort.

With landowner concurrence, the sites provide opportunities for monitoring by our partners and that information will be incorporated into the project. For example, GGS monitoring and evaluation of the habitat may provide additional information to evaluate the practice. Whenever possible (and especially for ditchbank projects), we will utilize reference sites for comparison.

Because each landowner may wish to pursue different goals (for example, one landowner may wish to minimize weed cover and promote upland game habitat; another may wish to reduce bank erosion and maintenance costs) and some practices may require several years before they can be assessed, we will provide a qualitative assessment of the practice. Alternatively some simple screening-level efforts (for example, a habitat assessment for target species, wildlife counts, or bank measurements for erosion projects) may be incorporated into the monitoring.

The project will develop a monitoring program that quantifies its success (Table 1 in Appendix B). The restoration plans, reports, plant cover, avian usage monitoring, analysis of implementation activities and refuge restoration monitoring will be used to form a framework of elements to measure the success of the project and as an adaptive management tool.

Plans and Reports

The entire project will be detailed in a restoration plan prior to any habitat restoration activities. As adaptive management tools, the quarterly and annual reports evaluate the project's progress in terms of goals, objectives, and special considerations. These reports provide a means of communicating implementation activities to our partners, document completed project milestones, assess field activities, and recommend specific actions to meet the project objectives.

Planting Census

A field survey and data from the site will be collected prior to restoration. After this survey is completed, a dBase IV program, developed by Sacramento River Partners (SRP) will be used to design the planting scheme. The exact location and species of every tree and shrub will be planned and tracked with this database. At the end of each growing season, we will census the

plants for individual plant survival. This allows us to evaluate to success of the project based upon comparisons among communities, soil characteristics, and topographic position. The native grass will be monitored using photo-points and vegetative plots.

Avian Usage Monitoring

The Point Reyes Bird Observatory (PRBO) in consultation with the USFWS will implement season-long monitoring on the site, including point-counts along permanent transects, nest-searches, and vegetation structure around each nest. Species richness and numbers of individuals for the site will be determined.

Regulatory Evaluation Plan

The performance evaluation will be based upon the tasks and deliverables outlined in Appendix D. The performance evaluation will be outlined in a matrix detailing the task, deliverable, and date to be completed to assess if the project is on track and will be completed by the end of project period.

The research component will contribute to many of the goals and objectives of the regulatory component. Research and monitoring will help landowners and RCDs qualify and comply with regulatory stipulations such as the determination of a baseline conditions, the most appropriate management practices, and monitoring.

As adaptive management tools, the quarterly and annual reports evaluate the project's progress in terms of goals, objectives, and special considerations. These reports provide a means of communicating implementation activities to our partners, document completed project milestones, assess field activities, and recommend specific actions to meet the project objectives.

6. FEASIBILITY

CSUC College of Agriculture, a leader in agricultural education and research in the Sacramento Valley, will be in a highly advantageous position to advocate research developed from this project. Many of its graduates have entered farming in the Butte and Colusa Basins and along the Sacramento River and have maintained a relationship with the College and its faculty. The College of Agriculture has teamed with the Colleges of Natural Sciences and of Engineering, Computer Science, and Construction Management and has developed a strong partnership with the Butte, Colusa, and Glenn RCDs, River Partners, Sustainable Conservation, and Point Reyes Bird Observatory (PRBO) to help implement and enhance existing farmer incentives and create new incentives for implementing conservation practices. Coordination among the partners will be facilitated by the project director who will manage everyday implementation of the project.

We anticipate no complications in completing the proposed surveying and monitoring activities in a timely fashion. Resource Conservation District (RCDs) directors and staff put a high value on their ability to work with the local landowners by gaining their trust and keeping that trust as a top priority. RCDs continually strive to obtain landowner input to keep the District's projects and USDA Farm Bill programs focused on local conservation priorities. River Partners is a leader in ecosystem restoration in the Sacramento Valley and has worked closely with RCDs and local landowners to help restore the physical and biological components of river ecosystems. Sustainable Conservation is a leader in Safe Harbor and Coordinated Permit projects in California. Sustainable Conservation will work with all partners to support the development of a coordinated permit for conservation practices and safe harbor agreements. PRBO is a leader in surveying bird species in California. PRBO has been working in the Central Valley providing

monitoring and analysis for bird species on private land for many years. PRBO will continue to provide this service to this project.

7. Data Handling and Storage

Data will be compiled in an electronic database maintained at the College of Agriculture at CSUC for analysis with applicable software (i.e., GIS, statistical analyses and Mark/Recapture Analysis). Further coordination with other members of the project team will determine the scope and format of the final report.

8. Information Value

The value of research and literature reviews to identify the correct and most beneficial agricultural and conservation practices will help landowners, River Partners and RCDs during the planning, monitoring, and implementation process. Knowing specific practices and how to plan for MSCS-covered species allows each partner to identify what practices are best able to protect or enhance MSCS-covered species. The information gathered during this project will also help ERP and government agencies create incentives for agricultural landowners to protect or enhance MSCS-covered species. RCDs can also begin working with the NRCS to identify how the research can benefit the Conservation Effects Assessment Program and fit it to state priorities and needs.

Information provided from this project will be very valuable to growers, researchers, RCDs, and nongovernmental organizations involved in species conservation. The development of beneficial agricultural and conservation practices will enable farmers to assess their current farming practices in terms of their effects on a particular species or set of species. Information garnered from this project will also be used by RCDs to prioritize farmlands that have been earmarked for the EQUIP program. Another important benefit of this study is the collaboration developed between the Biology Department and the College of Agriculture at CSU, Chico. Cross-fertilization of ideas between professors, students, and researchers will strengthen both programs and expose students to new fields of study. Students will be involved in all aspects of this study such as documenting farm practices, monitoring selected species, and analyzing the data. This information will be incorporated into agriculture and biology classes that will further disseminate the knowledge to science and liberal arts students at CSUC.

Below are specific outcomes for the GGS, WPT, bird populations, and VELB.

Giant Garter Snake and Western Pond Turtle—The baseline population estimates will provide the first wide-scale systematic surveys of GGS and WPT distribution and abundance in agricultural lands in the Sutter, Butte and Colusa Basins. In the context of the larger project, the further detailed population studies will contribute substantially to understanding the relative effectiveness of different traditional and conservation-based farming practices in maintaining appropriate habitat and healthy populations of these two important wetland-dependent MSCS species. As a whole, this aspect of the overall project will make large steps toward the development and implementation of agricultural activities that benefit MSCS.

Bird Populations—The importance of assessing wintering habitat stems from recent studies conducted by PRBO that documented exceptionally high abundance and diversity of migratory landbirds and shorebirds using riparian, grassland, and wetland habitats in the valley. Indeed, our data has led wetlands in the Sacramento and San Joaquin valleys to be designated as sites of "International Importance" by the Western Hemisphere Shorebird Reserve Network for their support of migratory and wintering shorebirds.

The biological and habitat information gained from this project will be used to actively guide effective restoration and management on program and partner sites, and results and recommendations will be published in reports, bird conservation plans, web based databases, and the scientific literature. Results of this monitoring and assessment project also will contribute to regional conservation efforts by providing information to California Partners in Flight, the Riparian Habitat Joint Venture, and the Central Valley Joint Venture.

Valley Elderberry Longhorn Beetle—All data will ultimately be entered into a matrix of other data sets gathered by collaborators. A correlation matrix identifying which agricultural practices most benefit VELB and other target wildlife species will be used to formulate our findings and recommendations to farmers and to CALFED. These results, together with results from the dispersal estimates, indices of dispersion, the effects of host plant nutrition on VELB and any association with Argentine ants will be disseminated to the public via submission to and possible publication in the professional journals Conservation Biology and Ecological Entomology, as well as through seminars and workshops.

9. PUBLIC INVOLVEMENT AND OUTREACH

The RCDs have done extensive outreach prior to the submittal of this proposal to local landowners and personnel at agricultural and environmental organizations. They have talked to and consulted with (through meetings or conversations) with the following organizations: Northern California Water Association, Rice Commission, Farm Bureau, Agriculture Commissioners, Board of Supervisors, Family Water Alliance, Colusa Basin Drainage District, Yolo County RCD, California Association of Resource Conservation Districts, NRCS, UC Extension, SRCAF, Sacramento Preservation Trust, and The Nature Conservancy. The RCDs will continue to ask for input and direction from these organizations, some of which have provided this proposal with a letter of support.

Project Coordinators will be charged with the task of communicating and making presentations at these organization's meetings as well as develop three newsletters to go out to agricultural and environmental organizations and landowners. The Project Coordinators will also be charged with the task of writing and submitting news articles and press releases to promote agricultural and conservation practices.

Project Coordinators, CSUC Faculty, and River Partners will hold field tours to the demonstration sites and other sites for landowners and representatives from agricultural and environmental organizations. This will show what has been done and the benefits to landowners and MSCS-covered species.

B. Applicability to CALFED Bay-Delta Program and ERP Goals and priorities for this solicitation.

1. ERP PRIORITIES

This proposal addresses four of five project priorities and three of thirteen priority areas outlined in the proposal solicitation package. It will research, monitor, and implement most of the management practices listed as well as management practices described in the NRCS Field Office Technical Guide and Conservation Security Program Conservation Enhancement Guide and the Department of Fish and Games stream restoration manuals.

This project directly addresses four of the ERP Goals (CALFED 2002):

- **Goal 1** (Endangered and Other At Risk Species and Native Biotic Communities). This project will provide or enhance habitat for targeted species such as VELB, giant garter

snake, Chinook salmon, Swainson's Hawk, Western Yellow-billed Cuckoo and other neotropical migratory birds. The restoration will help aquatic species as well.

- **Goal 2** (Ecological Processes). This project will reduce the erosion potential of the site, improve water quality, establish native plants in a short period of time, and create conditions that favor native plants in some areas.
- **Goal 4** (Habitats). This project will look at agricultural and conservation practices that benefit MSCS-covered species and their habitat. The reintroduction of native plant species onto the site will improve wildlife habitat for a variety of species, by improving structure, cover, and food sources.
- **Goal 5** (Non-native Invasive Species). Weed control activities and the reintroduction of native plant species are designed to limit the establishment of additional non-native plant species. This will reduce the site as a potential source of non-native species in the Bay-Delta estuary and its watershed.

2. RELATIONSHIP TO OTHER ECOSYSTEM RESTORATION ACTIONS/ PROGRAM INVESTMENTS

This proposal will recognize the tremendous investments and advancements that have been made by the ERP, NRCS, CVP funded projects, USFWS, DFG, and irrigation districts throughout the North State for water use efficiency, water quality improvements, and habitat restoration. Two prime examples are the work along the Sacramento River and Butte Creek. To build upon the overwhelming success along Butte Creek in improved fish passage and the restoration of endangered Chinook salmon runs and the success of restoring lands along the Sacramento River, this project will look at how private property owners have and can further contribute to these goals. This project seeks to leverage the advancements in knowledge and technical ability of past ERP projects to increase public recognition of this work and the investment that can and has been applied to agricultural lands in Butte and Colusa Basins and along the Sacramento River.

Appendices

Appendix A – Literature Cited

Appendix B – Giant Garter Snake Monitoring Protocols

Appendix C – Partner Organization and Staff Qualifications

Appendix D – Tasks and Deliverables

Appendix E – Organization Proposals

Appendix F – Timeline

Appendix G – Conceptual Model

Appendix H – Resumes of key personnel

Appendix I – Exceptions Requested to Terms of Sample ERP Agreement Template

Appendix J – Justification for Indirect Cost Rate

Appendix A
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Appendix B
Giant Garter Snake Monitoring Protocols

U.S. Fish and Wildlife Service Guidelines: Information to Include in a Monitoring Report for Giant Garter Snake

1. Date

2. Surveyor

3. Project information (should include the following):
    a. Project name
    b. Location
    c. Project impacts and acres impacted

4. Survey information (should include the following):
    a. Time of day
    b. Temperature at start and end of survey. Include ambient temperature, temperature at ground level, and at approximately 3 inches above ground level.
    c. Weather conditions (include wind conditions and cloud cover)
    d. Acres/area surveyed

5. Site description (may include the following):
    a. Habitat types present, substrate/soils, etc.
    b. Topography/elevation
    c. Surrounding land-use/activity
    d. Description of project features

6. Habitat characteristics:
    a. Burrows/potential hibernacula present? (Y/N)
    b. Amount and type of cover present, including upland and emergent vegetation
    c. Prey species present? (Y/N)
    d. Distance to nearest available habitat
    e. Other species observed

7. Giant garter snakes present? (Y/N) If observed provide the following information:
    a. Number of individuals, and if possible to determine, whether juveniles or adults
    b. Location(s)
    c. Describe behavior and activity
    d. Describe protective measures implemented

8. Describe on site minimization and avoidance measures implemented (fencing, dewatering, worker awareness training, etc.). Include any difficulties implementing measures and corrective measures taken.

Report all sightings to the US Fish and Wildlife Service, Sacramento Fish and Wildlife Office at (916) 414-6600, and to the California Department of Fish and Game (CDFG). The monitoring biologist must submit all sightings to CDFG Natural Diversity Data Base (NDDB) using a California Native Species Field Survey Form and provide copies to CDFG and the Service.

Table 1. Example of Monitoring and Data Collection Information for the Drumheller Slough Habitat Restoration Project

Question to Be Evaluated	Monitoring Parameters	Data Evaluation Approach	Data Priority
Implementation Success	Initiation and completion of tasks	Timeline is followed, project evaluated in annual reports in terms of restoration plan.	High
Planting success	Assess end of season and after planting plant survivorship, document growth in year 3	Use a dBase IV program (developed by SRP) to design the planting scheme, describe the location and species of every planted tree or shrub, and census the plants for survival, and growth, establish photo points across the site	High
Native grass	Percent dominance, frequency, occurrence	Collect random herbaceous plot samples from pilot plots	Medium
Avian use monitoring	Point-counts and nest surveys, species richness and numbers of individuals	Collect data along permanent transects and note vegetation structure around each nest.	High

Appendix C
Partner Organization and Staff Qualifications

The **Colusa County Resource Conservation District** (CCRCD) has had four successful grant projects in the Colusa Basin and has continued to take a leadership role in coordinating activities in the watershed for the past ten years. Three of the grant projects were funded by CALFED. The CALFED Sand & Salt Creek Watershed Project and the CALFED Colusa Basin Watershed Project both involved working with landowners to implement conservation practices that addressed water quality and provided a number of educational outreach activities that demonstrated the value of these practices to the agricultural community. The CALFED Watershed Educational Training project provided watershed educational presentations in local schools to show how a watershed functions and how non-point source pollution affects the water quality in the Sacramento River and ultimately the Bay Delta. The CCRCD District Manager has provided assistance will all of the District grants during the past eight years.

Established in 1989, the **Glenn County Resource Conservation District** (GCRCD) provides leadership to help people conserve, improve, and sustain our natural resources, our environment, and our county's economic viability. The GCRCD board comprises seven locally appointed volunteers who are landowners within the District. They provide for local leadership in natural resources management and set priorities to carry out programs based on local conditions and needs. The GCRCD has successfully completed numerous grants, some with the Natural Resources Conservation Service, CBDA Watershed Program, and the Bureau of Reclamation. The GCRCD currently has two grants from the California Bay-Delta Authority, and one from each the Bureau of Reclamation and Department of Reclamation. The projects are in good standing and are assisting in the assessment and monitoring of Stony Creek.

Founded in 1965 as the Point Reyes Bird Observatory, **PRBO Conservation Science** is a non-profit, membership supported, research and conservation institute. PRBO has been conducting long-term monitoring of terrestrial bird populations for more than 39 years. Ongoing programs at PRBO, specifically Palomarin and Southeast Farallon Island field stations, represent two of the oldest databases on land bird populations in North America. Results of these studies have contributed significantly to current protocols now used to monitor and assess bird populations throughout the new world. PRBO biologists have been instrumental in the development, standardization, and validation of the integrated methods of monitoring used for birds. The analyses and interpretation of bird monitoring data and application to bird and habitat conservation have been the focus of recent presentations, publications, and activities of PRBO staff. PRBO staff is also well versed in population dynamic models and conservation planning.

River Partners is a California non-profit corporation founded in 1998 under current Federal 501 (c) (3) regulations dedicated to the mission of creating wildlife habitat for the benefit of people and the environment. River Partners its staff and directors has unique experience that bridges both agricultural and conservation. Six out of our nine board of directors currently depend on agriculture for their businesses, and three quarters of our staff either have worked in agriculture or own farms in the area.

In the last 7 years River Partners has secured $19,000,000 in public and private funding, built a staff of 25 full time employees and developed the organizational capacity to carry out this mission. We work cooperatively with a variety of agency and private landowner partners and engage agribusiness in much of the restoration work. We are in the process of restoring over 3891 acres on 18 separate projects along the Sacramento, Feather, Bear, Stanislaus, Tuolumne, Merced and San Joaquin Rivers. We recently acquired three riverside properties. River Partners' science team has completed fish entrapment studies, Valley Elderberry Long-horn Beetle

surveys, and pre-restoration plans for several agencies. River Partners has the experience, expertise and resources to solve problems and develop meaningful solutions.

Sustainable Conservation advances the stewardship of natural resources using innovative, pragmatic strategies that actively engage businesses and private landowners in conservation. Founded in 1992, Sustainable Conservation has developed a distinctive approach that combines business strategies with environmental priorities. We're committed to this approach because standard tools for solving environmental problems - litigation, legislation, and land acquisition - fail to adequately address the private sector's impact on the environment. Our work spans rural and urban pollution problems, bringing us into contact with a wide variety of businesses and industries. Currently, most of our work focuses on California, but over the next five years, we will expand into other states where our approach can have a positive impact. In California's rural areas, land is more than a natural resource - thousands of people make their living from it. The agriculture industry affects adjacent natural resources, not always for the better. Two of Sustainable Conservation's projects, Dairies and Partners in Restoration, are dedicated to finding environmentally and economically beneficial solutions for rural working landscapes.

