Project Information

2005 Proposal Number: 0068

Proposal Title: **Yolo Wildlife Area: An Evolving Model for Integration of Agriculture and Habitat Restoration in a Flood Control Setting**

Applicant Organization Name: **Yolo Basin Foundation**

Total Amount Requested: $**1,231,400**

ERP Region: Delta Region

Short Description

Implement a pilot project on the Yolo Wildlife Area to assess three different rice field treatments for value and use of aquatic birds and impact on rice production. The project also proposes to address mercury issues in the area as well as continue the Yolo Bypass Working Group.

Executive Summary

The Proposal: The proposed project is located in CALFED's Sacramento–San Joaquin Delta Ecological Zone, North Delta Unit. The study area is the northern end of the 16,000 acre Yolo Bypass Wildlife Area, which is managed by the California Department of Fish and Game. The study fields cover approximately 1041 acres and can be found immediately south of Interstate 80 in the Yolo Bypass, a 43 mile long flood control channel west of Sacramento. This is a pilot/demonstration project with research components. In 2002, Wildlife Area staff implemented a field rotation of white rice in year 1, wild rice in year 2, and shorebird management in year 3 (fallowing followed by summer flooding). This rotation schedule provides both shallow water habitat for migratory shorebirds while still generating income for farmers. The positive response of shorebirds to the fallowed and flooded fields and the reduction of nuisance weeds during the following production year appear to be significant. This project has four key

components. First, we will standardize a regime of land and water management for rice that can produce measurable results for farmers. We also will document possible benefits to farmers, both through the actual rotation and through participation in government programs such as the USDA's Conservation Security Program. Second, we will quantify the response of migratory shorebirds, waterfowl and other aquatic birds to the shallow water habitat available during the fallow year of the field rotation. Third, we will examine habitat use by a known population of the threatened Giant Garter Snake in a flood control area that regularly undergoes periodic inundation. Fourth, we will assess if and how the proposed field rotation has any impacts on methylmercury production and its uptake into the local food web. The results of all aspects of the project will be presented to farmers and others on a regular basis at the CALFED–funded Yolo Bypass Working Group meetings, which this grant would extend.

Meeting CALFED Goals: Goal #1 of the CALFED Ecosystem Recovery Program (ERP) seeks to achieve recovery of a native species that is at risk. The threatened Giant Garter Snake (Thamnophis gigas) has been discovered in the Yolo Bypass adjacent to recently restored wetlands and the west levee of the Bypass. This project seeks to document the use of wetlands, rice fields, and infrastructure by the Giant Garter snake in a flood control channel, information crucial to the recovery of the species. Goal #4, the habitat recovery goal of the ERP, seeks to restore functional habitat types in the Bay–Delta estuary. In accordance with that goal, the fallow year stage of this rotation takes advantage of the management capabilities of rice infrastructure to recreate shallow wetlands during a critical period for shorebirds returning to the wintering grounds of central California. Goal #6 is the water quality goal of the ERP. The Yolo Bypass is the source of more than 10% of the methylmercury load to the Bay–Delta estuary (Regional Water Quality Control Board, Central Valley Region, Draft TMDL Report for Total and Methyl Mercury, 2005). It is possible that managed wetlands, including fields in agricultural production such as rice, contribute significantly to the methylation of mercury in the Yolo Bypass. Important methylation data from rice production fields and open–water

wetlands will be generated by this project which will contribute to the development of best management practices for both rice and wetlands that minimize mercury.

Yolo Wildlife Area: An Evolving Model for Integration of Agriculture and Habitat Restoration in a Flood Control Setting

A. Project Description

1. Problem

Proposal Problem Statement: Critical wetland habitat for wildlife has been severely diminished in the Central Valley of CA, due to increased urbanization and wetland conversion to agricultural lands. These land use changes have resulted in poor water quality and substantial decrease in wildlife diversity, both of which threatens the survival of several sensitive species. Further, wildlife species in the Bay-Delta are stressed due to contamination of the region with toxic mercury as a result of its historic use in mining.

Rice Rotation Problem Statement

It is estimated that 90-95% of the historic wetlands in the Central Valley have been lost. The once vast marshes, which were seasonally flooded, provided habitat annually for many thousands of migrating waterfowl and shorebirds and other wetlands species. Today the 16,000 acre Yolo Wildlife Area, managed by the CA Department of Fish and Game, is faced with the challenge of restoring wetland habitat and encouraging agriculture, both for its intrinsic value and to generate income to operate the Wildlife Area, while at the same time maintaining the primary role of the Bypass as a flood water passage region.

It has been documented that rice fields, although not equivalent to natural wetlands, can be valuable substitutes (Elphick 2000). In the last few years the effectiveness of the flooded post-harvest rice residue in attracting migrating waterfowl has been seen throughout the California rice growing region, including the Yolo Wildlife Area (Feliz, pers. com.). The tremendous display of wintering water birds has been in sharp contract to the lack of birds in the summer when the rice fields are not readily available to birds, and the seasonal wetlands are dry. Three years ago the Yolo Wildlife Area management began a small project of rotating a field with white rice one year, wild rice the next, and a fallow field the third, which was shallowly flooded in the summer to attract shorebirds. The results were very promising but not well documented.

This phase of the project proposes to determine if there are farming benefits to the rotation cycle, so that rice growers might choose to implement the practice on their property. The rotation has already been endorsed by the Natural Resources Conservation Service's Conservation Securities Program (CSP). It is listed as an approved compensable ($125/acre) practice entitled "Wildlife Habitat Management Enhancement, Component #11 – Manage Fallow Cropland Areas for Shorebird Habitat." (www.calrice.org/downloads/NRCS_CSP_Enhanc_List4-8-05.pdf) Farmers enrolled in the CPS will be able to receive compensation by implementing the described rotation. This project may prove to be a very useful demonstration of an innovative, wildlife friendly rice farming practice.

Field Rotation for Shorebirds Problem Statement

Many North American populations of shorebirds are in decline (Morrison et al. 2001). A major conservation initiate has been established for shorebirds, with regions such the Central Valley identified as critical to conservation of their populations (Brown et al. 2001). Surveys have shown the Central Valley to be one of the most important regions in western North America for migrating and wintering shorebirds (Shuford et al. 1998). In fact, the Valley is the second most important inland site for migrating shorebirds after Great Salt Lake, Utah in fall (Shuford et al. 1998). Because it supports such large numbers of shorebirds, the Central Valley boasts two sites of International Importance under the Western Hemisphere Shorebird Reserve Network (Harrington and Parry ARRINGTON AND PERRY 1995; WWW.MANOMET.ORG/.WHSRN).

Agriculture is by far the dominant land use in the Central Valley and agricultural fields are one of the most heavily used habitats types by shorebirds in the Valley (Shuford et al. 1998, Shuford et al. 2005). Any broad-scale changes in farming practices could tremendously influence shorebird habitat. Thus, studies documenting practices that are beneficial to both agriculture and wildlife and research enabling us to improve lands for agriculture and wildlife are valuable for maintaining aquatic bird populations in the Pacific Flyway.

In western North America, autumn migration of shorebirds extends from late June through October. This is a period when relatively few wetlands are flooded in the Central Valley and vegetation in rice fields is too high and dense to attract most migrating shorebirds (Shuford et al. 1998). Consequently, any shallow, open water habitat in the Central Valley is potentially very valuable to shorebirds at this time. Anecdotal observations made at the Yolo Bypass Wildlife Area indicate shallowly-flooded, agricultural fields that are unvegetated to sparsely-vegetated have the potential to provide habitat for large numbers of migrating shorebirds between July and September (Dave Feliz pers. comm.)

We propose to document the extent to which the shallowly flooded fields provide foraging and roosting habitat for aquatic birds, and to evaluate two shallow flooding depths for their efficacy in creating shorebird foraging habitat. The study will be conducted on six fields over a 3-year period. In any one year only two fields will receive shallow flooding. Each year of the rotation, fields will be divided to allow two treatments per field. Treatments will differ in depth of flooding.

Giant Garter Snake Investigation Problem Statement

The giant garter snake (GGS) (*Thamnophis gigas*) is a federal threatened species that has been documented in the Yolo Basin (CNDDB 2005). Described as among California's most aquatic garter snakes (Fitch 1940), giant garter snakes are associated with low gradient streams, valley floor wetlands, and marshes. GGS requires wetlands for foraging (fish and amphibians are their prey), upland areas for basking, upland burrows as summer shelter, and higher elevation uplands for winter hibernacula (Hansen and Brode 1980, Hansen 1998, USFWS 1993, USFWS 1999). GGS emerge in March, are active (foraging and breeding) from April through September, and seek winter refuge in October (Brode 1988, Hansen and Brode 1993, Wylie *et al.* 1997, USFWS 1999, E. Hansen 2004). A wetland species historically associated with marshes, ponds, and low-gradient streams, GGS is also associated with rice

agriculture and the water supply channels supporting its practice (Hansen and Brode 1993, Hansen 1998, USFWS 1999, Wylie *et al*. 1997).

Locality records indicate that within this range, garter snakes are distributed in 13 unique population clusters coinciding with historical flood basins, marshes, wetlands, and tributary streams of the Central Valley (Brode and Hansen 1992, USFWS 1997, USFWS 1999), including the Yolo/Willow Slough and Yolo/Liberty Farms populations that lie to the north and southwest of the Yolo Wildlife Area, respectively.

Giant garter snakes are documented in two distinct concentrations along the eastern edge of Yolo County (CNDDB 2005). The first concentration lies in the northeastern portion of Yolo County northwest of Knights Landing, in the southern end of the Colusa Basin near Sycamore Slough. The second concentration lies in the eastern central potion of Yolo County, with records in the Yolo Bypass east of Conaway Ranch near the Tule Canal, within the Willow Slough/ Willow Slough Bypass from the Conaway Ranch south to the Yolo Wildlife Area, and along the western edge of the Yolo Bypass east of Interstate 80 within the Yolo Wildlife Area.