BUTTE COUNTY RCD

Pia Sevelius – District Manager

Ms. Sevelius received her B.S. in Environmental Planning and Management from University of California, Davis and her J.D. from Gonzaga University School of Law, Spokane Washington. She has worked with Butte County resource conservation issues for over a decade as a private agricultural landowner, county employee and RCD contractor. Ms. Sevelius is a graduate of the California Agricultural Leadership Program, Class XXIX. Ms. Sevelius is co-owner of GunnHill Farms, LLC. Chico, California (almonds), and Stensgöl Säteri of Eksjö, Sweden (commercial forestry).

COLUSA COUNTY RCD

Patti Turner

Ms. Turner has worked for the Colusa County Resource Conservation District (CCRCD) since 1997. She has been the CCRCD District Manager for the past six years. Her duties as District Manager includes being responsible to the CCRCD Board of Directors for representing, managing and directing the District’s operations consistent with the goals, objectives, procedures and policies established by the Board. She organizes, plans and directs the District’s budget, policies, programs and staff training. She oversees implementation of board policy, District staffing, acquisitions, expenditures and overall program operations. She has written, supervised and managed a number of grants for the CCRCD. Patti has good rapport with the local landowners, NRCS, local government and many other agriculture related partners within Colusa County. She has served as the Secretary/Treasurer for the California Association of Conservation District’s Sacramento Valley Region for the past six years. Besides working for the CCRCD Patti owns and runs her own art related business and holds a current California Real Estate License. She is a Charter member and past Captain of the Colusa County Sheriff’s Search and Rescue Team, current member and past president of the Glenn-Colusa Cattlewomen, current member and past president of Xi Sigma Kappa Sorority, current Secretary/Treasurer of Blue and Gold athletic boosters club and is an Emergency Medical Technician.

GLENN COUNTY RCD

Kandi Manhart, District Manager

Kandi Manhart is the current District Manager for the Glenn County Resource Conservation District and has been since October 2005. Previously she was the Executive Assistant for the Central Sacramento Valley Resource Conservation and Development Council for two years. During that time she also assisted the California Association of Resource Conservation and Development Councils. She is Alumni of California State University, Chico where she obtained a Bachelor of Science Degree in Agriculture Business, emphasized in Marketing, in May 2003. Her qualifications include grant writing, budget creation, management, and implementation; administering and supervising District operations and finances, such as business and personnel files, insurance, updating financial policies, updating personnel policies, records, coordination of monthly Board meetings, office space, and any other administrative activities pertaining to the operation of the District; reporting and communicating to the Directors; and supervising and guiding personnel. She is a well rounded person who believes in quality projects and working in collaboration with other agencies.

Ajay Singh, Watershed Coordinator

Mr. Singh received his B.A. in Geography from the University of Oregon and a M.A. in Geography at CSUC. He has worked locally and internationally in watershed and environmental management for more than eight years. Mr. Singh has worked with landowners in implementing best management practices, conflict management, environmental mitigation, habitat restoration, environmental education, permit coordination, watershed assessments, and monitoring programs. Mr. Singh is also an instructor of geography at the Butte-Glenn Community College.

PRBO CONSERVATION SCIENCE

Geoffrey R. Geupel, Director, Terrestrial Ecology Division

Mr. Geupel received his B.S. in Biology at Lewis and Clark College in Portland Oregon in 1978 and has been employed as a biologist at PRBO for over 24 years. He has over 25 years experience in ornithological monitoring and research and has authored over 35 peer- reviewed publications. Recent publications and presentations have helped define bird-monitoring protocols and applications of monitoring data now used throughout North America. He has taught numerous technical workshops on bird monitoring and currently oversees an annual budget of $1.7 million employing over 40 field biologists. Current areas of interest include breeding and population biology, bird response to habitat restoration, and conservation planning. He is currently: Co-Chair of California Partners in Flight; Board member of the Riparian Habitat Joint Venture, Central Valley Joint Venture, and Sonoran Joint Venture; and member of both the National Cowbird Advisory Council and Important Bird Area (IBA) International Technical Committee.

Chrissy Howell PhD, Conservation Scientist

Ms. Howell first came to PRBO as an intern with the Terrestrial Program in 1991. She has degrees from the University of California, Berkeley (B.A. Biology 1991) and the University of Missouri-Columbia (PhD Ecology 1999). Her doctoral research focused on avian demography and life history evolution in a coastal California population of Song Sparrows. In 2000 she received a National Science Foundation Post-doctoral Fellowship in Biological Informatics to pursue research in collaboration with Missouri Botanical Garden and the International Center for Tropical Ecology at the University of Missouri Saint Louis. Her NSF research focused on the

development and use of spatially explicit models and statistics (applying Geographic Information System technology) as practical tools in coarse-grain conservation studies. She uses these approaches to test hypotheses about the distributions of rare species, conservation reserve design, the implications of global climate change, and fragmentation effects in riparian systems. In 2004 she joined the staff of PRBO as a Conservation Scientist.

Catherine Hickey, Southern Pacific Shorebird Conservation Coordinator
Ms. Hickey first came to PRBO from the University of California, Santa Cruz as an intern with the Terrestrial Program in spring 1993. In winter 1993/94 she began working for the Wetlands Ecology Division as a biologist on the Pacific Flyway Project. She has led Snowy Plover monitoring projects in San Francisco Bay, and on Point Reyes National Seashore and Vandenberg Air Force Base. More recently she completed her M.S. in Conservation Ecology at the University of California, Davis and worked at Manomet Center for Conservation Sciences co-authoring the U.S. Shorebird Conservation Plan.

Data handling and Storage

PRBO and project staff have extensive experience with data base management, in particular with the types of data described in the proposal. Data are entered and proofed daily and are stored in a format compatible with ArcView and ArcInfo Geographic Information Systems (GIS) and SQL-based database systems. Results, reports, and appropriate data will be made available through the PRBO website http://www.prbo.org/cms/index.php. PRBO maintains daily, weekly, and seasonal backup copies of all data collected as standard procedure. Original data sheets are scanned into pdf files at the end of each field season and stored off site. Bird monitoring data and metadata are stored in the California Partners in Flight database, which is part of the California Information Node of the National Biological Information Infrastructure. This is a public access resource and is maintained at the Information Center for the Environment by UC Davis staff (http://cain.nbii.gov/).

RIVER PARTNERS

Tad Alexander – Chief Operations Officer
Tad acquired his B.S. in Agricultural Business and Masters in Business Administration from C.S.U, Chico. He has developed models for projecting future crops as well as developing and monitoring multi million dollar budgets. Mr. Alexander has worked with major Sacramento Valley crops including prunes, almonds, and walnuts. He has worked in the corporate agricultural arena for over 10 years. Tad brings knowledge of agricultural practices as well as a broad understanding of the fiscal requirements an organization in this industry demands.

John Carlon – President
Mr. Carlon obtained a B.S. in agronomy and horticulture from C.S.U., Chico and a M.S. in International Agriculture Development from C.S.U. San Luis Obispo. Mr. Carlon has been engaged in land protection and riparian restoration on the Sacramento River for the last 12 years. He has direct involvement in the acquisition and restoration of over 2,000-acres along the Sacramento River.

Tom Griggs – Senior Restoration Ecologist
Dr. Griggs has 24 years of experience in riparian restoration. He developed the original riparian restoration efforts on the Sacramento River and has been published extensively in professional journals on riparian restoration. He obtained a B.S. in Biology from California Polytechnic

University, Pomona, an M.S. in Botany from C.S.U. Chico and a Ph.D. in ecology from U.C. Davis.

Dan Efseaff – Restoration Ecologist
Mr. Efseaff received a B.S. in Biology from U.C. Davis and a M.S. in Biology from C.S.U. Chico, where he researched the interaction of riparian tree roots with soil types. Mr. Efseaff grew up on a family farm in the San Joaquin Valley and worked in agriculture as a farm foreman as well as summer employment with the Cooperative Extension. Mr. Efseaff has 14 years of broad experience working for natural resource agencies, consulting firms, and research institutions. He has developed sampling programs, prepared ecological risk assessments, conducted botanical surveys and constructed plant designs based on soil types.

Cayle Little - Restoration Field Manager
Mr. Little was raised in a farming community adjacent to the Sacramento River, on a four hundred acre dried plum orchard, where he was intimately involved in both physical and fiscal operations. He graduated from CSUC with a B.S. in Agriculture Science, and will graduate from U. C. Davis in winter of 2006 with a M.S. in Horticulture and Agronomy, specializing in Pomology. Cayle has been a Restoration Field Manager with River Partners since July 2005. Having been actively involved in Northern California agricultural for his entire life, he has a good perspective of the priorities of the local farms, agri-businesses, and understanding of riparian habitats.

Deborah McLaughlin – Controller
Ms. McLaughlin has 19 years of practical experience in accounting work for real estate, office supplies, waste disposal services and agribusiness companies. She obtained her B.S. in Business Administration from California State University, Chico.

Stephen Sheppard – Restoration Field Manager
Mr. Sheppard is a restoration field manager with over 5 years of field and supervisory experience in the San Joaquin Valley. Prior to employment with River Partners, Mr. Sheppard worked and lived on an organic cotton farm. At the same time he also worked for a non-profit that educated cotton farmers on how to control insect pests with the use of beneficial insects. Mr. Sheppard received his Bachelors degree in Agricultural Economics and a Minor in plant science. He has received a Pest Control Advisors (PCA) and a Qualified Applicators License (QAL) from the Department of Pesticide Regulation (DPR).

Tamara Sperber – Restoration Ecologist
Ms. Sperber received a B.S. in ecology from Idaho State University and a M.S. in Land Rehabilitation from Montana State University, where she researched soil properties and soil water dynamics under spotted knapweed and native grasses. Ms. Sperber has 5 years of broad experience working for consulting firms, and research institutions. She is experienced in ecological research and monitoring. She has been with River Partners for two years.

Helen Swagerty – Restoration Biologist
Mrs. Swagerty received a B.S. in Environmental Science from Oregon State University, where her emphasis was in Environmental Geosciences. Mrs. Swagerty has 5 years of experience working for natural resource agencies, consulting firms, and research institutions. She has collected native plant materials for propagation, developed monitoring program protocols, and facilitated activities related to restoration for elementary students.

SUSTAINABLE CONSERVATION

Nicole Martin, Project Manager
Nicole leads the Partners in restoration efforts in Santa Cruz County. Prior to that, Nicole was an environmental analyst with two Bay Area consulting firms, MHA Environmental Consulting and Tetra Tech, Inc. As a consultant, she worked with the public and private sectors to ensure compliance with the California Environmental Quality Act and the National Environmental Policy Act. She received a BS in ecology, behavior and evolution and a BA in economics from the University of California, San Diego. Nicole also holds a MA in environmental management from Yale University.

Carolyn Remick, Program Director, Restoration on Private Lands
Carolyn leads the Partners in restoration efforts in the Salinas, coastal Marin, and Navarro River watersheds. With an extensive background in environmental issues, she brings a breadth of experience in habitat restoration, land use permitting, and environmental dispute resolution. Carolyn has managed restoration and planning efforts at two Bay Area consulting firms, Zentner and Zentner and CONCUR, and specializes in multi-party dialogues on permitting issues. She holds a BS in conservation and resource studies from the University of California, Berkeley and received an MS in geography from the University of Nevada.

Susan Kester manages the Landowner Assurances for Habitat Restoration Project, a cooperative effort between Sustainable Conservation and Environmental Defense. The project works to provide legal protection for landowners from endangered species laws in cases where restoration efforts provide a net gain for endangered species populations. Her past work experience includes: managing a demonstration garden for a popular seed company, teaching and managing a diverse educational farm, and acquiring agricultural conservation easements protecting rangeland from non-agricultural development. Susan received a BA in English Literature from Colgate University and a Certificate in Ecological Horticulture from UC Santa Cruz. She also holds an MS from UC Davis in International Agriculture Development.

Appendix D
Tasks and Deliverables

Goal 1. Identify relationships of site characteristics and management with target species populations.

Objective 1. Identify baseline conditions for 30 sites in each of three land use categories (90 sites total): rice, orchard and range.

- Task 1.1.1. Document baseline site characteristics.
  - Deliverables: a report will be created documenting environmental parameters (e.g. water quality, landscape features, etc,) of the landscape
- Task 1.1.2. Document baseline production management practices.
  - Deliverables: a report will be created documenting agricultural practices of the selected sites.
- Task 1.1.3. Document baseline target species populations (GGS, WPT, VELB, Salmon, Bird Populations).
  - Deliverables: a report will document: 1)GGS and WPT—the first wide-scale systematic surveys of GGS and WPT distribution and abundance in agricultural lands in the Sutter, Butte and Colusa Basins and identify farming practices that maintain habitat and healthy populations of these two important wetland-dependent MSCS species; 2) Bird populations— bird conservation plans, web based databases will be developed; 3) VELB—baseline data of the habitat where these beetles live will be determined, 4) Salmon— assessment of a new statistical technique called geometric morphometrics, which allows us to examine morphological variation using pictures of the organisms under scrutiny.
- Task 1.1.4. Document cost structure associated with management practices.
  - Deliverables: A cost/benefit analysis will be conducted with regard to the management practices associated with each of the land uses
- Task 1.2.4. Conduct correlation analysis among site characteristics, management, and target species populations.
  - Deliverables: A correlation matrix will be developed correlating baseline environmental and management characteristics with target species populations.

Objective 2. Monitor management practices and target species populations

- Task 1.2.1. Monitor ongoing management at all sites
- Task 1.2.2. Monitor target species populations
- Task 1.2.3. Continue correlation analyses among site characteristics, management, and target species populations.
  - Deliverables: A report documenting correlation matrices between agriculture practices and target species populations.

Goal 2. Enhancement of management practices to promote target species populations

Objective 1. Implementation of agricultural and conservation practices

- Task 2.1.1. Apply management practices with the strongest correlations to targeted species populations on sites of cooperating farmers.
  - Deliverable: Implement conservation and agricultural practices on 6-12 sites in the Butte and Colusa Basins and along the Sacramento River.
- Task 2.1.2. Provide regulatory compliance
  - Deliverable: provide farmer with support on environmental permits.

Objective 2. Adaptive management.

- Task 2.2.1. Analyze correspondence between enhanced management practices and target species populations.
  - Deliverable: A matrix that correlates practice to MSCS-covered species and water quality and recommendations to RCD and partnering agencies and organizations.
- Task 2.2.2. Conduct field research to study target species responses to enhanced practices.
  - Deliverable-: Monitoring data on species and water quality response.
- Task 2.2.3. Reanalysis and assessment of implemented practices
  - Deliverable: Recommendations on altering what, when, where, and how to implement practices.

Goal 3. Reduce farmer disincentives associated with implementing conservation practices

Objective 1. Economic analysis

- Task 3.1.1. Conduct cost-benefit analysis of agricultural and conservation practices that comprise economic, agronomic, environmental, and social aspects of implementation.
  - Deliverable: Cost/Benefit analysis for each agricultural and conservation practice.

Objective 2. Outreach

- Task 3.2.1. Conduct landowner and public outreach activities (workshops, site tours, educational publications, educational displays, and presentations).
  - Deliverables: Four workshops to farmers at demonstration sites, four presentations at professional conferences, three presentations at farm shows in the project areas, ongoing (minimum 10) presentations at agricultural and environmental organization meetings within the project area, and continue to work with irrigation and commodity groups to create educational publications (minimum 2).

Objective 3. Regulatory support

- Task 3.3.1. Assist in the development of a coordinated permit process.
  - Deliverable: A coordinated permit for agricultural and conservation practices
- Task 3.3.2. Assist landowners with Safe Harbor Agreements and other protection measures.
  - Deliverable- A programmatic agreement for the Valley Elderberry Longhorned Beetle and the Giant Garter Snake for Butte, Colusa, and Glenn Counties.

Appendix E
Organization Proposals

River Partners Proposal Description for Demonstration Project

Project Overview

River Partners requests $465,000 to develop a demonstration program to work with private landowners to develop or incorporate cost-effective practices to conserve and restore wildlife habitat while preserving or enhancing the economic conditions for agriculture. In addition, River Partners will provide technical guidance for Best Management Practices (BMPs) to other project partners. Since 1998, River Partners has restored over 4,000 acres of land into habitat while working with a variety of agencies and private landowners and has a unique experience with restoration and agriculture.

A number of factors, such as changes in the federal farm bill and economy, water quality and conservation issues, and new farm practices, will encourage landowners in the future to incorporate conservation practices (many of them are already implemented in other areas of the state) on their farms. There are few local models that provide comprehensive information on the cost, benefits, and technical expertise required for landowners that wish to implement these practices successfully on their land.

We envision a demonstration project to work with 2 landowners in each of Butte, Colusa, and Glenn Counties. Each project is tailored to meet the needs of the landowner to help meet objectives for their property. Project sites are used to demonstrate to other producers the benefits of the conservation practices. The project will demonstrate conservation techniques, but also model a process for planning and securing permits, identifying sources of funding, and examination of potential benefits to agricultural operations. We will work with Resource Conservation Districts (RCDs) to identify receptive landowners, and help identify appropriate practices and funding sources. Program goals are described in Table 1.

Table 1. Summary of project goals and objectives for the demonstration project.

Project Goals and Objectives
• Partner with landowners in Butte, Colusa, and Glenn Counties and project partners (RCDs, CSUC) to develop Best Management Practices (BMPs) for habitat conservation.
• Work with landowners to implement 6 demonstration projects (2 in each county) to model cost-effective BMPs.
• Monitor and document the effectiveness of the management practices and the program model.
• Working with the RCDs, use the demonstration sites and landowner experience to educate local landowners on economic opportunities, benefits of practices, and implementation techniques.

We will focus on existing conservation practices that have been successfully integrated into agricultural practices but have not been widely adopted in the area. Of particular interest are practices that promote habitat for the Giant Garter Snake (GGS), although other conservation goals will also be considered. Best Management Practices (BMPs) identified by the research effort at CSUC, the RCDs, and from landowners may also be utilized on appropriate sites. Funding the program provides the opportunity for willing landowners to incorporate these

practices into their operation. For example, planting ditch banks with native vegetation may provide wildlife corridors, benefiting targeted wildlife species (such as giant garter snakes, and upland game birds), improve water quality, reduce weed seed sources, support native insect pollinators, and reduce maintenance efforts and costs.