Each of these concentrations are potential source populations for GGS that may inhabit the Yolo Bypass within the Yolo Wildlife Area. The Yolo Bypass conducts floodwaters from the Sacramento River during the winter and supports a mosaic of managed wetlands and The project proposes to use rice agriculture rotated to benefit wetland dependent species during the summer. Depending on snake movements and habitat conditions, especially the extent of perennial water and management of agricultural waters during the active summer season, GGS distributions may expand and contract throughout the Yolo Bypass. Due to this potential for dispersal, the apparent suitability of spring and summer habitat, the presence of GGS along the western edge of the Yolo Bypass, and the close proximity to the Yolo/Willow Slough and Yolo/Liberty Farms populations, the Yolo Bypass may provide seasonal habitat for GGS within the Yolo Wildlife Area.

Mercury Investigation Problem Statement

Extensive mercury (Hg) use during historic gold processing has resulted in widespread Hg contamination (Alpers et al. 2005a) and toxic methylmercury (MeHg) bioaccumulation (Slotton et al. 1997; May et al. 2000, SFEI-MAPPING, Schwarzbach and Adelsbach 2002, Schwarzbach et al. 2005) in watersheds throughout northern California. The production of MeHg generally takes place in aquatic sediments and is facilitated by sulfate reducing bacteria (SRB) (Compeau and Bafrtha 1985, Gilmour et al. 1992). While a great many environmental factors impact MeHg production (Ullrich et al. 2001), they generally fall into two classes, namely, those that impact the activity of the SRB (e.g. sulfate and/or suitable organic matter availability, competition with other bacterial groups, etc.) and those that affect inorganic mercury (Hg(II)) availability to the Hg(II)-methylating SRB (e.g. Hg(II) binding to organic and/or inorganic particles, etc.). Recent CALFED sponsored research has clearly shown that habitat type plays a dominant role in defining the biogeochemical conditions that lead to more or less MeHg production in a given area (Marvin-DiPasquale and Agee 2003, Marvin-DiPasquale et al. 2003, 2005;

Yee et al. 2005). Vegetated areas (e.g. emergent freshwater and salt marshes, submerged aquatic vegetation zones) appear to be more active areas for MeHg production than non-vegetated deep-channel and open-water locations, although MeHg production rates and concentrations vary considerably even among the various types of vegetated regions. By sampling a diverse suite of habitats throughout the SF Bay Delta, we are only now beginning to clearly understand the habitat-specific factors that drive MeHg production locally. However, few (if any) investigations to date have focused explicitly on the role various agricultural and wetland management practices have on mediating MeHg production. The current project thus provides an extremely valuable opportunity to begin to fill the critical knowledge gap surrounding specific land use practices (rice cultivation, crop rotation, and seasonally managed wetlands), biogeochemical Hg cycling, and Hg bioaccumulation into the foodweb.

2. Goals and Objectives:

Goals:

- To increase habitat for wetland dependent wildlife by maximizing wildlife use of rice fields, while making it technically and economically feasible for farmers to grow rice as well as attract wildlife.

- To determine whether a three year crop rotation for rice production can produce valuable habitat for migrating shorebirds and other aquatic species during a fallow phase that is characterized by shallowly-flooded fields for up to two months during a period of minimal suitable aquatic habitat availability throughout the Central Valley.

- To learn more about the habitat use and dispersal of the Giant Garter Snake in the rice fields and other wetlands at the Yolo Wildlife Area.

- To examine key factors controlling MeHg production in Yolo Bypass sediments and its concentrations in sediment, overlying water, and biota.

- To educate farmers about the results of this project and encourage them to take advantage of programs which make it worthwhile to integrate wildlife friendly farming practices into their existing farming methods.

Objectives:

- To implement a three year pilot/demonstration project at the Yolo Wildlife Area which will measure the use of rice fields by shorebirds and other aquatic birds under three treatments as well as assessing its impact on farmers. Will total rice yield, total herbicide use, extent of weeds present, and extent of disease found on rice plants differ between the fields in the rotation and a field planted in white rice every year (as most fields are)?

- To document the numbers, densities and activities of shorebirds using these shallowly-flooded fields, and to identify variables that could be important determinants of shorebird use. Is shorebird use of the flooded fallow fields influenced by water depth, invertebrate prey abundance, extent of vegetative cover, predator activity, or relative abundance of other waterbirds?

- To study (by trapping and telemetry) the seasonal use of rice fields and other wetlands and their associated waterways by the Giant Garter Snake (GGS) in order to answer the following: a) Do GGS utilize habitat within periodically inundated flood control channels? b) Is there sufficient aquatic habitat for foraging? c) Is there an adequate prey base? d) Is there sufficient high-quality upland habitat available for basking, retreats, and winter refuge from flooding? e) What enhancement measures are needed? f) Why do GGS occur in some areas and not others? g) Do GGS exhibit fidelity to particular sites or are they opportunistic? h) Will snakes utilize newly created prime habitat if they are already established in a specific habitat area? i) What are the differences in male and female habitat utilization? j) Is one sex more likely to colonize new areas? k) What life cycle trait determines this? l) How can this lead to recommendations in GGS management strategy? m) What is the baseline for mercury levels in GGS at the Yolo Wildlife Area?