The program will utilize successful communication and implementation methods from established cooperative farmer communication programs. The project implementation will be a site specific effort. River Partners will work with participant landowners to develop a plan given the agricultural setting and conservation goals for that particular parcel. The demonstration project will provide not only an on the ground example, but also model the steps to successfully implement a project on private land. River Partners will provide planning, assist with permitting, conduct the early implementation of the project, and provide landowner training for maintenance. Working with agency partners, we will develop project funding from existing sources (such as NRCS, USDA, and USFWS). As appropriate, River Partners will conduct some targeted site monitoring, but these locations will serve as excellent sites for CSUC's larger monitoring effort.

A long-term goal is that this information will help build a community of farmers, agricultural professionals, and public institutions, dedicated to the voluntary adoption of flexible practices to provide conservation benefits and maintain long term profitability.

Tasks and deliverables

We have identified the following tasks for River Partners contribution to this project:

1. Project management
2. Implement demonstration project
3. Conduct monitoring and reporting
4. Provide outreach
5. Assist with permit application.

Each of these tasks is described below.

Task 1 – Administer Project Management

Administer project funding, monitor project progress, manage subcontractors, schedule deliverables, and provide progress reports and invoices, schedule deliverables.

Deliverables: Invoices, and communication with CSUC and RCDs on project progress.

Task 2 – Implement recommended agricultural and conservation practices

Implementation requires a number of steps to complete. We describe several key steps below. Working with landowners, River Partners will initiate 6 pilot projects to demonstrate conservation techniques. Appropriate areas include riparian, wetland, and agricultural lands.

River Partners will complete a site-specific plan for each demonstration unit. Landowner input and consideration of the local setting will be important components of selecting the management practices. As a demonstration with potential effects that may ripple throughout the watershed, the plan will be an important communication tool. River Partners anticipates considerable consultation with local landowners and RCDs, to gain a good understanding of local concerns and available resources. We hope that this approach will yield solutions that meet landowner and watershed objectives and capitalize on local resources and knowledge.

The plan will:

- Briefly evaluate site conditions.
- Identify potential funding sources for implementation and maintenance.

- Develop conservation goals for the site.
- Identify and describe recommended conservation practices.
- Outline the implementation of practices.
- Identify the location and acreage of treated areas on the site.
- Detail monitoring efforts and long term management practices.

Appropriate practices will originate from a variety of sources including the NRCS Technical Guide, the Department of Fish and Game's (DFG) *California Salmonid Stream Habitat Restoration Manual* (1994), practices developed by landowners and River Partners, and suggestions from the technical team.

Recommended techniques will be selected based on ones that are likely to be successfully implemented based on goals and characteristics, landowner concerns, available local resources, and the available budget. Ultimately the selection and implementation of techniques will rest with the demonstration landowner.

River Partners will assist the landowner with the initial steps of implementation and train landowners so that they can embrace the long-term maintenance. River Partners will blend active restoration techniques, modern farming practices, and conservation science to effectively establish habitat enhancements.

The selection of sites will be developed in consultation with the RCDs, but some entities (such as irrigation districts, Rancho Llano Seco) have indicated a potential interest in participation. We anticipate the creation (at a minimum) of the following habitat types:

- 16,000 linear feet of revegetated canal or ditch bank (Figure 1).
- 20 acres of grassland, riparian, or wetland habitat.

Ideally these areas could be combined to provide nodes of larger habitat along wildlife corridors. It is critical that these plantings enhance the agricultural operation. For example, the area along canals could be planted with native grasses (such as creeping wildrye or deer grass), and forbs (such as gumplant or mugwort) that would reduce erosion, improve water quality, and provide wildlife corridors without impacting (and perhaps reducing the need for) maintenance operations. Riparian habitat may be appropriate in "waste" areas or to provide a buffer between crops and the river. Vegetated strips can provide protection from debris, sedimentation, or erosion, reduce pollutants in runoff, and host beneficial insects. River Partners completed a 3 acre project in 2003 on River Ranch in Glenn County (Figure 2). The riparian planting (shown in year 2) was incorporated into walnut orchard in a swale and along the bank of the Sacramento River and serves as an example of how riparian habitat can enhance ag operations by minimizing flood impacts (Figure 2).

Deliverables: Draft and final site plan for each demonstration area, six demonstration projects (2 in each county).

Task 3 – Conduct Monitoring and Reporting

A) Monitoring

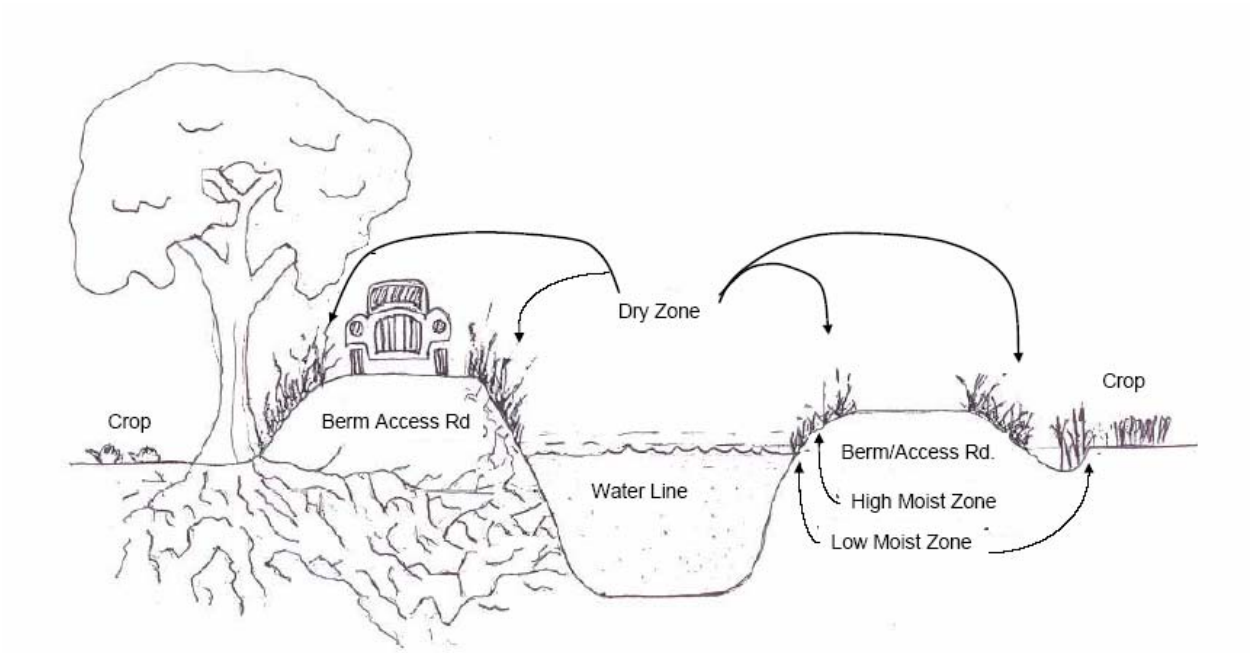
We propose the following monitoring measures on each demonstration site:

- Establish photopoint locations to illustrate project progress (pre- and post-treatment photographs).
- Estimate plant cover and/or survivorship (i.e. using cover classes, or sampling of the number of plants).
- Conduct a time and material analysis to develop estimates for effectiveness, cost, and level of effort.

With landowner concurrence, the demonstration sites provide opportunities for monitoring by our partners and that information will be incorporated into the project. For example, GGS monitoring and evaluation of the habitat may provide additional information to evaluate the practice. Whenever possible (and especially for ditchbank projects), we will utilize reference sites for comparison.

Because each landowner may wish to pursue different goals (for example, one landowner may wish to minimize weed cover and promote upland game habitat another may wish to reduce bank erosion and maintenance costs) and some practices may require several years before they can even be assessed, we will provide a qualitative assessment of the practice. Alternatively some simple, screening level efforts (for example, a habitat assessment for target species, wildlife counts, or bank measurements for erosion projects) may be incorporated into the monitoring.

Figure 1. Diagram of Proposed Ditchbank Planting.



(Adapted from illustration from John Anderson, Hedgerow Farms).

Figure 2. Photo of River Ranch Planting (2002).

B) Reporting

River Partners will complete an End of Season Report and a Final Project Report. The reports will summarize activities on each of the demonstration sites and help distill some of the information for outreach activities. Key functions of the reports are to:

- Communicate implementation activities to our partners,
- Describe the funding model used to implement the projects,
- Document the completion of project milestones,
- Present the monitoring results,
- Evaluate the effectiveness of field activities (including target species monitoring),
- Provide a cost estimate of practices, and
- Recommend specific actions (adaptive management recommendations) to meet the project objectives.

Summarizing the project will allow us to communicate the findings of the project to participants. The reports will be written in such a manner to allow for easy translation into educational material for the workshops.

Deliverables: Completion of monitoring activities, Preliminary and Final Project Report.

Task 4 – Provide Outreach

This task covers the coordination and outreach with landowners, RCDs, and researchers will be critical to communicate the project to a larger audience. We intend to use existing agricultural communication models of utilizing landowners to communicate to fellow

landowners. River Partners will support RCD efforts by utilizing the information generated during the project to develop materials and presentations for workshops and informal meetings.

River Partners will work with the RCD Coordinator to develop educational guides and handouts and the content for the meetings. This is a great opportunity to empower local landowners.

Deliverables: Participation in 4 workshops, provide informal consultation with other landowners, development of handout materials and brochure, consultation with partners on developing Best Management Practices.

Task 5 – Assist with Permit Applications

As permits are the responsibility of the landowner, River Partners will play a limited role. River Partners will provide information and guidance developed during planning phase to assist landowners to complete permit applications. In addition, River Partners will provide some technical support to the RCDs in their effort to explore a programmatic Safe Harbor Agreement (SHA).

Deliverables: Consultation time with landowners and RCDs, supporting documentation for selected permits and SHA, meetings with agency personnel at key meetings with RCDs.

Cost Estimate

Table 2. Proposed budget for the BMPs demonstration project for Butte, Colusa, and Glenn Counties, California.

Task	Description	Amount
1	Project management	$ 50,000
2	Implement demonstration project	$287,500
3	Conduct monitoring and reporting	$ 45,800
4	Provide outreach	$ 66,700
5	Assist with permit application	$ 15,000
Total		**$465,000**

Project TimeLine

We propose a three year timeline to complete this project. Selection of sites and coordination with landowners and RCDs will occur throughout the project. Outreach and coordination with landowners and RCDs will be an important component of the project. Selection of sites will occur within the first few weeks of the project.

Background

River Partners is a California non-profit corporation founded in 1998 under current Federal 501 (c) (3) regulations dedicated to the mission of creating wildlife habitat for the benefit of people and the environment. River Partners its staff and directors has unique experience that bridges both agricultural and conservation. Six out of our nine board of directors currently

depend on agriculture for their businesses, and three quarters of our staff either have worked in agriculture or own farms in the area.

In the last 7 years River Partners has secured $19,000,000 in public and private funding, built a staff of 25 full-time employees and developed the organizational capacity to carry out this mission. We work cooperatively with a variety of agency and private landowner partners and engage agribusiness in much of the restoration work. We are in the process of restoring over 3891 acres on 18 separate projects along the Sacramento, Feather, Bear, Stanislaus, Tuolumne, Merced and San Joaquin Rivers. We recently acquired three riverside properties. River Partners' science team has completed fish entrapment studies, Valley Elderberry Long-horn Beetle surveys, and pre-restoration plans for several agencies. River Partners has the experience, expertise and resources to solve problems and develop meaningful solutions.

COLUSA COUNTY RCD
PROPOSAL NARRATIVE

Project Description

Farmers and wildlife will both benefit through the support of sound research, educational outreach endeavors and by resolving the disincentives that hinder the integration of agriculture and ecosystem restorations. To truly assist Farmers in integrating ecosystem restoration practices with agriculture on a more common basis four of the following elements must be demonstrated; a benefit to the agricultural producer, protection from further regulatory actions, ease of implementation requirements, and the total cost of the activity must not exceed the benefit to the Farmer over an acceptable amount of time. Ecosystem restoration that would typically benefit a farmer would include practices to control erosion that prevents the loss of farmable ground and infrastructure, removal of noxious weeds, conserve water and/or address water quality, decrease production and maintenance expenses, increase production yields and enhance wildlife habitat that could potentially provide economic opportunities and/or enjoyment to the landowner. However, the majority of the agricultural community views the enhancement of wildlife habitat as a benefit to the public good and fears exposure to disincentives that could be detrimental to the farming operation. Farmers feel they are already doing a lot of good things for the environment and want to be recognized for what they are doing. Research can quantify these claims, acknowledge the conservation practices that are most beneficial to wildlife and provide data to support the economic value of agriculture's many contributions to the ecosystem.

The Colusa County Resource Conservation District's (CCRCD) Directors and Staff put a high value on their ability to work with the local landowners. The CCRCD has gained the trust of the local farming community and keeping that trust is a top priority. The CCRCD continually strives to obtain landowner input to keep the District's projects and USDA Farm Bill programs focused on local conservation priorities. Proceeds from this grant will enable the CCRCD to hire a fulltime Project Manager to provide services that will assist Farmers in integrating ecosystem restoration conservation practices with agriculture in the Colusa Basin. The Colusa Basin Project Manager (CBPM) will be housed in the Colusa NRCS/CCRCD office. The CBPM's work space, utilities, use of office equipment and use of a part-time vehicle will be furnished by the NRCS. The CCRCD District Manger will provide a limited amount of hours to assist the CBPM with landowner outreach activities.

The CBPM will solicit and enlist rice, orchard and rangeland agricultural producers to participate in CSUC research projects. The CBWP will obtain written agreements with interested farmers that will provide accessibility to the property and landowner assurance of confidentiality in exchange for their participation in the project. This condition is vital to the CCRCD's ability to obtain participation from an agricultural community that is very concerned about possible ramifications of further regulatory actions. Research sites will be identified by a number which will not be released outside of the CCRCD and CSUC. The CBPM will serve as the go between for the Farmers and CSUC faculty and staff.

The implementation of conservation practices will also play a vital role in assisting Farmers integrate ecosystem restoration with agriculture. CCRCD puts a high value on getting conservation on the ground. The CBPM will solicit the participation of 3-6 Farmer to implement conservation practices on their lands. Potential sites could be included in the CSUC's study depending on timing and how well they fit into the research criteria. The CBPM will work with the NRCS and other partners to select and assist participating Farmers in the development of conservation plans, provide technical assistance, and provide project oversight throughout the implementation process.

The Colusa Basin will allocate a total of $525,000 of the ERP grant funding to provide direct financial assistance to the landowners. The ERP funding will be pooled with USDA Farm Bill program assistance to provide for the implementation of wildlife friendly conservation practices on selected sites. Farm Bill Programs administered by the Natural Resources Conservation Service such as the Environmental Quality Incentive Program (EQIP) and the Wildlife Habitat Incentive Program (WHIP) will be utilized along with the Landowner's in-kind contribution when applicable. EQIP provides 50% cost-share and WHIP provides 75% cost-share. Farmers who have Conservation Security Program (CSP) contracts may also become eligible to increase their incentive payments by applying additional conservation practices on their land. The Sacramento-Stone Corral, Hydrological Unit Catalog (HUC) was selected in 2005 to participate in CSP when it was offered for the first time in California. The Colusa Basin makes up the majority of this HUC's landmass. There are currently 166 CSP contracts in the HUC that will be in effect for the next 5-10 years. Many of these landowners have already expressed interest in enhancing conservation on their property.

The CCRCD is currently working with three landowners that are interesting in implementing ecosystem restoration practices on their agriculture property. These landowners want to enhance wildlife habitat along riparian corridors in agricultural landscapes that could benefit species of concern. These project sites, if selected, will install native riparian vegetation, address weed control, install erosion control practices in the waterway, and establish permanent perennial vegetation for wildlife habitat. Species of concern that could benefit from these projects include; Giant Garter Snake, Valley Elderberry Longhorn Beetle, Swainson's Hawk, Willow Flycatcher, Western Yellow-Billed Cuckoo, Bank Swallow and Western Pond Turtle. Two of the landowners are motivated by increased sport hunting opportunities and the other's desire is to increase CSP enhancement payments. However, the final selection of implementation sites will be dependent on Farm Bill program ranking criteria for the 2007 and 2008 program years, potential program changes in the pending 2007 Farm Bill, total funds allocated within the Colusa Basin, timing of contract approval and the implementation of practices, and the landowner's success in executing a contract with the NRCS.

The CBPM will participate in Stakeholder and Local Workgroup Meetings that will help define the criteria of the local Farm Bill programs. The CCRCD is confident that the sites selected to participate in this project will receive priority ranking for inclusion in the Farm Bill programs. The CCRCD's knowledge and experience in working within the constraints of the conservation programs, proximity to NRCS and the long standing rapport with the NRCS will be vital in coordinating funding cycles with on the ground implementation activities.

The CBPM will provide extensive educational outreach activities within the agricultural community throughout the duration of the project. CSUC's research data will be utilized to promote sound conservation practices that benefit wildlife, including the species of concern and address disincentives associated with their implementation. The implementation sites will be utilized to demonstrate how Farmers can apply conservation practices to their property. The CBPM will facilitate a minimum of three workshops and tours during the span of the project. Outreach will also include the production of at least three newsletters, three newspaper articles and three presentations to agricultural based organizations. The CBPM will regularly attend the meetings of local agriculture related organizations to establish informal communication channels with the memberships. Exhibits will be provided at the 2007 and 2008 Colusa County Farm Shows to reach a large number of agricultural producers from a broad area across California. The Colusa County Farm Show has been in operation for over 40 years and is the oldest running show in the West. The CBPM will provide exhibits that promote wildlife friendly conservation practices and information about the Giant Garter Snake and other wildlife commonly found in

the Colusa Basin. The rental fee for the CCRCD's educational exhibit, as in past years, will be furnished by the 44th District Agricultural Association.

To assist agricultural producers in the rangelands of the Colusa Basin the CBPM will work with local landowners and other stakeholders to facilitate the development of Oak Woodland Management Plans. The California Oak Woodland Conservation Act adopted in 2001 recognized that the loss of oak woodlands as having a critical impact on a wide range of wildlife species that are dependent on this type of habitat. The plan will promote and encourage oak woodland conservation and provide sustainability through a voluntary approach. Once a plan is created and adopted by the local governments there will be funding opportunities available through the Wildlife Conservation Board for projects that conserve and restore oak woodlands.

The CBPM will investigate further grant funding opportunities and develop and submit a minimum of two project proposals to continue to assist Farmers with the implementation of ecosystem restoration practices with agriculture in the Colusa Basin and provide educational outreach endeavors to optimize long-term sustainability.

CBPM will work with NRCS to attempt to secure long-term financial support from the 2007 Farm Bill programs to serve as cash match for ARI funding through CSUC to continue the research components of this project.

Applicability to CALFED Bay-Delta Program

Colusa Basin is contained in the Sacramento River priority area and is identified as a priority area for the giant garter snake. The long-term ecological health of the Delta depends on the health of its component parts. The Colusa Basin Ecological Zone contribution to the health of the Sacramento-San Joaquin Delta and Sacramento River Ecological Management Zones will increase after its ecological processes, habitats, and ability to support sustainable fish, wildlife, and plant communities are improved. The Colusa Basin Ecological Management Zone supports the Bay-Delta by contributing flow and sediment, and by providing riparian and riverine aquatic and wetland habitat that supports a wide variety of wildlife. (CALFED Volume II: Ecosystem Restoration Program Plan, Colusa Basin Ecological Management Zone Vision, July 2000).

The Colusa Basin Drainage area contains vital waterfowl and wetland habitats, and has some of the highest concentrations of giant garter snakes in the Central Valley (CALFED Volume II: Ecosystem Restoration Program Plan, Colusa Basin Ecological Management Zone Vision, July 2000). **Also from the same document:** List of Species to Benefit from Restoration Actions in the Colusa Basin Ecological Management Zone..Lamprey, GGS, native anuran amplibians, native resident fishes, neotropical migratory birds, waterfowl, plants and plant communities.

GENERAL INFORMATION ABOUT THE COLUSA BASIN

The Colusa Basin Watershed covers approximately one million acres and extends into portions to Colusa (50%), Glenn (35%) and Yolo (15%) counties. It is comprised of many natural and man-made waterways that drain into the Sacramento River. The Sacramento River is California's largest river and provides the bulk of the Bay-Delta water supply, and contributes approximately 80% of the inflow to the Delta. The Colusa Basin Drain is the main watercourse within the watershed that transports agricultural and storm run-off into the River. Both the Colusa Basin Drain and Sacramento River are listed as impaired water bodies in the EPA's 303(d) list. The Colusa Basin Drain contains eight pollutant/stressors listed as key constituents or concerns. The Central Valley Regional Water Quality Control Board has also identified four locations within the HUC as "toxic hot spots" based on water and sediment sampling conducted during a water quality investigation program that focused on agricultural drains.

The watershed provides important habitat for a variety of migratory species including waterfowl, wetland and riparian dependent species and listed species

Qualifications and Organization

The CCRCD has had four successful grant projects in the Colusa Basin and has continued to take a leadership role in coordinating activities in the watershed for the past ten years. Three of the grant projects were funded by CALFED. The CALFED Sand & Salt Creek Watershed Project and the CALFED Colusa Basin Watershed Project both involved working with landowners to implement conservation practices that addressed water quality and provided a number of educational outreach activities that demonstrated the value of these practices to the agricultural community. The CALFED Watershed Educational Training project provided watershed educational presentations in local schools to show how a watershed functions and how non-point source pollution affects the water quality in the Sacramento River and ultimately the Bay Delta.

The CCRCD District Manager has provided assistance will all of the District grants during the past eight years.

Glenn County RCD ERP Coordinated Permit Proposal for Butte and Colusa Basins

Project Description

Habitat degradation for endangered species in the Butte and Colusa Basins has been associated with the removal of native vegetation in order to maximize yields and reduce pest species on agricultural lands. In order to alter the present condition of streams and wetlands to help solve this problem, environmental permits need to be acquired. This creates a major disincentive for individual farmers because of the cost, time, and expertise needed to acquire those permits.

This project will facilitate the increase native habitat for endangered species by implementing and promoting an expedited permitting process for conservation practices. The Butte-Colusa Permit Coordination Program will provide a "one-stop shopping" for regulatory compliance to landowners willing to improve the natural resource conditions on their lands. This program will further promote stewardship among private landowners by removing a major barrier to environmentally beneficial work – the time, cost and complexity of complying with multiple state and federal permits. The Glenn RCD will work with regulatory agencies to create a blanket permit or package permit for landowners to apply to. The RCD will then help landowners fill out and comply with permit requirements and also do long-term monitoring.

The NRCS and RCD have long served as a point of contact for technical advice and cost-sharing for restoration projects in Butte, Colusa, and Glenn Counties. This proposal builds on regulatory coordination initiatives currently underway or completed by the Sustainable Conservation and the Natural Resources Conservation Service (NRCS) in the Elkhorn Slough, Salinas River, Navarro River, and Morro Bay watersheds.

Goal

To develop a coordinated permit for a list of identified conservation practices to help integrate agricultural practices with ecosystem restoration in the Butte and Colusa Basins.

Objectives

1. Train one coordinator and create local capacity in environmental compliance and permitting with the support of Sustainable Conservation.
2. Work with NRCS, River Partners, and CSUC to identify conservation practices that will integrate agriculture and ecosystem restoration.
3. Organize and carry out workshops to work with regulatory agencies to develop environmental compliance measures and a coordinate permit that will facilitate the permit process for individual farmers in the project area.
4. Provide permit support and expertise for individual projects funded by this grant for farmers within the project area

Scope of Work

1. Project Management

The Glenn County RCD will hire a Permit Coordinator who will develop a coordinated permit for conservation practices identified by through this project as being beneficial to the overall project goals and provide support for landowners participating in implementing practices through this grant. The Permit Coordinator will work with permitting agencies and the NRCS to develop a permitting process that reduces the time and cost for farmers to implement

Task Products: Quarterly Reports

2. Workshops

The Permit Coordinator will organize and facilitate a series of permit workshops with regulatory agencies to develop a coordinated permit.

Task Products: Coordinated Permit and Environmental Compliance Measures

3. Permit Support for Farmers

The Permit Coordinator will provide support for farmers doing conservation practices that are funded through this grant. This will help get projects funded by this grant on the ground in a timely manner.

Task Products: Permits for Projects Funded Through This Grant

Performance Measures

The Glenn RCD and Sustainable Conservation will develop a task plan and deliverables schedule to gage progress in acquiring a coordinated permit and individual permits for projects funded through this grant.

Feasibility

Sustainable Conservation has been working with and training RCDs in California for more than four years and is the leader in the coordinated permit process. The Glenn RCD has been trained by Sustainable Conservation and is involved in the process of creating a coordinated permit for the Stony Creek Watershed. The Glenn RCD will continue developing coordinated permits for the Butte and Colusa Basins.

In the long-run this project will allow RCDs to help agricultural landowners apply and comply with environmental permits. When this project is completed the RCD will have the knowledge and expertise to continue this project in other areas and for other conservation practices that will help agriculture integrate with ecosystem restoration.

Yolo County's Reclamation District 108 Levee Revegetation Project

Proposed for inclusion in CSU Chico 2005 'Working Landscapes' proposal

Yolo County's Reclamation District 108 boasts one of the richest water delivery networks along the Sacramento River. Yet, like other water districts, there are valid concerns over erosion, sedimentation, and nutrient build-up in the system. Calfed goals to sustain and restore wildlife habitat and improve water quality in the Sacramento and San Joaquin Rivers are greatly affected by the vast acreages of agricultural land beyond the river corridor and the irrigation supply and drainage canal system.

These lands are key to greater water quality demands, future waterfowl populations in the Central Valley Flyway, and many other species dependent on disappearing valley habitats, including Giant garter snake. The Yolo County RCD and Reclamation District 108 have joined forces to achieve these goals on a demonstration site within Reclamation District 108:

- Provide channel stability on a major drainage canal
- Create sustaining wildlife habitat
- Control weeds and erosion
- Reduce chemical and physical maintenance costs

The effective use of native vegetation and bioengineering methods transform weedy areas typically managed by spraying and scraping into sustainable, manageable systems that work with intensive agriculture. The project site is 0.8 mile of eroding lateral canal levee to be reshaped to a 3:1 slope (see image) and both sides (field and canal) planted to native grasses, sedges, and rushes. RD 108 will provide more than 50% of the cost of this work through the earthmoving and site preparation tasks. Under a subcontract to the Glenn County RCD, the Yolo County RCD, with local partners, will install the vegetation and maintain it for the first 3 years of growth, after which RD 108 will incorporate the vegetated levee into its routine vegetation maintenance program as it has on other sites established cooperatively with the Yolo Co. RCD in prior projects. The District holds all of the necessary permits for conducting this work.

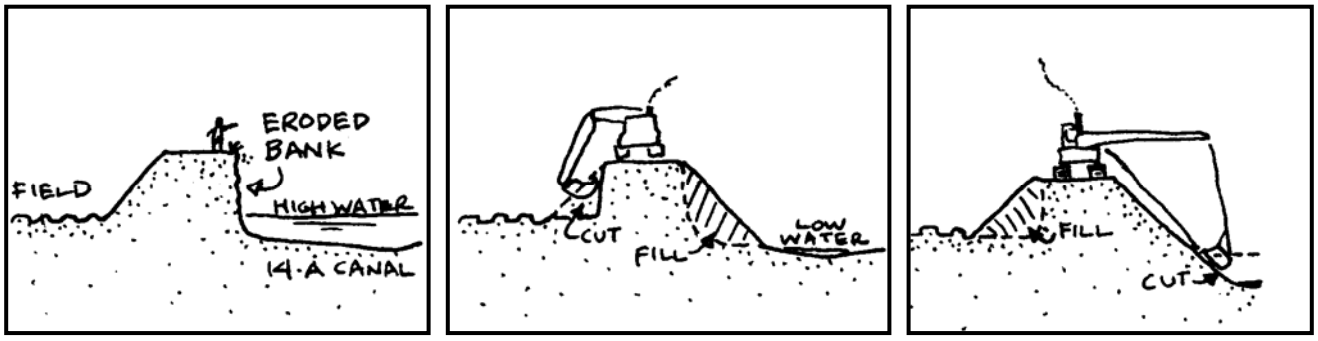


***Figure**: Levee Reshaping to be undertaken by RD 108 prior to planting on 14-A Canal. Eroded bank (to be planted with natives) is built out to 3:1 slope with soil excavated from opposite side of levee, which is later rebuilt with excavated silt from canal.*

PRBO Conservation Science

PRBO Conservation Science will provide the following deliverables:

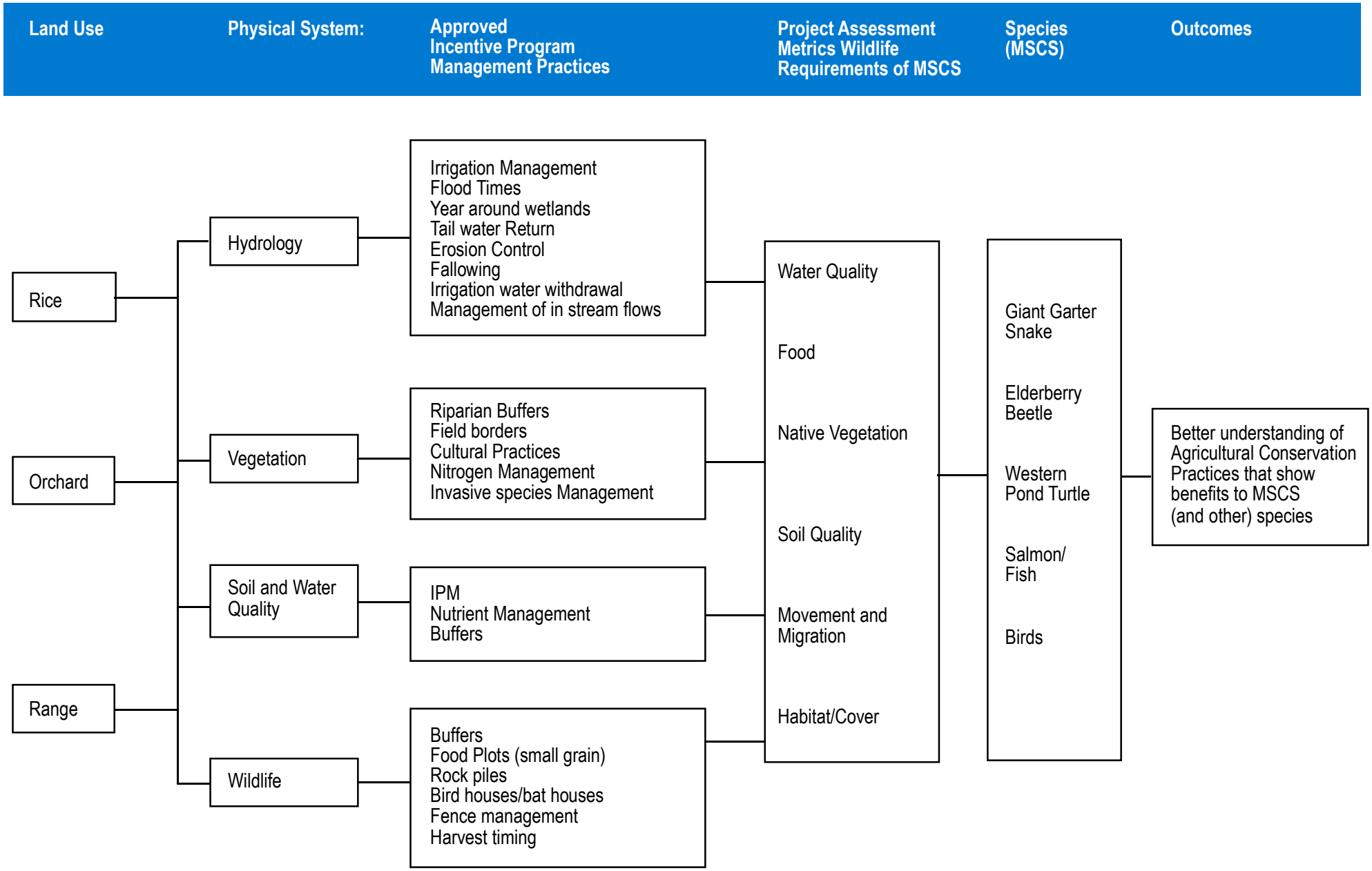
- A dataset integrating bird and vegetation data collected for the project by PRBO that includes abundance patterns, species richness, and abundance trends. This will include also be broken down by agricultural practices/land types.
- Report on habitat associations of birds utilizing different agricultural land types including the influence of agricultural practices on avian abundance, richness, and distribution patterns.
- Report based on overall results that makes recommendations to private landowners on bird-friendly agricultural practices for breeding and wintering birds.

Appendix F
Timeline

TASK	2007				2008				2009			
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct
Task 1.1.1.	Documentation of baseline site conditions											
Task 1.1.2.	Documentation of baseline management practices											
Task 1.1.3.	Documentation of baseline target species populations											
Task 1.1.4.	Documentation of cost structure associated with management practices											
Task 1.1.5.				Correlation analysis of baseline site/population data								
Task 1.2.1.					Monitor ongoing management at all sites							
Task 1.2.2.					Monitor target species populations							
Task 1.2.3.								Analysis of monitoring data				
Task 2.1.1.					Implement enhanced management practices							
Task 2.1.2.					Provide regulatory compliance							
Task 2.2.1.				Analyze correspondence between enhanced management practices and target species populations								
Task 2.2.2.					Conduct field research to study target species responses to enhanced practices.							
Task 2.2.3.								Reanalysis and assessment of implemented practices				
Task 3.1.1.					Conduct cost-benefit analysis							
Task 3.2.1.			Conduct landowner and public outreach activities									
Task 3.3.1.			Assist in the development of a coordinated permit process.									
Task 3.3.2.			Assist landowners with Safe Harbor Agreements and other protection measures.									