- To answer the following questions about mercury in the study area: a) Are there differences in MeHg production rates, or MeHg concentrations in sediment, water or lower trophic biota (aquatic invertebrates) among the three rotations proposed? b) Is there significant change in MeHg production rates or sediment/water concentrations associated with seasonal field flooding and draining management actions? c) Is there significant change in MeHg production rates or sediment/water MeHg concentrations resulting from the application of agricultural amendments containing sulfate? d) Is there significant difference in MeHg production rates or sediment/water concentrations in fields that are undergoing the above 3-year rotation regime, compared with rice fields and/or seasonal wetlands that are not undergoing rotation? e) Are total Hg levels in eggs of birds from the Yolo Bypass below toxic threshold levels (Lowest Observable Adverse Effect Levels)? f) What are the Hg levels in Giant Garter Snake in the Yolo Bypass and do they differ by habitat type?

- Continue the existing Yolo Bypass Working Group to provide a forum for communication among farmers, landowners, agency representatives, elected officials and environmentalists on issues of mutual interest in the Yolo Bypass, including the progress and results of this project. Develop outreach materials for farmers that present the findings of this project that may assist them in utilizing wildlife friendly farming techniques.

3. Conceptual Model – Refer to Figure 1 Project Conceptual Model and Figure 2 Mercury Conceptual Model.

4. Approach and Scope of Work

Task 1. Project Management

Subtask 1.1 Communications with Primary Subcontractors

The Project Director will communicate monthly with each of the primary subcontractors to assess progress and assist with problem solving at the site. The Executive Director will be the alternate contact if Project Director is not available. Subcontractors will provide a monthly report through email and an invoice. The primary subcontractors will meet at least semi-annually with Project Director and Executive Director to discuss the progress of the work and determine any adaptive management necessary. This will be in advance of the semi-annual fiscal and programmatic reporting. At that time data will be presented and prepared for the semi-annual data submittal.

Subtask 1.2 Invoicing and Budgeting

The Executive Director will review all subcontractors' invoices and prepare a monthly or quarterly project invoice for submittal to CALFED. The Executive Director will be responsible for payment to all subcontractors. Project Director and Executive Director will review the project budget monthly to ensure that project costs stay on budget.

Subtask 1.3 Reporting

Project Director and Executive Director will prepare semi-annual fiscal and programmatic reports. They will compile all deliverables and submit them to CALFED.

Subtask 1.4 Final Report

Project Director and Executive Director will compile and synthesize the data and prepare a final report. They will submit a draft report to project partners for review. They will print and distribute the report to the appropriate agencies and other organizations.

Deliverables: Invoices, semi-annual fiscal and programmatic reports, subcontract documentation, final project report.

Task 2. Rice Rotation

Rice has been grown on the Yolo Wildlife Area since 2001 by farmers who lease the land from Fish and Game. In 2002 the Wildlife Area managers and the lessee experimented with a three year rotation that included a fallow year, during which the field was disced and prepared for flooding (but no rice was planted) in order to provide shallow water habitat for migratory shorebirds. Anecdotal observations indicate a large number of shorebirds utilize these areas during their southbound migration as a temporary stopping point or as their winter home. Farmers have reported a decreasing need for

herbicides and fungicides during the first production year and a benefit from the infrastructure improvements completed during the fallow year.

This task intends to repeat this now well established rotation and measure the agricultural benefits that result. Two sets of three fields will be utilized for this study. One set of fields, directly south of the Yolo Causeway, ranges from 91.9 to 103.2 acres. The second set of fields is located approximately 150 feet south of the first, and they range from 180.2 to 222.2 acres (see map). The wild and white rice fields will be managed by the farmer as he normally would for commercial production. The farmer is a tenant who pays rent to the Dept. of Fish and Game. He will incur all costs associated with the white and wild rice production. He will keep records of the parameters to be measured. Each set of fields will be managed in the following rotation:

- **White rice production** – One field in each set will be planted in white rice (short grain S102, Akita, Koshi or CM-101) in mid to late April (April 22—May 10) depending on weather and bypass conditions, by airplane onto flooded fields. Approximately 7 days after planting, the farmer will look for a ratio of rice plants to weeds, watergrass and sprangletop primarily, at a set number of sites around the field. Depending on the weed ratio, he will then apply herbicide around day 12. At 21 days the farmer will survey for broad leaf weeds and watergrass and sprangletop escapees, again using a ratio of rice to weeds to determine the level of herbicide application. The weeds will be allowed to grow to 45 days, the water level is lowered and herbicide is applied. The fertilizer application will be as follows: Before flooding the fields, aqua ammonia will be injected into the soil (120 units/acre-70 lbs nitrogen/acre) and 16-20-0 granular fertilizer will be broadcast on the field (200 lb/acre–32lbs nitrogen/acre 40 lb phosphorus/acre 20 lb sulfate/acre). At day 30-35 plant tissue analysis will determine if more nitrogen is needed, and, if so, 150-200 lbs/acre of ammonium sulfate will be applied. This procedure will be repeated at day 60-65 if necessary. Harvest will be at 120-130 days after seeding.