Appendix G
Conceptual Model

Conceptual Model Of the Research and Implementation Project



Appendix H
Resumes of Key Personnel

CURRICULUM VITAE

Lee S. Altier
Professor
Phone: 530 898-4137
Fax: 530 898-5845
Email: laltier@csuchico.edu

College of Agriculture
California State University, Chico
Chico, California, USA 95929-0310

Education

Cornell University	Ph.D.	Horticulture	1992
Cornell University	M.S.	Horticulture	1990
Washington State University	B.S.	Horticulture	1979
University of Washington	B.A	Anthropology	1977

Professional Experience

Professor, College of Agriculture, California State University, Chico, CA	2004-present
Associate Professor, College of Agriculture, California State University, Chico, CA	1999-2004
Assistant Professor, College of Agriculture, California State University, Chico, CA	1995-1999
Research Horticulturist, USDA/ARS Southeast Watershed Research Lab, Tifton, GA	1992-1995
Graduate Research and Teaching Assistant, Cornell University	1986-1992
Farm Inspector, Organic Farm Certification Pgm., Natural Org. Farmers Assoc. of NY	1987-1990
Project Supervisor, Specialty Crops Program, Dept. of Vegetable Crops, Cornell Univ.	1987
Horticulture Extension Agent, U.S. Peace Corps, Nepal	1982-1985
Farm Director, Navajo Mission Academy, Farmington, NM	1980
Orchard Manager, Bennett Orchards, Manson, WA	1979

Distinctions

Agricultural Research Initiative Grant, *Glenn County Surface Water Stewardship Project*, CSU, Chico, CA	2003-2006
Fulbright Alumni Initiative Award, *An Online Exchange Program in Agricultural Globalization*	2003
Exemplary Online Instruction Award, CSU, Chico	2003
CELT Teaching Grant, *Certification in Holistic Management*, CSU, Chico, CA	2002, 2001, 2000
Fulbright Senior Scholars Fellowship, *Sustainable Agric. Systems Development*, Chiang Mai, Thailand	2001
Agricultural Research Initiative Grant, *REMM User Interface Development*, CSU, Chico, CA	2000

Professional Organization Membership

American Society for Horticultural Science
American Society of Agronomy
Sigma Xi Scientific Research Society (secretary of CSU, Chico Chapter, 1997; president of the CSU, Chico Chapter, 1998-2001)

Recent Professional Service

Reviewer for American Association of Agricultural Engineers	2004
Fulbright Scholar Program, Plant Specialist Review Committee member, Council for International Exchange of Scholars, Washington, D.C.	2003, 2004
Reviewer for the Journal of the American Water Resources Association	2001, 2003, 2005
Grant Reviewer for the Armenian-U.S. Bilateral Grants Program, U.S. Civilian Research & Development Foundation (CRDF).	2002
USDA-CSREES grant review panel member, July 8-11, Washington D.C.	2001
Reviewer for state-wide CSU Agricultural Research Initiative proposals.	2001

Recent Professional Presentations

Financial Planning for Profit, three day workshops for farmers and ranchers, Glen, Colusa, Yreka County Resource Conservation District Offices	2002-2005

Scientific Writing Workshops, two-week programs for graduate students in the Dept. of Agronomy, Chiang Mai University, Chiang Mai, Thailand 2003, 2004, 2005

Developing Effective Online Courses, an invited campus-wide presentation at Chiang Mai University 2003

Developing Research with Impact, an invited presentation to the Multiple Cropping Centre, Chiang Mai University 2003

Holistic Management, a one-day training session for NRCS personnel, NRCS Willows Field Office. 2003

Beyond Management: Training to Think Holistically, presentation at the Western Region Teaching Symposium, UC, Davis 2002

Agricultural Instruction on the Internet: Adjusting to New Media! A presentation at the Western Region Teaching Symposium, UC, Davis 2002

Online Education: Assessment of WebCT Communication Tools, presentation at the Western Region Teaching Symposium, UC, Davis 2002

Scientific Writing Workshop, a three-day program for Ph.D. candidates in the Dept. of Agronomy, Chiang Mai University, Chiang Mai, Thailand 2002

Improving the Sustainability of Agriculture, an invited presentation at the National Institute for Plant Protection, Hanoi, Vietnam 2002

Organic Farming in the Tropics, a presentation at the National Institute for Soils and Fertilizers, Hanoi, Vietnam 2002

Can University Education Benefit from Web-Based Instruction? An invited presentation in the Department of Information Technology, University of Agriculture and Forestry, Ho Chi Minh City, Vietnam 2002

Is Organic Horticulture Sustainable? Possibilities for Production in the Tropics, an invited presentation to the Faculty of Agriculture at Khon Kaen University, Khon Kaen, Thailand. 2002

The Water Quality Functions of Riparian Buffer Systems, an invited presentation in the Dept. of Agro-Industrial Technology at King Mongkut's Inst. of Technology, Bangkok, Thailand 2002

Peer Reviewed Publications

Altier, L.S. and S.P. Inamdar. 2002. Soil temperature. p. 131-135. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Altier, L.S., R.R. Lowrance, and R.G. Williams. 2002. Soil nutrients: carbon. p. 66-92. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Altier, L.S., R.R. Lowrance, R.G. Williams, S.P. Inamdar, and R.K. Hubbard. 2002. Soil nutrients: nitrogen. p. 93-112. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Altier, L.S., R.R. Lowrance, S.P. Inamdar, R.G. Williams, and R.K. Hubbard. 2002. Soil nutrients: phosphorus. p. 113-130. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Altier, L.S. and R.G. Williams. 2002. Hydrology module—interception and evaporation. p. 23-36. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Altier, L.S., R.G. Williams, and R. Lowrance. 2002. Litter and sediment interactions. p. 55-65. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Altier, L.S., R.G. Williams, and R. Lowrance. 2002. Vegetation: photosynthesis and carbon allocation. p. 136-176. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Altier, L.S., R.G. Williams, and R. Lowrance. 2002. Vegetation: growth and development. p. 177-216. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Bosch, D.D., R.G. Williams, S.P. Inamdar, L.S. Altier and R. Lowrance. 2002. Sediment transport. p. 37-54. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Williams, R.G., J.M. Sheridan, S.P. Inamdar, D.D. Bosch, R. Lowrance, R.K. Hubbard, D.L. Thomas, and L.S. Altier. 2002. Hydrology: surface and subsurface water movement. p. 12-20. In: Altier, L., R. Lowrance, R.G. Williams, S.P. Inamdar, J.M. Sheridan, D.D. Bosch, R.K. Hubbard, and D.L. Thomas. 2002. Riparian Ecosystem Management Model: Simulator for Ecological Processes in Riparian Zones. USDA Conservation Research Report No. 46, USDA-ARS, Washington, D.C.

Inamdar, S.P., J.M. Sheridan, R.G. Williams, D.D. Bosch, R. Lowrance, L.S. Altier, and D.L. Thomas. 2000. Evaluation of the Riparian Ecosystem Management Model (REMM): I. Hydrology. Trans. ASAE 42:1679-1690.

Inamdar, S.P., R. Lowrance, L.S. Altier, and R.G. Williams. 2000. Evaluation of the Riparian Ecosystem Management Model (REMM): II. Water quality and nutrient cycling. Trans. ASAE 42:1691-1708.

Lowrance, R.R., L.S. Altier, R.G. Williams, S.P. Inamdar. 2000. The Riparian Ecosystem Management Model. J. Soil Water Cons. 55:27.

Lowrance, R.R., L.S. Altier, J.D. Newbold, R.R. Schnabel, P.M. Groffman, J.M. Denver, D.L. Correll, J.W. Gilliam, J.L. Robinson, R.B. Brinsfield, K.W. Staver, W.C. Lucas, and A.H. Todd. 1997. Water Quality Functions of Riparian Forest Buffers in Chesapeake Bay Watersheds. Environ. Mgmt. 21:687-712.

Non-Peer Reviewed Publications, Videos, and Abstracts

Gilbert, K.D., D.L. Brown, L. Altier, and M.N. Oliver. 2003. Effectiveness of vegetated buffer strips in reducing dormant season orthophosphate pesticide loading to surface waters in Glenn County, northern California. 2003 Fall Meeting of the American Geophysical Union, San Francisco, CA. (abstr.)

Altier, L.S. and M. Bell, Riparian management. 2003. (a training video developed for the USDA-NRCS)

Altier, L.S. and M. Bell, Rangeland biodiversity. 2003. (a training video developed for the USDA-NRCS)

Altier, L.S. and M. Bell, Rangeland monitoring. 2003. (a training video developed for the USDA-NRCS)

Pinay, G., T. Burt, J. Baudry, P. Merot, J. Verhoeven, S. Sabater, A. Hillbricht-Ilkowska, A. Vadineanu, A. Parriaux, N. Haycock, L. Altier, and E. Maltby. 2001. Nitrogen Control by Landscape Structures in Agricultural Environments (Research Programme 1997-2000, ENV4-CT97-0395). Report submitted to the European Union, Brussels.

Altier, L.S. and C. Poteet. 2001. Agricultural Offsite Impacts: Using REMM to Assess Control of Water Quality. Annual Meetings of the American Society for Horticultural Science. (abstr.)

Altier, L.S., S.M. Griffith, P.J. Wigington, Jr., and C. Poteet. REMM Simulation and Analysis of Riparian Management in the Northwest. American Water Resources Association 2000 Specialty Conference, Portland, OR. (abstr.)

Altier, L.S., C. Poteet, and R.G. Williams. The REMM User Interface. American Water Resources Association 2000 Specialty Conference, Portland, OR. (abstr.)

Dr. Joel F. Arthur

Department of Civil Engineering
California State University
Chico, California 95929-0930
(530) 898-4292

EDUCATION

University of California, Davis, Ph.D. Agricultural and Civil Engineering, 1986
University of California, Davis, M.S. Agricultural and Civil Engineering, 1981
California Polytechnic State University, San Luis Obispo, B.S. Agricultural Engineering, 1980

REGISTRATION

California, Civil Engineering, 1987 (License No. C041722)

PROFESSIONAL HISTORY

California State University, Chico, Professor, 1993 - present
California State University, Chico, Associate Professor, 1986 - 1993
California State University, Chico, School of Agriculture, Lecturer, 1983 - 1984

PROFESSIONAL ACTIVITIES

Teaching Assignments:

Statics	Reinforced Concrete	Soil Mechanics
Materials Testing	Surveying for Non-Engineers	Strength of Materials
Engineering Economy	Advanced Structural Mechanics	Structural Mechanics
Mechanics of Materials	Construction Management I & II	Surveying
Farm Tractors	Farm Machinery Management	Agricultural Power
Agricultural Control Systems		

Committee Assignments:

Academic Advisor	Department Personnel Committee
Awards Committee	Engineering Microcomputer
College Brochure	Faculty Support and Development
College Leaves and RTP Committee	

Professional Activities:

Consulting related to real estate, land use issues and land development.
Commercial farming of almonds.
Expertise in utilization of biomass materials for alternative energy production.
Develop graphic oriented interactive structural analysis software for engineering education.
Professional consulting involving structural calculations for residential and commercial structures.
Design and construction of seven residential housing projects including a duplex and six custom homes. Expertise in all phases of residential construction and construction management.

RECENT GRANTS AND CONTRACTS

Researcher, Autonomous Farming Using Intelligent Ground Vehicles, funded under Agricultural Research Initiative (ARI) beginning January, 2005.

Researcher, Olive Harvester Performance Studies and harvester development, funded under Agricultural Research Initiative (ARI) summer of 2000 to present.

Researcher, Naval Post Doctoral Fellow funded by the Office of Naval Technology, 1992-93. Prepared computer simulations of the dynamic response of selected naval facilities.

Researcher, Research Opportunity Award (ROA) funded by NSF, 1990-91. Develop computer interactives to demonstrate the phenomena of soil liquifaction.

Project Director, research project funded by CSU, Chico. January 1989 to June 1990. Developed interactive computer courseware for use in undergraduate engineering instruction.

Principal Investigator, research project funded by Committee on the Relationship of Energy to Agriculture. January 1986 to January 1987. Investigated methods to improve walnut dryer performance using computer models developed for dissertation.

Researcher, heat and mass transfer in packed beds and walnut dryer performance. January 1985 to January 1986. Ph.D. dissertation research.

Researcher, biomass handling and processing, and alternative energy systems. June 1981 to September 1983. Masters degree research.

AWARDS

Teacher of the Year award from student chapter of ASCE, Spring 1996
ASEE/ONT Post Doctoral Fellow, 1992 - 1993
Meritorious Performance and Professional Promise Award, CSU, Chico, Spring 1988

PUBLICATIONS

Fundamental Considerations in Structural Engineering Education, with R. Mills, presented at ASEE summer meeting, 1995.
Scientific Visualization for Engineering Education, presented at ASEE summer meeting, 1993.
MacInTruss, A Truss Analysis Program for Engineering Education, presented at ASEE summer meeting, 1991.
Program MacInTrussSD, Computer Structural Modeling in Statics, presented at ASEE summer meeting, 1991.
Program MacInTruss, Structural Simulation for Engineering Education, presented at Society of Computer Simulation winter meeting, January 1991.
Improving Walnut Dryer Performance, printed in CREA Rural Energy Conference Proceedings, January 1987.
Two-dimensional Drying Model for Batch Walnut Driers, ASAE Paper No. 86-3064.
Two-dimensional Heat Transfer Model For Packed Beds, ASAE Paper No. 86-6003.
Tub Grinder Performance with Crop and Forest Residues, Transactions of the ASAE-1982.

Curriculum Vitae
Tag N. Engstrom

Assistant Professor
Department of Biology
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tengstrom@csuchico.edu

Date and Place of Birth: April 18, 1972: Friday Harbor, Washington USA
Marital Status: married
Home Address: 1733 Arcadian Ave. Chico CA, 95926

Employment
August 2004 – present: Assistant Professor of Vertebrate Ecology, Department of Biology California State University, Chico.

Education
Ph.D. University of California, Davis June 2003
Graduate Group in Population Biology
Major Professor: H. Bradley Shaffer
Dissertation: Molecular Studies of Phylogenetics, Ecology and Conservation of Turtles
B.S. – Biology, minor – Chemistry: Eckerd College, St. Petersburg, FL 1994
Senior Thesis: A survey of the genetic diversity of a population of juvenile loggerhead sea turtles, *Caretta caretta*, in developmental habitat in Caribbean Panama

Post-Doctoral Experience
Post Doctoral Research Associate, Stony Brook University, Stony Brook NY (January 2003-August 2004) with advisor John J. Wiens.

Grants and Contracts
CSU Chico Research Foundation Population Biology and Conservation of Western Pond Turtles (*Clemmys marmorata*) in Natural, Managed and Unnatural habitats in the Northern Sacramento River Drainage 2004 **$5,000**
CSU Chico Research Foundation Ecological speciation in terrestrial vertebrates: Local adaptation of the Western skink, *Eumeces skiltonianus* in the Big Chico Creek Ecological Reserve. 2004 **$5,000**
Wildlife Conservation Society: Status and distribution of the Euphrates Softshell Turtle in South East Anatolia Turkey (2001) **$7,070** (with Ertan Taskavak)
UC Davis Undergraduate Instruction Improvement Grant: Curation of a Herpetology teaching collection at the University of California, Davis Museum of Zoology (2001) **$8,686** (with Brad Shaffer)
Daphne and Ted Pengally Research Award (1999) **$1000**
University of California Humanities Research Grant (1998) **$1,500**
Jastro-Shields Research Award (1998) **$961.11**
University of California, Davis Center for Biosystematics Research Grant 1997 **$1,000**
Center for Population Biology Graduate Student Research Grants (1996-1999) **$2,970**

Eckerd College senior thesis development grant (1994) **$500**
Ford Foundation senior research development grant (1993-1994) **$2,000**
Howard Hughes Foundation Grant for Undergraduate Research, 1992; **$2,000**

Grants and Contracts Pending

"Proposed Genetic Analysis of Giant Garter Snake (Thamnophis gigas) populations in the Sacramento River Valley." Principle Investigator: Tag Engstrom. December 29, 2005. AKT Investments. **$171,810**

Fellowships:

Kramer and Balderston Memorial Fund Fellowship (1999) **$500**
National Science Foundation Pre-Doctoral Fellowship **1995-1998**
Fulbright Full Grant for study in Australia (1994-1995) **$13,000**
Barry M Goldwater Scholarship, (1993-1994) **$3,500**

Publications:

Tag N. Engstrom, H. Bradley Shaffer, & William P. McCord. 2004. Multiple datasets, high homoplasy and the phylogeny of softshell turtles. Systematic Biology 53(5):693-710.

Mathew K Fujita, **Tag N. Engstrom**, David E. Starkey, H. Bradley Shaffer. 2004. Turtle phylogeny: insights from a novel nuclear intron. Molecular Phylogenetics and Evolution 31:1031-1040

Tag N. Engstrom & William P. McCord. 2002. Molecular support for the taxonomic conclusions of McCord and Pritchard (2002) regarding *Chitra*. Hamadryad 27(1):57 – 61.

Tag N. Engstrom, Peter A. Meylan & Anne B. Meylan. 2002 Origin of Juvenile loggerhead turtles (*Caretta caretta*) in developmental habitat in Caribbean Panamá. Animal Conservation. 5(2):125-133.

Tag N. Engstrom, H. Bradley Shaffer, & William P. McCord. 2002. Phylogenetic diversity of endangered and critically endangered southeast Asian softshell turtles (Trionychidae: Chitra). Biological Conservation. 104 (2002) 173–179.

Manuscripts Submitted:

John J. Wiens, **Tag. N. Engstrom**, and Paul T. Chippindale. Rapid diversification and incomplete isolation in eastern North American salamander (genus *Plethodon*). (submitted to Evolution 9-26-2005)

Manuscripts in prep:

Tag N. Engstrom & Pekka Soini**.** Mitochondrial DNA diversity and population structure of the yellow-spotted Amazon River Turtle, *Podocnemis unifilis* in the Reserva Nacional Pacaya Samiria, in Amazonian Perú (in prep for Molecular Ecology)

Tag N. Engstrom, Peter A. Meylan, Anne B. Meylan, & Jennifer A. Gray. The genetic identity of green turtles, *Chelonia mydas* (Testudines:Cheloniidae) in developmental habitat in Bermuda (in prep for Molecular Ecology)

Tag N. Engstrom & Ertan Taskavak. Biogeography of aquatic turtles in Southeast Anatolia Turkey: Evidence for post-Pleistocene re-colonization of aquatic habitats in the Tigris and Euphrates Rivers (in prep for Conservation Genetics)

MITCHELL M. JOHNS, Ph.D.
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(530) 898-6159 (Office)
mjohns@csuchico.edu **(e-mail)**

EDUCATION: Ph.D. Crop and Soil Science, Montana State University, May 1992.
M.S. Soils, Montana State University, 1980.
B.S. Agronomy, Pennsylvania State University, 1975.

AFFILIATIONS: American Society of Agronomy
Soil Science Society of America
American Carbon Society
Western Society of Soil Science

EXPERIENCE:

7/1998-Present **Associate Professor, Soil Science, College of Agriculture, California State University, Chico, CA.** Responsibilities include instruction in Plant and Soil Science curriculum and other courses within the College. Areas of instruction include soil science, soil fertility and plant nutrition, irrigation, soil and water conservation, and agrochemicals. Administration and advising of students and curriculum. Successful grant writer with research exceeding $1,000.000. Current research involving soil chemical changes due to application of fruit canning solid and liquid wastes, Medusahead eradication on rangeland soils, forest soil carbon sequestration changes with logging practices, agricultural land preservation by applying on-site wastewater disposal standards for home development, pesticide drift and rural home interior air quality, and soil amendment using composted agricultural and food by-products. Outreach efforts including participation in agricultural field events and community college(s) presentations. Advisory board member for California Wastewater Teaching and Research Center and College of Agriculture University Farm Irrigation Center. Member of university General Education Advisory Committee and Library Advisor Committee.

2/1997-6/1998 **Research Chemist, USDA-ARS,** Southern Regional Research Center, New Orleans. Studying the use of agricultural by-products as feedstocks for producing carbonaceous adsorbents and activated carbons. Byproducts include shells of pecan, walnut, peanut, almond, and hulls of soybean, cottonseed, and rice. Producing, characterizing, and applying activated carbons to wastewater treatment of heavy metals, BETX & industrial solvent(s), and for raw sugar decolorization. Involved in design/development of an environmentally friendly production process to make activated carbons. Grant and journal writing. Administrative duties. Adjunct graduate faculty for university students. Collaborations include several companies and Louisiana State University. PI for $53,990 (5/97) Small Business Innovative Research grant (Pecan Shell Activated Carbons for Wastewater Remediation) by CSREES, USDA. Co-inventor of three patents.