- **Wild rice production** -The wild rice fields will be planted between May 25-June 10 (Wild rice has a shorter growing season than white rice). The field will be flooded to a depth of 8-10” for weed control and the seed will be flown on by airplane. At 30 days the rice to weed ratio will be determined and a broadleaf herbicide applied if necessary. There will be minimal herbicide use on the wild rice because the plant is closely related to the target weeds. The fertilizer program will be the same as white rice, but with fewer units used (aqua ammonia at 100 units/acre). At 30-35 days ammonium sulfate will be applied. At 60 days chemical (Spodnam) to help keep grain on the panicle will be applied. Wild rice will be harvested at 90 days.

- **Shallow water shorebird management** – Two fields in each set will be fallowed in the rotation. The fields will be disced and tri-planed to level the fields between June 15 -30. The rice checks will be reconstructed, and flooding will occur during the months of July and August. Fields will

be maintained at varying depths to provide habitat to a wide suite of species (see Shorebird section). By the end of August, much of the flooded fields will be covered by annual weeds. After they are drained, these areas will be disced in September, ideally before the annual weeds have a chance to set seed.

There will also be a 150 acre field planted with white rice for all three years of the study. This field will serve as a reference since most rice farmers plant white rice every year. It will be farmed in the manner described above for white rice production. If fungus, stem rot or sheath spot, is found in the 2^{nd} or 3^{rd} white rice rotation, the farmer will document it at 60-75 days and apply fungicide. During each of the three years, each stage of the rotation will be represented in both sets. The following parameters will be monitored in the planted fields, including the reference field:

a) Total rice yield from each field each year

b) Level of herbicide use in each field each year

c) Presence of disease on rice plants by randomly sampling 100 plants in each field at times to be determined by the farmer

d) Ratio of rice plants to weeds in each field at approximately 7 and 20 days for white rice and 30 days for wild rice

To evaluate the efficacy of the fallow/flooded-white rice-wild rice (fa-wt-wl) rotation in maintaining acceptable rice yields and decreasing the need for chemical application, we will compare the yields/acre and chemicals required for these fields with locally-based reference samples. To establish the reference samples for yield and chemical use, we will use yield and chemical use data for each year from as many fields outside the study site as are available in the Yolo Basin. Data from individual fields will be solicited from farms not using crop rotation with a fallow phase, but using methods similar to the study site in other cultivation methods and in chemical use. No data will be individually identifiable to farm or landowner, to lessen the reluctance of data sharing by farmers. It is likely that the sample sizes for reference data from outside the study area will not be balanced over the three years.

To examine the hypotheses that yields of rice are as high (or chemicals needed are less than) under the fa-wt-wl rotation as are obtained when the fa-wt-wl rotation is not used, we will compare the means for the two fields in each rice type to the reference sample outside our study area each year and reject these hypotheses at the 0.1 level. Assuming independence of the data from the different fields in the three years, we can use a binomial distribution with n = 3 (years) and p = 0.1 (the rejection probability for each year's comparison) to create overall hypothesis tests. The probability of rejecting the hypothesis if it is, in fact, true would be 0.028 if the annual comparison hypothesis were rejected in 0-1 years and 0.271 if it were rejected in 0-2 years. (If the annual test level were 0.05, the overall probability of rejecting the hypothesis if it is true would be 0.007 if the hypothesis were rejected in 0-1 years and 0.143 if it were rejected in 0-2 years.) Therefore, we would conclude that rice yields were as high when the fa-wt-wl rotation is used as when it is not, if the study field yields were not lower than for the

reference sample in two or three of the three years of study. Similarly, we would conclude that chemical use was lower when the fa-wt-wl rotation is used as when it is not, if chemical use were lower than in the reference sample in two or three of the three years of study.

Subtask 2.1 White and Wild Rice Production. White and wild rice fields in the rotation will be farmed by rice farmer, who incurs costs. He will gather the data as part of his normal record keeping.

Subtask 2.2 Preparation of New Field for the Rotation. Rice farmer will be paid to prepare a new 222 acre field for the rotation at the start of the project.

Subtask 2.3 Fallow Field Preparation and Maintenance. Rice farmer will be paid to prepare and maintain the fallow fields in the rotation, including the flooding to the levels proposed in the Shorebird section below (Task 3).

Deliverables: semi-annual progress reports and a final report as required by CBDA.

Task 3. Shorebird Assessment in Fallow Field Rotation

Two groups of three fields will be identified for the three-year rotation of fallow to white rice to wild rice in the Yolo Bypass Wildlife Area. Each field in each group will be subject to the three treatments of the rotation. Consequently, over the 3-year period there will be a total of 6 different fallow, shallowly flooded fields and there will be 2 fallow fields per year. Water-depth treatments, of approximately 2.5 cm (1 inch) and 10 cm (4 inches), will be maintained in approximately half of each fallow field. Thus each year there will be two very shallow and two moderately shallow sampling units. These will total six sampling units of very shallowly flooded fields and six sampling units of moderately shallow flooded fields over the 3-year period.

We propose to document the extent to which the fallow fields in the 3-year rotation provide foraging and roosting habitat for aquatic birds, and to evaluate two shallow flooding depths for their efficacy in creating shorebird foraging habitat.

Subtask 3.1 Aquatic Bird Use of Fallow Fields

1. Numbers of Aquatic Birds and Shorebird Behavior

During the 3 years, bird abundance in each sampling unit will be measured on paired morning and afternoon censuses. We will conduct 3 of these censuses per week of shorebirds for nine weeks, commencing one week before field flooding. For each survey, we will count the number of birds of each species (shorebirds and other aquatic species) in each field segment. On at least two of the census days per week, we will categorize each shorebird's activity as foraging, standing or sitting, exhibiting antagonistic behavior, flying, predator avoidance (flying), or miscellaneous. Behavior may vary diurnally with feeding being a more prominent activity in the morning and roosting more likely later in the day. On each survey, we will verify the water depth in each field using marker stakes placed in the fields prior to flooding.

2. Categorizing Shorebirds by Age Class

Since juvenile migration of many shorebird species peaks approximately a month after that of adults, differences in migration routes for the two age classes could affect the temporal abundance at a particular site. Under favorable viewing conditions, it is possible to determine age class for many shorebird species in the field. In each of the 3 years we will collect at least weekly age-class samples for as many shorebird species as possible.

3. Recording Potential Predators of Shorebirds

The presence of raptors that prey on shorebirds may affect the number of birds observed using the fields. During the 3 years, on every survey we will record raptor abundance in the fields and all predator activity during the time observers are in the study area.

4. Vegetation Cover

The development of vegetation cover in the flooded fields will affect the ease with which shorebirds can forage and possibly the establishment of invertebrate prey as well. Each week in each year, we will estimate percent vegetation coverage for each type (grass or forb) and height category (greater than or less than 10 cm) within 1 sq m at 21 randomly selected points in each of the 4 sample units. While these measurements are being taken at each point, we will make a cursory examination of vegetation for the presence or absence of seed head formation.

Deliverables associated with this task include semi-annual progress reports, as required by CBDA, participation on CBDA sponsored workshop to convey research findings, and a detailed report of research findings presented as part of the larger groups' Final Report.

Subtask 3.2 Measuring Shorebird Foraging Rates and Identifying Potential Prey

1. Measuring Shorebird Foraging Rates

During Year 1 of the study we will conduct shorebird foraging observations to assess differences in feeding performance between the two shallowly flooded management scenarios (1 inch vs. 4 inch depths). Each week, we will collect foraging data for shorebird species, determined by their abundance, ease of observing their behavior, and their representation of a diversity of foraging strategies. We anticipate that Black-bellied Plover, Semipalmated Plover, Killdeer, Black-necked Stilt, Greater Yellowlegs, Lesser Yellowlegs, Long-billed Curlew, Western Sandpiper, Least Sandpiper, and Wilson's Phalarope could be sufficiently common to allow us to collect foraging observations. Other species as abundant as these would also be candidates for foraging observations. For each sampling unit, we will select at least five individuals of each species and conduct one 2-minute focal observation on each. For each observation we will record number of prey capture attempts by microhabitat, the number of successful prey captures by microhabitat, with criterion for determining successful prey captures similar to Elphick (2000). Microhabitats are defined as air, water surface, water column, and substrate. In addition, data will be collected on other variables that may influence feeding performance, including date, time of day, group size, perceived predation threat (as in Elphick 2000, and see below), and water depth.

2. Identifying Potential Shorebird Prey

Since shorebirds feed primarily on invertebrate prey, shallowly-flooded fields will be most valuable to shorebirds in fall migration if they provide high quality foraging opportunities. In Year 1 of the study we will take three water samples and three sediment cores in each of the four sample units to identify the invertebrate prey available to foraging shorebirds and obtain preliminary estimates of variability. Sampling will occur once in the first and once in the second four weeks of flooding. Infaunal (substrate) cores will be at least 4 cm deep and core positions selected randomly within the fields. Water samples will be obtained by placing a cylindrical coring device, of at least 15 cm height and both ends open, into the substrate, and extracting all enclosed water. Invertebrates retained after sieving samples through a 500 μm mesh will be stained and preserved for later identification and tally.

Deliverables associated with this task include quarterly progress reports, as required by CBDA, participation on CBDA sponsored workshop to convey research findings, and a detailed report of research findings presented as part of the larger groups' Final Report.

Subtask 3.3 Measuring Prey Availability

The foraging value of the fields should be associated with high invertebrate abundance. To determine whether water depth affects prey availability, we will sample invertebrate prey in the four field segments in Year 2. Up to 100 cores will be collected, using the methods described above in the pilot sampling. Allocation of the sample over time and sampling units will be based on the results of the foraging observations and pilot invertebrate samples taken in Year 1, to most efficiently obtain density estimates for the most important microhabitats.

Deliverables associated with this task include semi-annual progress reports, as required by CBDA, participation on CBDA sponsored workshop to convey research findings, and a detailed report of research findings presented as part of the larger groups' Final Report.

Subtask 3.4 Reports

At the end of the first and second years of the study PRBO will produce progress reports as requested. At the end of the third year PRBO will produce a final report summarizing the results of the three years of study.