7/1993-1/1997 **Assistant Professor (Research), Louisiana State University.**

PUBLICATIONS

Johns, M. M. 1980. Sodium movement in undisturbed, sodic strip-mine spoils with emphasis on unsaturated flow. M.S. Thesis, June 1980. Montana State University.

Johns, M. M. and M. G. Klages. **1980.** Cation translocation in soil columns leached with solutions. In Dollhopf, D. J., E. J. Depuit, and M. G. Klages. Chemical amendment and irrigation effects on sodium migration and vegetation characteristics in sodic minesoils in Montana. Reclamation Res. Tech., 1980. Bull. 736. MT. Ag. Exp. Sta., Bozeman, MT.

Johns, M. M. 1992. Characterization of carbonaceous resins for soil organic matter and labile carbon studies. Ph.D. Thesis, May 1992. Montana State University.

Johns, M. M., E. O. Skogley, and W. P. Inskeep. 1993. Characterization of carbonaceous adsorbents by soil fulvic and humic acid adsorption. Soil Sci. Soc. Am. J. 57(6):1485-1490.

Johns, M. M. and E. O. Skogley. 1994. Application of carbonaceous resin capsules to soil organic matter testing and labile C identification. Soil Sci. Soc. Am. J. 58(3):751-757.

Johns, M. M. and W. E. Marshall. 1994. Metal adsorption using granular activated carbons from agricultural byproducts. 1994 Special Symposium on Emerging Technologies in Hazardous Waste Management VI., Atlanta, GA, Industrial & Eng. Chem. Div., Am. Chem. Soc. pp 998-1000.

Marshall, W. E. and M. M. Johns. 1995. New uses for oilseed by-products: Toxic metal adsorbents for the future? Proc. 44th Oilseed Conf., New Orleans, LA. March 13-14. pp 28-41.

Marshall, W. E. and M. M. Johns. 1996. Agricultural by-products as metal adsorbents: sorption properties and resistance to mechanical abrasion. J. Chem. Tech. Biotechnol. 66:192-198..

Marshall, W.E., C.A. Toles, and M. M. Johns. 1996. Cotton seed hulls as adsorbent material - an update. Proc. 45th Oilseed Conf., New Orleans, LA. March 10-12. pp 45-62.

Ahmedna, M., S.J. Clarke, R.M. Rao, W.E. Marshall, and M.M. Johns. 1997. Use of filtration and buffers in raw sugar colour measurements. J. Sci. Food Agric. 75:109-116.

Ahmedna, M., M. M. Johns, S. J. Clarke, W. E. Marshall, and R. M Rao. 1997. Potential of agricultural by-product-based activated carbons for use in raw sugar decolourisation. J. Sci. Food Agric. 75:117-124.

Toles, C. A., W. E. Marshall, and M.M. Johns. 1997. Mining the potential of pecans: nutshells studied for use in granular activated carbon. Water Technology, February.

Toles, C., W. E. Marshall, and M. M. Johns. 1997. Granular activated carbons from nutshells for the uptake of metals and organic compounds. Carbon. 35(9):1407-1414.

Ahmedna, M., M. M. Johns, R. M. Rao, and W. E. Marshall. 1998. Conversion of Louisiana agricultural by-products to carbonaceous adsorbents for use in sugar refining. La. Agric. 41(1): 18-20.

Johns, M. M., W. E. Marshall, and C. A. Toles. 1998. Agricultural by-products as granular activated carbons for adsorbing dissolved metals and organics. J. Chem. Tech. Biotechnol. 71:131-140.

Pendyal, B., Johns, M.M., Marshall, W.E., Ahmedna, M. and Rao, R.M. 1999. The effect of binders and agricultural by-products on physical and chemical properties of granular activated carbons. Bioresource. Technol. 68:247-254.

Pendyal, B., Johns, M.M., Marshall, W.E., Ahmedna, M. and Rao, R.M. 1999. Removal of sugar colorants by granular activated carbons made from binders and agricultural by-products. Bioresource Technol. 69:45-51..

Johns, M.M., W.E. Marshall, and C.A. Toles. 1999. The effect of activation method on the properties of pecan shell activated carbons. J. Chem. Tech. Biotechnol. 74: 1037-1044

Marshall, W.E., M. Ahmedna, R.M. Rao, and M.M. Johns. 1999. Granular activated carbons from sugarcane bagasse. Proc. International Conference on Value-Added Products for the Sugar Industry, April 26-28. Baton Rouge, LA. Sect III. pp41-50. 1999

Marshall, W.E., , L.H. Wartelle, D.E. Boler, M.M. Johns, and C.A. Toles. 1999. Enhanced metal adsorption by soybean hulls modified with citric acid. Bioresource. technol. 69:263-268.

Toles, C.A., W.E. Marshall, and M.M. Johns. 1999. Surface functional groups on acid-activated nutshell carbons. Carbon 37: 1207-1214.

Toles, C.A., W.E. Marshall, M.M. Johns, L.H. Wartelle, and A. McAloon. 2000. Acid-activated carbons from almond shells: physical, chemical and adsorptive properties and estimated cost of production. Bioresource Tech. 71:87-92.

Wartelle, L.H., W.E. Marshall, C.A. Toles, M.M. Johns. 2000. Comparison of nutshell granular activated carbons to commercial adsorbents for the purge-and-trap gas chromatographic analysis of volatile organic compounds. J. Chromatography. 879:169-175.

Marshall, W.E., M. Ahmedna, R.M. Rao, and M.M. Johns. 2000. Granular activated carbons from sugarcane bagasse: Production and Uses. Int. Sugar. J. 102(1215):147-151.

Johns, M.M. 2005. Essential Plant Nutrients (Chapter 2), Western Fertilizer Handbook (2nd ed.), Ornamental and Greenhouse Plants. At Editor scheduled for publication with Pearson-Prentice Hall, N.J.

TODD A. LONE
1771 Hooker Oak Avenue
Chico, CA 95926
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tlone@csuchico.edu

SUMMARY

Over ten years teaching experience in the College of Agriculture and College of Business at CSU, Chico. Course areas taught at CSUC include financial management, agribusiness management, marketing, economic theory, and microcomputer applications. Over ten years of market research experience: project development, survey design, data collection and analysis, and report preparation.

EDUCATION

Ph.D. Agricultural Economics 1991, Washington State University.
M.S. Economics 1985, South Dakota State University.
B.S. Agricultural Economics 1983, South Dakota State University.

PROFESSIONAL EXPERIENCE

Aug. 2005 to Present *CSU, Chico*--College of Agriculture

Assistant Professor

- Primary teaching responsibilities include management and finance areas.
- Current research projects include identification of consumer food choice determinants, the significance of retailer service attributes on consumer choices, and the impact of service learning on student's course performance.

1995 to 2005 *CSU, Chico*--College of Agriculture and Department of Finance/Marketing

Lecturer

- Taught undergraduate courses in economic theory, finance, marketing, management, and microcomputer applications. Classroom format incorporated lecture, discussion, team projects, and hands-on exercises.
- Volunteer at College of Agriculture extracurricular activities.
- Past Webmaster for College of Agriculture web site.

Assistant Project Manager--Agribusiness Institute

- Liaison between the Agribusiness Institute and Cochran Fellowship Program whose participants were U.S. and international government officials, university scholars, and private industry professionals.
- Responsible for scheduling seminars and facility tours for international clients.

PROFESSIONAL EXPERIENCE: (continued)

1992-1994 *ADM Associates, Inc.*, Sacramento

Senior Economist

- Conducted comprehensive economic analyses for public utility companies encompassing:
  - market penetration, consumer demographics, and market segmentation;
  - program evaluation and forecasting of potential program savings;
  - policy recommendations and management decision-making alternatives.
- Supervised data management processes, which included format design and data validation.
- Project Manager and assistant manager for multiple projects. Responsible for primary client contact, budget supervision, and staff coordination and scheduling.

1986-1991 *Washington State University*, Pullman

Graduate Research Assistant

- Developed a sequential decision model to predict the marketing of wheat in the Pacific Northwest; presented results at the Chicago Mercantile Exchange.
- Assisted in graduate curriculum review and restructuring.

Graduate Teaching Assistant

- Co-taught an undergraduate course in Production Economics and Financial Management.
- Responsible for lecture/homework/exam preparation and administration.

1983-1986 *South Dakota State University*, Brookings--Department of Economics

Research Associate (Post Master's Employment)

- Developed mathematical programming models to evaluate the economic impact of electric rate structures on producers' irrigation water and energy usage.
- Trained staff in use of computer programs and quantitative analysis techniques.

Graduate Research Assistant

- Developed mathematical programming model to determine optimal capital investment decisions for agricultural firms.

MICHAEL PAUL MARCHETTI

Associate Professor
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http://www.csuchico.edu/~sacperch/

Education:

University of California Davis, Doctor of Philosophy. Graduate Group in Ecology, Jan. 1999.
University of California Davis, Master of Science, Graduate Group in Ecology, June 1994.
Bucknell University, Bachelor of Arts, Biology, Bachelor of Arts, Chemistry. June 1990.

Awards/Grants/Scholarships

2005, Butte County Environmental Monitoring ($24,986)
2004, Putah Creek Council, Student Monitoring of Putah Creek ($750)
2004-06, CDFG Aquatic Macroinvertebrate Bioassessment Internship program ($25,000)
2003-04, Nature Conservancy Grant, Yellow-legged Frog Ecology ($13,405)
2003, CSU Research Award - Native Fish Larvae in Seasonal Tributaries ($4,830)
2002-03, Camp, Dresser & McKee-Watershed Conservation Plan, Butte Co. co-PI ($58,555)
2001-02, CA Dpt. of Water Resources- Juvenile Salmonids in the Feather River #72328 ($52,000)
2001-02, Nature Conservancy Grant, Juvenile Salmon Use of Flooded Riparian Habitat ($36,000)

Publications:

-Marchetti, M. P., J. L. Lockwood, and T.Light, 2006. Effects of urbanization on California's fish diversity: differentiation, homogenization and the influence of spatial scale. Biological Conservation 127(3):310-318.
-Lema, S. C. & M. J. Hodges, M. P. Marchetti, G. A. Nevitt. 2005. Proliferation zones in the salmon telencephalon and evidence for environmental influence on proliferation rate, Comparative Biochemistry & Physiology. Part A 141:327-335.
-Marchetti, M.P., P.B. Moyle, R. Levine 2004. Invasive species profiling: exploring the characteristics of exotic fishes across invasion stages in California. Freshwater Biology. 49(5): 646-661.
-Marchetti, M.P., T.S. Light, P. B. Moyle, J. Viers. 2004. Invasion and extinction in California fish assemblages: testing hypotheses using landscape patterns. Ecological Applications. 14(5)
-Esteban, E., M.P. Marchetti. 2004. What's on the menu? Evaluating a food availability model with young-of -the-year Chinook salmon (*Oncorhynchus tshawytscha*) in the Feather River of California Tranactions American Fisheries Society. 133:777-788.
-Marchetti, M.P., P.B. Moyle, R. Levine 2004. Alien fishes in California watersheds: characteristics of successful and failed invaders. Ecological Applications. 14(2):587-596
-Marchetti, M.P., E. Esteban, M. Limm, R. Kurth. 2003. Does size, taxa or color matter? Evaluating fish-larvae light trap efficiency in the Northern Sacramento River system. Pages 269-280 *in* F. Feyrer, L. R. Brown, R. L. Brown, and J.J. Orsi, Editors. Early life history of fishes in the San Francisco Estuary and watershed. American Fisheries Society, Symposium 39, Bethesda MD.
-Marchetti M.P. and G.A.Nevitt, 2002. Effects of habitat enrichment on brain structures in rainbow trout (*Oncorhynchus mykiss*). Environmental Biology of Fishes. 66: 9-14.

-Golet G.H, D.L. Brown, E.E. Crone, G.R. Geupel, S.E. Greco, K.D. Holl, K.A. Hoover, D.E. Jukkola, G.M. Kondolf, E.W. Larsen, F.K. Ligon, R.A. Luster, M.P. Marchetti, N..Nur, B.K. Orr, D.R. Peterson, M.E. Power, W.E. Rainey, M.D. Roberts, J.G. Silveira, S.L. Small, J.C. Vick, D.S. Wilson, and D.M. Wood. 2001. Using science to evaluate restoration efforts and ecosystem health on the Sacramento River Project, California. *in* PM Faber ed. *Proceedings of the Riparian Habitat and Floodplains Conference***.**

-Marchetti, M.P. and P.B. Moyle, 2001. Effects of flow regime and habitat structure on fish assemblages in a regulated California stream. Ecological Applications, 11(2):530-539.
-Marchetti M.P., T. S. Light, J. Feliciano, T.W. Armstrong and Z. Hogan., P.B. Moyle. 2001. Physical Homogenization and Biotic Homogenization in Aquatic Systems. Pages 259-278 *in* Lockwood J.L. and M. L. McKinney. Editors. *Biotic Homogenization: The Loss of Diversity through Invasion and Extinction*. Kluwer Academic/Plenum Publishers. N.Y.
-Marchetti, M.P. and P.B. Moyle, 2000. Spatial and temporal ecology of native and introduced larval fish in Lower Putah Creek (Yolo Co. CA). Environmental Biology of Fishes, 58(1):73-87.
-Marchetti, M.P., 1999, An experimental study of competition between the native Sacramento perch (*Archoplites interruptus*) and introduced bluegill (*Lepomis macrochirus*), Biological Invasions 1:55-65.
-Moyle P.B., M.P. Marchetti, J. Baldridge, T.L. Taylor.,1998. Fish Health and Diversity: Justifying Instream Flows. *Fisheries*. 23(7):6-15.
-Moyle P.B., and M. P. Marchetti, 1998. Applications of Indices of Biotic Integrity to California streams and watersheds. *in* Simpson T.P., editor. *Assessing the sustainability and biological integrity of water resource quality using fish assemblages*. CRC press. pp. 367-380.

Books

-Lockwood, J.L., M. F. Hoopes, and M. P. Marchetti 2006. Invasion Ecology. Blackwell Scientific, Oxford. UK.

News and Press articles

- Interview with Earth and Sky (NPR Radio program 8/28/02) (http://www.earthsky.com/2002/es020828.html)
-"Dull Trout" *Science*. vol. 289, number 5483, Aug. 25, 2000, pg. 1285.
-"Easy Life Makes for Dull Fish" *Science Now*. Aug. 16, 2000. (http://sciencenow.sciencemag.org/cgi/content/full/2000/816/5).
- "Wild trout outsmart stockees" *Fly Fisherman*, March, 2001

Professional Societies and Awards:

Associate in the Agricultural Experiment Station, WFCB Dept. U.C. Davis 2002-2004
Ecological Society of America
American Fisheries Society
Society for Conservation Biology
Putah Creek Keeper Award - Scientific and Creative Research - December 1998
Best Student Paper - American Fisheries Society, Western Regional Meeting 1998

References: Available Upon Request

DONALD G. MILLER III Curriculum vitae

Address:
Department of Biological Sciences, California State University, Chico; Chico, CA 95929
phone: (530) 898-6153 FAX: (530) 898-4363 e-mail: dgmiller@csuchico.edu

Education:
Ph.D. 1997 Environmental Science, Policy and Management, University of California, Berkeley. Advisor: Professor Wayne M. Getz. "The Manzanita Leaf-gall Aphid, *Tamalia coweni* (Cockerell) (Homoptera: Aphididae) as a Model System for Studies in Elementary Social Behavior, Sex Allocation and Life History Evolution."
M.Sc. 1990 Biological Anthropology, University of Oxford. Tutor: Dr. Anthony J. Boyce. "Health and Work-loads in Nepalese Villagers."
B.S. 1986 Biology. State University of New York, College of Environmental Science and Forestry at Syracuse, Syracuse, NY. Mentor: Dr. William Shields. Senior thesis: "Inter-patch Dispersal in the Cabbage Butterfly, *Pieris rapae*."

Professional positions:
2002– Assistant Professor of Biology, California State University, Chico
1999–2002 Assistant Professor of Invertebrate Biology, Trinity University, San Antonio, Texas
1997-1998 National Institute of Health Postdoctoral Research Fellow at the Center for Insect Science, University of Arizona

Selected grants and awards:
2006 AWTU release time, College of Natural Sciences: *Bioinventory of Sutter Buttes State Park*
2005 NSF-sponsored morphometrics workshop (pending)
2004 California Deer Association habitat grant $8396
2004 Entomological Society of America/NSF Travel Grant $2300
2003 Center for Excellence in Learning and Teaching grant—Class field trip $1535
2003 California State University Research Foundation Award $4205
2002 NSF-RUI Image Acquisition and Analysis Facility for Faculty-Student Research 0200148 (Major User) $102,142
2002 Associated Colleges of the South *Campus as a Laboratory for Sustainability* Alliance Action/Research Grant $1400
2002 Council on Undergraduate Research Summer Fellowship $3500
2001 Associated Colleges of the South Rasmussen Environmental Fellowship $2500
2001 Texas Core Knowledge Content Conference Award $500
2000 Trinity University Summer Research Stipend $7000
1998 NSF/IUSSI Travel Grant $1450
1997 National Research Service Award $20,320

Selected publications:
Miller III, D. G. (2005). Ecology and radiation of galling aphids (*Tamalia*; Hemiptera: Aphididae) on their host plants (Ericaceae). Basic and Applied Ecology 6: 463-469.

Miller III, D. G. (2004). The ecology of inquilinism in communally parasitic *Tamalia* aphids (Hemiptera: Aphididae). Annals of the Entomological Society of America **97**: 1233-1241.

Farmer, N.A., Ribble, D.O. and D.G. Miller III (2004). Influence of familiarity on shoaling behaviour in Texas shiner (*Notropis amabilis*) Girard and blacktail shiner (*Cyprinella venusta*) Girard. Journal of Fish Biology **64**: 776-782.

Miller III, D. G. and B. Crespi (2003). The evolution of inquilinism, host-plant use, and mitochondrial substitution rates in *Tamalia* gall aphids. Journal of Evolutionary Biology **16**: 731-743.

Miller III, D. G. and F. L. W. Ratnieks (2001). The timing of worker reproduction and breakdown of policing behaviour in queenless honey bee (*Apis mellifera* L.) societies. Insectes Sociaux **48**: 178-184.