1. Progress Reports

For Years 1 and 2 provide progress reports containing the following types of descriptive information:

For All Avian Species Combined, All Shorebird Species Combined, All Raptor Species Combined, and Individual Avian Species with Sufficient Data:

Graphs of abundance over 9 weeks (or 1 week plus the period of flooding) in all fields

Graphs of density for over 9 weeks, by water depth

Graphs and/or summary statistics of abundance, by time of day (comparing morning versus later afternoon)

Summary statistics on avian activity, by time of day

For All Shorebird Species Combined:

Graph of biomass over 9 weeks in all fields

Graph of biomass over 9 weeks, by water depth

Graph and/or summary statistics on abundance, by time of day

For Shorebird Species with Sufficient Data:

Chart of age composition of sample over 9 weeks

Chart of age composition of sample over 9 weeks, by water depth

For All Fields over the Flooding Period, by Water Depth:

Chart or graph vegetation cover for two water depths, by type (grass v. forb), and height ($\leq$ 10 cm v. > 10 cm)

Chart or graph difference in total vegetation cover for two water depths

Chart or graph difference in vegetation cover for two water depth, by type

Chart or graph difference in vegetation cover for two water depths, by height

For Total Invertebrates and Key Invertebrate Groups or Taxa (first and second years only):

Comparison of Core or Water Sample Abundances, by Water Depth

2. Final Report

The final report will summarize bird use of the fallow fields as described above and will test hypotheses as follows:

To examine hypotheses concerning relative avian abundances and densities in the two flooding regimes, we will use a mixed effect model to examine the following hypotheses, with the following variables:

- density, dependent variable
- field, as both a random and fixed effect (2 levels)
- week, a group variable with field as random effect (8 levels)
- depth, a fixed effect (2 levels)

Hypothesis 1: The density of shorebirds is the same in the two flooding regimes.

Versus: The density of shorebirds differs between the two water depths, with smaller species (Black-bellied Plover, Semipalmated Plover, Killdeer, Western Sandpiper, and Least Sandpiper)

occurring in higher densities in the 1 inch water depth and other species (Black-necked Stilt, Greater Yellowlegs, Lesser Yellowlegs, Long-billed Curlew, and Wilson's Phalarope) occurring in higher densities in the 4 inch water depth.

Hypothesis 2: The density of other aquatic birds is the same in the two flooding regimes.

Versus: The density of other aquatic birds is greater in the 4 inch than in the 1 inch depths.

To examine hypotheses concerning relative densities of invertebrate prey in the two flooding regimes, we will use a mixed effect model to examine the following hypothesis, with the following variables:

- number or biomass of invertebrates per sample, dependent variable
- field, as both a random and fixed effect (2 levels)
- time period (1st vs. 2nd 4-weeks), group variable with field as random effect (2 levels)
- depth, a fixed effect (2 levels)

Hypothesis 1: The abundance/biomass of organisms is the same in the two flooding regimes.

Versus: The abundance/biomass of organisms differs between the two flooding regimes.

Data considerations: 1) Since it may not be possible to divide the fields equally in area, we will use the densities rather than absolute abundances for each field segment. 2) We may pool avian count data over the three paired counts each week for each field segment for calculation of densities, to avoid including highly correlated data in the model and to buffer the effect of spurious variability. Individual birds may remain in the general region of the flooded fields for several days to a week, although turnover is likely during fall migration. Lack of turnover during short periods such as 3 to 5 days could create serious lack of independence in census results within a week. Additionally, factors that may be unrelated to the foraging value of the flooded fields, such as predator pressure, may cause birds to move among field segments, introducing spurious variability to counts.

Task 4. Giant Garter Snake Investigation

The Yolo Bypass study area is located within the Yolo Wildlife Area, west of the Sacramento Deep Water Shipping Channel and south of Interstate 80. The areas to be surveyed lay along and between the east and west Yolo Bypass levees. Target habitats include uplands, wetlands, rice fields, shore bird ponds, and the aquatic channels and drainages that serve these features.

Subtask 4.1 - Presence-Absence and Distribution Survey

4.1.1. Field Reconnaissance and Site Evaluation

Initial field reconnaissance will be completed by foot, boat and, by roadway in reference to 7.5-minute USGS topographical and aerial maps. Sites deemed as potential habitat for GGS will be slated for survey effort.

4.1.2 Visual Surveys and Aquatic Trapping

A combination of visual searching and aquatic trapping is necessary to adequately assess population numbers and dynamics.

Visual surveys will be conducted after emergence and throughout the spring portion of the active season, for eight weeks between approximately April 15 and June 15 (potential adjustments to this schedule are discussed below). Beginning in April the researcher will conduct visual surveys by walking or kayaking along the slough channel and nearby upland areas to search for basking and mating snakes. Primary searching areas include the vegetated banks channels and drainages, marshland edges, as well as upland basking sites. Snakes discovered during these searches will be caught by hand or using reptile snares.

Aquatic trapping will be conducted throughout this eight-week period. Floating modified minnow traps will be placed along the edges of streams and associated marshland. Traps will not be purposely baited, although frogs, tadpoles, and fish may be caught in these traps and act to lure snakes into the traps. Three hundred traps will be distributed and rotated within the project area as 50-trap transects set for a minimum of 14 days each. Trapping effort will be adjusted as necessary in response to field conditions (i.e., extended flooding of the bypass interior, low water within ditches and drains, etc.). Traps will be checked daily. Global positioning system (GPS) units will be used to determine the geocoordinates of capture locations. The vegetation type, approximate water depth, substrate type, time of day and ambient temperature will be recorded. If late season flooding of the bypass delays trap setting, or if it is determined that later trapping would better detect late-dispersing snakes within the Yolo Bypass, trapping may be divided into two four-week intervals occurring after the spring emergence and again during the second seasonal activity peak after females give birth.