Miller III, D. G. and L. Avilés (2000). Sex ratio and brood size in a monophagous outcrossing gall aphid, *Tamalia coweni* (Homoptera: Aphididae). Evolutionary Ecology Research **2**: 745-759.

Miller III, D. G. and M. J. Sharkey (2000). An inquiline species of *Tamalia* co-occurring with *Tamalia coweni* (Homoptera: Aphididae). Pan-Pacific Entomologist **76**: 77-86.

Miller III, D. G. (1998). Consequences of communal gall occupation and a test for kin discrimination in the aphid *Tamalia coweni* (Cockerell) (Homoptera: Aphididae). Behavioral Ecology and Sociobiology **43**: 95-103.

Miller III, D. G. (1998). Life history, ecology and communal behaviour of the Manzanita Leaf-gall Aphid, *Tamalia coweni* (Cockerell) (Homoptera: Aphididae). Journal of Natural History **32**: 351-366.

Ratnieks, F. L. W. and D. G. Miller (1993). Division of honey bees during swarming. Animal Behaviour **46**: 803-805.

Selected invited seminars:

2005 From the showy to the secretive: Bidwell Park's insects and the plants they need. Northern California Natural History Museum's "Lectures Without Walls" series. Chico, CA.

2004 Social behavior and its exploitation in gall-dwelling aphids. Department of Biology, San Francisco State University.

2004 The ecology of inquilinism in communally parasitic *Tamalia* gall aphids. XXII International Congress of Entomology, Brisbane, Australia.

2004 Social behavior and its exploitation in gall-dwelling aphids. Department of Entomology, University of California, Davis.

2003 The secret lives of aphids in manzanita galls. California Native Plant Society, Mount Lassen Chapter, Chico, CA.

2003 Foundresses and squatters: communal living in gall-dwelling aphids. Department of Science, Shasta College, Redding, CA.

2000 An inquiline aphid, *Tamalia inquilinus*, n. sp., co-occupying galls of the communal aphid *Tamalia coweni* (Homoptera: Aphididae). XXI International Congress of Entomology, Iguassu Falls, Brazil.

1999 Kinship and communal gall occupation in the aphid *Tamalia coweni*. XIII International Congress of the International Union for the Study of Social Insects. University of Adelaide, Australia.

1996 Factors affecting communal gall occupation in the aphid *Tamalia coweni*. XX International Congress of Entomology, Florence, Italy.

1996 Life history, ecology and communal gall occupation in the Manzanita Leaf-gall Aphid, *Tamalia coweni*. Imperial College at Silwood Park, Ascot, United Kingdom.

Society memberships:
American Association of University Professors, California Faculty Association, Council on Undergraduate Research, Entomological Society of America, Friends of the Biological Sciences Herbarium (California State University, Chico), International Union for the Study of Social Insects, Sigma Xi, Society for the Study of Evolution, Society of Systematic Biologists.

Community service:
2005 Presented at Family Safari event at Big Chico Creek Ecological Reserve, sponsored by Northern California Natural History Museum, Chico, CA
2005 Presented part of University insect collection (together with General Entomology student Dawn White) to Don Kinslow's 2nd-grade class at Parkview Elementary School, Chico, CA
2005 Helped design exhibit based on material from the CSU, Chico Entomology Collection for the Bidwell Park Centennial: "100 Years of Gratitude," opened in February at the Chico Museum
2004 Presented at Family Day event at Big Chico Creek Ecological Reserve, sponsored by Northern California Natural History Museum, Chico, CA
2004 Presented part of University insect collection (together with General Entomology student Meredith Lowe) to two 1st-grade classes at Parkview Elementary School, Chico, CA
2003 Hosted CSU, Chico Economic Entomology class for tour of University insect collection
2003 Presented part of University insect collection to Susan Kirk's 5th- and 6th-grade classes at Hooker Oak School, Chico, CA
2003 Helped lead tour of Big Chico Creek Ecological Reserve for Evolution Meeting conferees, Chico, CA
2003 Presented to The Exchange Club of Durham, CA

Conservation Biology:
2000-2002 Surveyed invertebrates of Salado Creek, San Antonio, Texas for contribution to Salado Creek Foundation watershed data-base.
1991-1998 Volunteer and group leader in Annual North American Butterfly Association Surveys in California, Kentucky and Arizona.
1990 Contributor to survey of British butterflies, published in Butterflies of Berkshire, Buckinghamshire and Oxfordshire, by James Asher (1994).

Appendix I
Exceptions Requested to Terms of Sample ERP Agreement Template

Applicant is willing and able to comply with the terms of the sample ERP grant agreement template, except we request consideration of the following changes:

1. As directed by the PSP, Applicant's proposed budget presents an estimate of its actual costs for accomplishing the tasks and deliverables that make up the entire work.

   Exhibit B (Items No.'s 1., 2., and 5.E.) suggests that a grantee must separately track and invoice for its actual costs on a "task-by-task" basis. Exhibit B (Item No. 6) would also withhold 10% from the reimbursement of all of a grantee's costs, even from the costs of tasks which have been completed and accepted, until the entire contract is completed.

   If a contract consists of the performance of "separate and distinct tasks," the State Contracting Manual (Section 7.33) provides that funds withheld for a particular task may be paid upon completion of that task. If the tasks in Applicant's budget are deemed to be "separate and distinct," then Applicant as Grantee should be reimbursed for 100% of the costs of tasks as they are completed and accepted. Conversely, if the tasks in the proposed budget are not deemed to be "separate and distinct," then we ask you consider not having the Grantee separately track and invoice costs "task-by-task."

   In the latter situation we suggest consideration that the Grantee accept a 10% retention from payment until all work has been completed, but Applicant will not then also need to separate its costs by tasks which are not "separate and distinct."

2. Exhibit B (Items No.'s 5.A., 5.C., 5.E., and 5.F.) requires submission of varying source documentation to the awarding agency in addition to an itemized invoice.

   Applicant is a non-profit public-benefit corporation and an auxiliary organization of the California State University, Chico. Applicant's compliance with the terms of contracts and grants and with governing laws and regulations and Applicant's internal control over financial reporting (invoicing) are tested annually by independent auditors in accordance with Government Auditing Standards. Applicant as Grantee could invoice only for its actual costs. Applicant must retain and make available for examination by funding agencies and auditors all source documentation supporting its reported costs.

   Applicant does not in its ordinary business practice gather paper copies of source documentation; therefore, we request that as a Grantee we not be required to undertake this burden when these other means are available to assure the veracity and accuracy of Applicant's invoicing.

Applicant is prepared to offer alternative language to the above-specified clauses of the sample ERP grant agreement template upon request.

Appendix J
Justification for Indirect Cost Rate

As the lead agency on a large and complicated project, CSU, Chico has used its standard rate of 20% of total direct costs for non-federal projects. Note that indirect costs are assessed only on the first $25,000 of each contract. Our federally-negotiated indirect cost rate is 42% of salaries and wages. The benefit to Calfed of our using the 20% of total costs rate is that more than $64,000 less than would be collected if we used our negotiated rate.

The CSU, Chico Research Foundation will have full fiscal and compliance responsibility for this project and will be subject to audit. There are a large number of personnel on the project as well as six large subcontracts, all of which require careful monitoring. FOR THESE REASONS, OUR STANDARD RATE OF 20% IS AN APPROPRIATE INDIRECT RATE.

Tasks And Deliverables

Task ID	Task Name	Start Month	End Month	Personnel Involved	Deliverables
1	Administration	1	36	Singh, Lal	Management of research sites, personnel staffing, payroll and other fiscal responsibilities.
2	Ag. Conservation Practice Research	1	36	Singh, Lal Arthur, Joel Altier, Lee Jansen, Henricus Johns, Mitchell Lone, Todd Rosecrance, Richard Tripp, Tim	Document baseline characteristics, production management practices, target species, cost structure associated with management practices. Cost/benefit analysis for each ag.and conservation practice. Correlation matrix and report.
3	GGS &MSCS	1	36	Miller, Don Marchetti, Michael Engestrom, Tag Hatfield, Colleen	Monitor management practices and target species. Documentation of correlation matrix between agriculture practices and target species.
4	Research Monitoring	1	36	Howell, Christie Hansen, Eric	Report documenting GGS and WPT distribution and abundance in ag.lands in Butte and Colusa Basin.

					Bird conservation plans; VELB baseline habitat data; salmon assessment.
5	Implementation	1	36	Turner, Patti Alexander, Tad Sevelius, Pia	REcommendations on altering what, where and when to implement practices. Workshops for farmers; create educational material.
6	Regulatory	1	36	Manhart, Kandi	Programmatic agreement for the VELB and GGS for Butte, Colusa and Glenn Counties.

Total Project Budget Summary by Task and by Fiscal Year

Note: This budget summary **automatically links** to the costs and totals on the **"Budget Detail"** worksheet.
DO NOT CHANGE FORMULAS OR ENTER NUMBERS INTO ANY CELLS EXCEPT THE SHADED CELLS for "Cost Share" and "Other Matching Funds"

BUDGET SUMMARY	Total Amount for Year 1	Total Amount for Year 2	Total Amount for Year 3	Total Amount for All Years
Total Costs for Task One	$ 197,328.00	$ 200,075.52	$ 210,154.75	$ 607,558.27
Total Costs for Task Two	$ 574,971.36	$ 392,463.60	$ 403,094.45	$ 1,370,529.41
Total Costs for Task Three	$ 185,537.33	$ 183,573.18	$ 175,913.76	$ 545,024.27
Total Costs for Task Four	$ 246,687.40	$ 162,836.00	$ 80,097.00	$ 489,620.40
Total Costs for Task Five	$ 902,819.46	$ 531,898.96	$ 545,071.82	$ 1,979,790.24
Total Costs for Task Six	$ 172,452.87	$ 163,941.06	$ 129,044.18	$ 465,438.11
Total Costs for Task Seven	$ -	$ -	$ -	$ -
Total Costs for Task Eight	$ -	$ -	$ -	$ -
Total Costs for Task Nine	$ -	$ -	$ -	$ -
Total Costs for Task Ten	$ -	$ -	$ -	$ -
Total Costs for Task Eleven	$ -	$ -	$ -	$ -
Total Costs for Task Twelve	$ -	$ -	$ -	$ -
Total Costs for Task Thirteen	$ -	$ -	$ -	$ -
Total Costs for Task Fourteen	$ -	$ -	$ -	$ -
Total Costs for Task Fifteen	$ -	$ -	$ -	$ -
Total Costs for Project Tasks	$ 2,279,796.42	$ 1,634,788.32	$ 1,543,375.96	$ 5,457,960.70
1/Cost Share	$ 35,546.67	$ 35,546.67	$ 35,546.67	$ 106,640.00
2/ Other Matching Funds	$ 441,254.67	$ 541,255.00	$ 591,255.00	$ 1,573,764.67

1/ *Cost share funds* are specifically dedicated to your project and can include private and other State and Federal grants. Any funds listed in this line must be further described in the text of your proposal (see Chapter 3, Section D, of the PSP document)

2/ *Other matching funds* include other funds invested consistent with your project in your project area for which the ERP grant applicant is not eligible. Any funds listed in this line must be further described in the text of your proposal (see Chapter 3, Section D, of the PSP document)

Proposal Number
Proposal Name

Detailed Budget Breakdown by Task and by Fiscal Year

Applicant Name

BUDGET FOR TASK ONE (Administrative)	TOTAL AMOUNT TASK 1 All Years	Year 1			Year 2			Year 3		
		Amount per hour	Number of Hours	Total Amount for Year 1	Amount per hour	Number of Hours	Total Amount for Year 2	Amount per hour	Number of Hours	Total Amount for Year 3
Personnel										
Lal Singh	$ 173,600.00	$ 70.00	800	$ 56,000.00	$ 72.00	800	$ 57,600.00	$ 75.00	800	$ 60,000.00
	$ -			$ -			$ -			$ -
Trish Graham	$ 105,600.00	$ 20.00	1600	$ 32,000.00	$ 22.00	1600	$ 35,200.00	$ 24.00	1600	$ 38,400.00
Student Assistants - TBA	$ 49,696.00	$ 10.00	1600	$ 16,000.00	$ 10.35	1600	$ 16,560.00	$ 10.71	1600	$ 17,136.00
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
Personnel Subtotal	**$ 328,896.00**			**$ 104,000.00**			**$ 109,360.00**			**$ 115,536.00**
1/ Benefits as percent of salary	36%			$37,440.00			$39,369.60			$41,592.96
Personnel Total (salary + benefits)	**$447,298.56**			**$141,440.00**			**$148,729.60**			**$157,128.96**
Other Costs	**Total All Years**			**Total Year 1**			**Total Year 2**			**Total Year 3**
Operating Expenses: (ex: seed, plant materials, irrigation supplies, software, office supplies, computer, etc)	$ 29,000.00			$ 13,000.00			$ 8,000.00			$ 8,000.00
2/ Travel and Per Diem	$ 30,000.00			$ 10,000.00			$ 10,000.00			$ 10,000.00
3/ Equipment	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ 59,000.00**			**$ 23,000.00**			**$ 18,000.00**			**$ 18,000.00**
5/ Overhead Percentage (Applied to Personnel & Other Costs)	20%			$ 32,888.00			$ 33,345.92			$ 35,025.79
Total Costs for Task One	**$ 607,558.27**			**$ 197,328.00**			**$ 200,075.52**			**$ 210,154.75**

1/ Indicate your rate, and change formula in column immediately to the right of this cell

2/ Travel expenses and per diem must be at rates specified by the Department of Personnel Administration. The contractor is required to maintain travel receipts and records for auditing purposes.
No travel out of the state of California shall be reimbursed unless prior written authorization is obtained from the State.

3/ Please provide a list and cost of major equipment ($5,000 or more) to be purchased, and complete "Equipment Detail" Worksheet

4/ Please list each subcontractor and amounts (if subcontractor not selected yet, use function like "ditch construction subcontractor")

5/ Indicate rate in column immediately to the right of this cell; and provide a description of what expenses are covered by overhead. If overhead is > 15% must provide justification

Proposal Number
Proposal Name

Detailed Budget Breakdown by Task and by Fiscal Year

Applicant Name

BUDGET FOR TASK TWO	TOTAL AMOUNT TASK 2 All Years	Year 1			Year 2			Year 3		
		Amount per hour	Number of Hours	Total Amount for Year 1	Amount per hour	Number of Hours	Total Amount for Year 2	Amount per hour	Number of Hours	Total Amount for Year 3
Personnel										
Lee Altier (Agriculture Conservation Practice Research)	$ 104,220.00	$ 62.00	540	$ 33,480.00	$ 65.00	540	$ 35,100.00	$ 66.00	540	$ 35,640.00
Joel Arthur	$ 106,425.00	$ 69.00	495	$ 34,155.00	$ 72.00	495	$ 35,640.00	$ 74.00	495	$ 36,630.00
	$ -	$ 70.00	0	$ -	$ 84.00	0	$ -	$ 87.00	0	$ -
Henricus Jansen	$ 21,800.00	$ 70.00	100	$ 7,000.00	$ 73.00	100	$ 7,300.00	$ 75.00	100	$ 7,500.00
Mitch Johns	$ 82,620.00	$ 49.00	540	$ 26,460.00	$ 51.00	540	$ 27,540.00	$ 53.00	540	$ 28,620.00
	$ -	$ 39.00	0	$ -	$ 41.00	0	$ -	$ 42.00	0	$ -
Todd Lone	$ 36,180.00	$ 43.00	270	$ 11,610.00	$ 45.00	270	$ 12,150.00	$ 46.00	270	$ 12,420.00
Rich Rosecrance	$ 75,600.00	$ 45.00	540	$ 24,300.00	$ 47.00	540	$ 25,380.00	$ 48.00	540	$ 25,920.00
Lal Singh	$ 86,800.00	$ 70.00	400	$ 28,000.00	$ 72.00	400	$ 28,800.00	$ 75.00	400	$ 30,000.00
Tim Tripp	$ 26,800.00	$ 43.00	200	$ 8,600.00	$ 45.00	200	$ 9,000.00	$ 46.00	200	$ 9,200.00
Six Under Graduate Student Assistants - TBA	$ 128,899.00	$ 10.00	4150	$ 41,500.00	$ 10.35	4150	$ 42,952.50	$ 10.71	4150	$ 44,446.50
Personnel Subtotal	**$ 669,344.00**			**$ 215,105.00**			**$ 223,862.50**			**$ 230,376.50**
1/ Benefits as percent of salary	36%			$77,437.80			$80,590.50			$82,935.54
Personnel Total (salary + benefits)	**$910,307.84**			**$292,542.80**			**$304,453.00**			**$313,312.04**
Other Costs	**Total All Years**			**Total Year 1**			**Total Year 2**			**Total Year 3**
Operating Expenses: (ex: seed, plant materials, irrigation supplies, software, office supplies, testing, etc)	$ 198,300.00			$ 174,100.00			$ 12,100.00			$ 12,100.00
2/ Travel and Per Diem	$ 33,500.00			$ 12,500.00			$ 10,500.00			$ 10,500.00
3/ Equipment	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ 231,800.00**			**$ 186,600.00**			**$ 22,600.00**			**$ 22,600.00**
5/ Overhead Percentage (Applied to Personnel & Other Costs)	20%			$ 95,828.56			$ 65,410.60			$ 67,182.41
Total Costs for Task Two	**$ 1,370,529.41**			**$ 574,971.36**			**$ 392,463.60**			**$ 403,094.45**

1/ Indicate your rate, and change formula in column immediately to the right of this cell

2/ Travel expenses and per diem must be at rates specified by the Department of Personnel Administration. The contractor is required to maintain travel receipts and records for auditing purposes.
No travel out of the state of California shall be reimbursed unless prior written authorization is obtained from the State.

3/ Please provide a list and cost of major equipment ($5,000 or more) to be purchased, and complete "Equipment Detail" Worksheet

4/ Please list each subcontractor and amounts (if subcontractor not selected yet, use function like "ditch construction subcontractor")

5/ Indicate rate in column immediately to the right of this cell; and provide a description of what expenses are covered by overhead. If overhead is > 15% must provide justification

Proposal Number
Proposal Name

Detailed Budget Breakdown by Task and by Fiscal Year

Applicant Name

BUDGET FOR TASK THREE	TOTAL AMOUNT TASK 3 All Years	Year 1			Year 2			Year 3		
		Amount per hour	Number of Hours	Total Amount for Year 1	Amount per hour	Number of Hours	Total Amount for Year 2	Amount per hour	Number of Hours	Total Amount for Year 3
Personnel										
Tag Engstrom (GGS and MSCS)	$ 52,140.00	$ 36.00	474	$ 17,064.00	$ 37.00	474	$ 17,538.00	$ 37.00	474	$ 17,538.00
Colleen Hatfield	$ 13,400.00	$ 43.00	100	$ 4,300.00	$ 45.00	100	$ 4,500.00	$ 46.00	100	$ 4,600.00
Michael Marchetti	$ 57,190.00	$ 43.00	430	$ 18,490.00	$ 44.00	430	$ 18,920.00	$ 46.00	430	$ 19,780.00
Don Miller	$ 61,097.00	$ 35.00	571	$ 19,985.00	$ 36.00	571	$ 20,556.00	$ 36.00	571	$ 20,556.00
Two Graduate Student Assistants - TBA	$ 49,941.80	$ 12.00	1340	$ 16,080.00	$ 12.42	1340	$ 16,642.80	$ 12.85	1340	$ 17,219.00
Two Under Graduate Student Assistants - TBA	$ 29,507.00	$ 10.00	950	$ 9,500.00	$ 10.35	950	$ 9,832.50	$ 10.71	950	$ 10,174.50
One Staff Person - John Hunt	$ 6,880.00	$ 21.00	160	$ 3,360.00	$ 22.00	160	$ 3,520.00	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
Personnel Subtotal	**$ 270,155.80**			**$ 88,779.00**			**$ 91,509.30**			**$ 89,867.50**
1/ Benefits as percent of salary	36%			$31,960.44			$32,943.35			$32,352.30
Personnel Total (salary + benefits)	**$367,411.89**			**$120,739.44**			**$124,452.65**			**$122,219.80**
Other Costs	**Total All Years**			**Total Year 1**			**Total Year 2**			**Total Year 3**
Operating Expenses: (ex: seed, plant materials, irrigation supplies, software, office supplies, etc)	$ 59,775.00			$ 24,875.00			$ 19,525.00			$ 15,375.00
2/ Travel and Per Diem	$ 27,000.00			$ 9,000.00			$ 9,000.00			$ 9,000.00
3/ Equipment	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ 86,775.00**			**$ 33,875.00**			**$ 28,525.00**			**$ 24,375.00**
5/ Overhead Percentage (Applied to Personnel & Other Costs)	20%			$ 30,922.89			$ 30,595.53			$ 29,318.96
Total Costs for Task Three	**$ 545,024.27**			**$ 185,537.33**			**$ 183,573.18**			**$ 175,913.76**

1/ Indicate your rate, and change formula in column immediately to the right of this cell

2/ Travel expenses and per diem must be at rates specified by the Department of Personnel Administration. The contractor is required to maintain travel receipts and records for auditing purposes.
No travel out of the state of California shall be reimbursed unless prior written authorization is obtained from the State.

3/ Please provide a list and cost of major equipment ($5,000 or more) to be purchased, and complete "Equipment Detail" Worksheet

4/ Please list each subcontractor and amounts (if subcontractor not selected yet, use function like "ditch construction subcontractor")

5/ Indicate rate in column immediately to the right of this cell; and provide a description of what expenses are covered by overhead. If overhead is > 15% must provide justification

Proposal Number
Proposal Name

Detailed Budget Breakdown by Task and by Fiscal Year

Applicant Name

BUDGET FOR TASK FOUR	TOTAL AMOUNT TASK 4 All Years	Year 1			Year 2			Year 3		
		Amount per hour	Number of Hours	Total Amount for Year 1	Amount per hour	Number of Hours	Total Amount for Year 2	Amount per hour	Number of Hours	Total Amount for Year 3
Personnel										
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
RESEARCH MONITORING	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
Personnel Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
1/ Benefits as percent of salary				$0.00			$0.00			$0.00
Personnel Total (salary + benefits)	**$0.00**			**$0.00**			**$0.00**			**$0.00**
Other Costs	**Total All Years**			**Total Year 1**			**Total Year 2**			**Total Year 3**
Operating Expenses: (ex: seed, plant materials, irrigation supplies, software, office supplies, etc)	$ -			$ -			$ -			$ -
2/ Travel and Per Diem	$ -			$ -			$ -			$ -
3/ Equipment	$ -			$ -			$ -			$ -
4/ Sub-Contractor - Giant Gartner Snake Consultant	$ 353,128.00			$ 120,195.00			$ 157,836.00			$ 75,097.00
4/ Sub-Contractor - Bird Consultant	$ 116,492.40			$ 116,492.40			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor//Indirect @ 20% of first $25K of each subctrct	$ 20,000.00			$ 10,000.00			$ 5,000.00			$ 5,000.00
Other Costs Subtotal	**$ 489,620.40**			**$ 246,687.40**			**$ 162,836.00**			**$ 80,097.00**
5/ Overhead Percentage (Applied to Personnel & Other Costs)	0%			$ -			$ -			$ -
Total Costs for Task Four	**$ 489,620.40**			**$ 246,687.40**			**$ 162,836.00**			**$ 80,097.00**

1/ Indicate your rate, and change formula in column immediately to the right of this cell

2/ Travel expenses and per diem must be at rates specified by the Department of Personnel Administration. The contractor is required to maintain travel receipts and records for auditing purposes.
No travel out of the state of California shall be reimbursed unless prior written authorization is obtained from the State.

3/ Please provide a list and cost of major equipment ($5,000 or more) to be purchased, and complete "Equipment Detail" Worksheet

4/ Please list each subcontractor and amounts (if subcontractor not selected yet, use function like "ditch construction subcontractor")

5/ Indicate rate in column immediately to the right of this cell; and provide a description of what expenses are covered by overhead. If overhead is > 15% must provide justification

Proposal Number
Proposal Name

Detailed Budget Breakdown by Task and by Fiscal Year

Applicant Name

BUDGET FOR TASK FIVE	TOTAL AMOUNT TASK 5 All Years	Year 1			Year 2			Year 3		
		Amount per hour	Number of Hours	Total Amount for Year 1	Amount per hour	Number of Hours	Total Amount for Year 2	Amount per hour	Number of Hours	Total Amount for Year 3
Personnel										
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
IMPLEMENTATION	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
Personnel Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
1/ Benefits as percent of salary				$0.00			$0.00			$0.00
Personnel Total (salary + benefits)	**$0.00**			**$0.00**			**$0.00**			**$0.00**
Other Costs	**Total All Years**			**Total Year 1**			**Total Year 2**			**Total Year 3**
Operating Expenses: (ex: seed, plant materials, irrigation supplies, software, office supplies, etc)	$ -			$ -			$ -			$ -
2/ Travel and Per Diem	$ -			$ -			$ -			$ -
3/ Equipment	$ -			$ -			$ -			$ -
4/ Sub-Contractor - Butte County RCD	$ 628,778.60			$ 257,371.84			$ 182,389.08			$ 189,017.68
4/ Sub-Contractor - Colusa County RCD	$ 840,734.64			$ 273,698.62			$ 280,244.88			$ 286,791.14
4/ Sub-Contractor - River Partners	$ 465,277.00			$ 356,749.00			$ 54,265.00			$ 54,263.00
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor/Indirect @ 20% of first $25K of each subctrct	$ 45,000.00			$ 15,000.00			$ 15,000.00			$ 15,000.00
Other Costs Subtotal	**$ 1,979,790.24**			**$ 902,819.46**			**$ 531,898.96**			**$ 545,071.82**
5/ Overhead Percentage (Applied to Personnel & Other Costs)	0%			$ -			$ -			$ -
Total Costs for Task Five	**$ 1,979,790.24**			**$ 902,819.46**			**$ 531,898.96**			**$ 545,071.82**

1/ Indicate your rate, and change formula in column immediately to the right of this cell

2/ Travel expenses and per diem must be at rates specified by the Department of Personnel Administration. The contractor is required to maintain travel receipts and records for auditing purposes.
No travel out of the state of California shall be reimbursed unless prior written authorization is obtained from the State.

3/ Please provide a list and cost of major equipment ($5,000 or more) to be purchased, and complete "Equipment Detail" Worksheet

4/ Please list each subcontractor and amounts (if subcontractor not selected yet, use function like "ditch construction subcontractor")

5/ Indicate rate in column immediately to the right of this cell; and provide a description of what expenses are covered by overhead. If overhead is > 15% must provide justification

Proposal Number
Proposal Name

Detailed Budget Breakdown by Task and by Fiscal Year

Applicant Name

BUDGET FOR TASK SIX	TOTAL AMOUNT TASK 6 All Years	Year 1			Year 2			Year 3		
		Amount per hour	Number of Hours	Total Amount for Year 1	Amount per hour	Number of Hours	Total Amount for Year 2	Amount per hour	Number of Hours	Total Amount for Year 3
Personnel										
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
REGULATORY	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
Personnel Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
1/ Benefits as percent of salary				$0.00			$0.00			$0.00
Personnel Total (salary + benefits)	**$0.00**			**$0.00**			**$0.00**			**$0.00**
Other Costs	**Total All Years**			**Total Year 1**			**Total Year 2**			**Total Year 3**
Operating Expenses: (ex: seed, plant materials, irrigation supplies, software, office supplies, etc)	$ -			$ -			$ -			$ -
2/ Travel and Per Diem	$ -			$ -			$ -			$ -
3/ Equipment	$ -			$ -			$ -			$ -
4/ Sub-Contractor - Glenn County RCD	$ 450,438.11			$ 167,452.87			$ 158,941.06			$ 124,044.18
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor//Indirect @ 20% of first $25K of each subctrct	$ 15,000.00			$ 5,000.00			$ 5,000.00			$ 5,000.00
Other Costs Subtotal	**$ 465,438.11**			**$ 172,452.87**			**$ 163,941.06**			**$ 129,044.18**
5/ Overhead Percentage (Applied to Personnel & Other Costs)	0%			$ -			$ -			$ -
Total Costs for Task Six	**$ 465,438.11**			**$ 172,452.87**			**$ 163,941.06**			**$ 129,044.18**

Proposal Number
Proposal Name

Detailed Breakdown of Equipment Purchase

Applicant Name

EQUIPMENT DETAIL

Use this worksheet as a sample of how to present project equipment costing more than $5,000. Applicants must complete a spreadsheet as shown below to present project equipment costing more than $5,000.

Task No	List of Equipment	Unit Cost	Task Total
	N/A	$ -	
			$ -
		TOTAL	**$ -**

Equipment purchased for a project shall be purchased by **( )** and shall adhere to State of California Contracting rules and regulations as stated in State Contracting Manual (SCM) 7.29 Equipment Purchases.

For further information please go to: http://www.ols.dgs.ca.gov/Contract+Manual/default.htm

The Contractor shall maintain an inventory record for each piece of non-expendable equipment purchased with the funds provided under the terms of this agreement. The inventory record for each piece of such equipment should include the date acquired, total cost, serial number, model identification, and any other information or description necessary to identify said equipment. Non-expendable equipment are those items of equipment that have a normal life expectancy of one year or more and an approximate cost of $5,000 or more.

Contractor shall provide DFG with a copy of the inventory record at the time an invoice is presented for reimbursement for such equipment purchase.

NOTE: Ownership and reporting requirements for equipment purchased depends upon the Contractor's type of organization (state agency, local entity, private, etc.). Specific provisions for equipment purchases shall be provided at the time contract documents are prepared.

COST SHARE (Must Document - Direct Costs ?)				YEAR 1	YEAR 2	YEAR 3	TOTAL
Federal	**Partner**	**Status**					
NRCS	Glenn County RCD	Tentative Approval		8,870	8,870	8,870	26,610
NRCS	Colusa County RCD	Tentative Approval		11,167	11,167	11,167	33,500
NRCS	Butte County RCD	Tentative Approval		15510	15510	15,510	46,530
NRCS	Yolo County RCD	Tentative Approval		0	0	0	0
		Total		35,547	35,547	35,547	106,640
OTHER MATCHING FUNDS							
State	**Partner**	**Status**					
Agri. Research Inititive	CSU, Chico	Contingent Contract		0	100,000	150,000	250,000
Federal	**Partner**	**Status**					
NRCS	Glenn County RCD	Contingent Contracts		100,000	100,000	100,000	300,000
NRCS	Colusa County RCD	Contingent Contracts		179,588	179,588	179,588	538,764
NRCS	Butte County RCD	Contingent Contracts		155,000	155,000	155,000	465,000
NRCS	Yolo County RCD	Contingent Contracts		0	0	0	0
Private	**Partner**	**Status**					
DR5 - Wild Goose	River Partners	Approved		6,667	6,667	6,667	20,000
		Total		441,255	541,255	591,255	1,573,764
						TOTAL	**1,680,404**

Environmental Compliance

CEQA Compliance

Which type of CEQA documentation do you anticipate?
X none *Skip the remaining questions in this section.*
− negative declaration or mitigated negative declaration
− EIR
− categorical exemption *A categorical exemption may not be used for a project which may which may cause a substantial adverse change in the significance of a historical resource or result in damage to scenic resources within an officially designated state scenic highway.*

If you are using a categorical exemption, choose all of the applicable classes below.

− Class 1. Operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" itemized above are not intended to be all−inclusive of the types of projects which might fall within Class 1. The key consideration is whether the project involves negligible or no expansion of an existing use.

− Class 2. Replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced.

− Class 3. Construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure. The numbers of structures described in this section are the maximum allowable on any legal parcel, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

− Class 4. Minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

– Class 6. Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies. These may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded.

– Class 11. Construction, or placement of minor structures accessory to (appurtenant to) existing commercial, industrial, or institutional facilities, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

Identify the lead agency.

Please write out all words in the agency title other than United States (Use the abbreviation "US".) and California (Use the abbreviation "CA".).

Is the CEQA environmental impact assessment complete?

If the CEQA environmental impact assessment process is complete, provide the following information about the resulting document.

Document Name
State Clearinghouse Number

If the CEQA environmental impact assessment process is not complete, describe the plan for completing draft and/or final CEQA documents.

NEPA Compliance

Which type of NEPA documentation do you anticipate?
X none *Skip the remaining questions in this section.*
– environmental assessment/FONSI
– EIS
– categorical exclusion

Identify the lead agency or agencies.

Please write out all words in the agency title other than United States (Use the abbreviation

"US".) and California (Use the abbreviation "CA".).

If the NEPA environmental impact assessment process is complete, provide the name of the resulting document.

If the NEPA environmental impact assessment process is not complete, describe the plan for completing draft and/or final NEPA documents.

Successful applicants must tier their project's permitting from the CALFED Record of Decision and attachments providing programmatic guidance on complying with the state and federal endangered species acts, the Coastal Zone Management Act, and sections 404 and 401 of the Clean Water Act.

Please indicate what permits or other approvals may be required for the activities contained in your proposal and also which have already been obtained. Please check all that apply. If a permit is *not* required, leave both Required? and Obtained? check boxes blank.

Local Permits And Approvals	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
conditional Use Permit	–	–	
variance	–	–	
Subdivision Map Act	–	–	
grading Permit	–	–	
general Plan Amendment	–	–	
specific Plan Approval	–	–	
rezone	–	–	
Williamson Act Contract Cancellation	–	–	
other	–	–	

State Permits And Approvals	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
scientific Collecting Permit	–	–	
CESA Compliance: 2081	–	–	

CESA Complance: NCCP	**–**	**–**	
Lake Or Streambed Alteration Agreement	**–**	**–**	
CWA 401 Certification	**–**	**–**	
Bay Conservation And Development Commission Permit	**–**	**–**	
reclamation Board Approval	**–**	**–**	
Delta Protection Commission Notification	**–**	**–**	
state Lands Commission Lease Or Permit	**–**	**–**	
action Specific Implementation Plan	**–**	**–**	
SWRCB Water Transfer Approval	**–**	**–**	
other	**–**	**–**	

Federal Permits And Approvals	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
ESA Compliance Section 7 Consultation	**–**	**–**	
ESA Compliance Section 10 Permit	**–**	**–**	
Rivers And Harbors Act	**–**	**–**	
CWA 404	**–**	**–**	
other	**–**	**–**	

Permission To Access Property	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
permission To Access City, County Or Other Local Agency Land Agency Name	**–**	**–**	
permission To Access State Land Agency Name	**–**	**–**	
permission To Access Federal Land Agency Name	**–**	**–**	
permission To Access Private Land Landowner Name	**–**	**–**	

If you have comments about any of these questions, enter them here.

Land Use

Does the project involve land acquisition, either in fee or through easements?
X No. *Skip to the next set of questions.*
– Yes. *Answer the following questions.*

How many acres will be acquired by fee?

How many acres will be acquired by easement?

Describe the entity or organization that will manage the property and project activities, including operation and maintenance.

Is there an existing plan describing how the land and water will be managed?
X No.
– Yes. *Cite the title and author or describe briefly.*

Will the applicant require access across to or through public or private property that the applicant does not own to accomplish the activities in the proposal?
X No. *Skip to the next set of questions.*
– Yes. *Answer the following question.*

Describe briefly the provisions made to secure this access.

Do the actions in the proposal involve physical changes in the current land use?
X No. *Skip to the next set of questions.*
– Yes. *Answer the following questions.*

Describe the current zoning, including the zoning designation and the principal permitted uses permitted in the zone.

Describe the general plan land use element designation, including the purpose and uses allowed in the designation.

Describe relevant provisions in other general plan elements affecting the site, if any.

Is the land mapped as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance under the California Department of Conservation's Farmland Mapping and Monitoring Program?
X No. *Skip to the next set of questions.*
– Yes. *Answer the following questions.*

Land Designation	Acres	Currently In Production?
Prime Farmland		**–**
Farmland Of Statewide Importance		**–**
Unique Farmland		**–**
Farmland Of Local Importance		**–**

Is the land affected by the project currently in an agricultural preserve established under the Williamson Act?
X No. *Skip to the next set of questions.*
– Yes. *Answer the following question.*

Is the land affected by the project currently under a Williamson Act contract?
X No. *Skip to the next set of questions.*
– Yes. *Answer the following question.*

Why is the land use proposed consistent with the contract's terms?

Describe any additional comments you have about the projects land use.