4.1.3 Marking and Measuring

Data will be collected from snakes upon capture. Weight, total length, snout to vent length, sex, scale counts on head and mid-body, and other physical features such as scars and tumors will be noted. Captured snakes will be implanted with passive induced transponder (PIT) tags for permanent identification. This allows snakes to be identified using a scanner, which is more time efficient than identifying the scale clippings on each snake. This method is essential in estimating population size, density, male to female ratios, and fecundity of the species. Tissue will be collected and archived for future genetic analyses. All snakes will be immediately released at their capture location after data is recorded.

Subtask 4.2 – Seasonal Distribution Survey

Telemetry will be useful to understand GGS distribution patterns, dispersal, use of different habitats, and overwintering behavior. Implementation of this task will depend on the size of the population in the survey area, since we do not want to implant transmitters in more than 20%. If sufficient numbers of snakes are captured, sixteen snakes (eight female and eight male) will be chosen for telemetry. Larger individuals (150 grams) will be implanted with radio transmitters. The radios will last for 18 months, allowing for monitoring through the duration of two active seasons and one overwintering period. Five-gram transmitters will be used with both female and male snakes to facilitate the collection of consistent temporal and spatial data between males and females. Upon capture, snakes will be taken to the Sacramento Zoo to surgically implant the radios. Dr. Ray Wack, DVM, has the necessary permits and experience to perform the surgeries. Snakes will need a recovery period of ten to fourteen days before being returned to their capture location for release.

Snakes will be located using hand-held and/or vehicle mounted telemetry systems. When located, geocoordinates of the snakes will be recorded with a GPS unit. If snakes are in an area that cannot be accessed by foot, their locations will be estimated with triangulation. Snakes will be monitored three to five times per week through different day-time periods in order to track movement, behavioral characteristics and habitat utilization. Tracking will be reduced to once per week during the inactive season. When possible, the surrounding environmental characteristics of the snakes will be recorded.

Subtask 4.3 Report

Progress of survey success in Tasks 1 and 2 shall be reported informally (meeting and/or email) upon request and within reason throughout the course of the survey. A written report shall be prepared that summarizes the survey upon its completion. The report will include the following sections:

- Introduction – objective of survey, description and location of survey area, and definitions of terms
- Methods – details on survey methods and criteria used to determine GGS presence and habitat use
- Results – results of survey, such as numbers and locations of GGS observed and captured, demographic data, habitat conditions.
- Conclusions – discussion of GGS population status, distribution and dispersal patterns, and response to crop rotation and watering patterns.

Included in the report will be a location map of survey area and GGS occurrences, and electronic format of GIS data.

Task 5. Mercury Investigation

The overall field sampling design will include the following eight sampling locations:

[a.] Six fields undergoing the 3-year rotation regime (i.e. white rice wild rice fallow seasonally managed wetland), which are out of sync such that n = 2 of each habitat type is represented at all times; One control site representing a perennial, seasonally managed wetland (i.e. never in rice production); One control field, annually in white rice production.

Quality assurance (QA) and quality control (QC) for mercury and methylmercury analyses in biota, sediment, and water will follow procedures described in a Quality Assurance Project Plan (QAPP) approved for previous CALFED-sponsored mercury projects.

Subtask 5.1. Biota Characterization

Hg levels in biota for Task 5.1 will be quantified by the USGS Western Ecological Research Center (Josh Ackerman, Keith Miles, and John Takekawa).

5.1.1. Methyl Mercury Levels in Bird Prey

We will sample invertebrate prey of waterbirds twice each year during the pre-breeding (about March) and late-breeding seasons (about July) when avian reproduction is most sensitive to Hg during egg formation and chick growth. These sampling times will be coordinated spatially and temporally with sediment and water Hg samples, as well as the late summer/early fall bird surveys assessing use of each habitat type. These sampling time periods correspond, respectively, to the end of winter flooding of rice fields and the beginning of flooding of rice fields after seeding.

We will sample 6 fields in total each year (2 replicates of each of the 3 habitat types described above) with 3 composite sub-samples per field (18 total composite samples per year) at randomly chosen sites within each field where sediment and water samples are collected for Hg analysis. We will sample aquatic invertebrates in the water column using sweep nets and light traps. We will selectively choose the most abundant invertebrate species (e.g., mosquito larvae or corixids) and analyze MeHg levels. MeHg levels in invertebrates will be compared to MeHg levels in sediment and water at each sampling site and field.

5.1.2. Total Hg Levels in Bird Eggs & Effects on Reproduction

During the spring breeding season, we will collect up to 15 eggs from black-necked stilt (*Himantopus mexicanus*) nests found on the Yolo Wildlife Area each year. If black-necked stilts do not nest in high enough densities for egg collections (typically there are 30 nests per year; D. Feliz, pers. obs.), we will collect eggs from the next most abundant waterbird nesting in the area, likely mallards or black-crown night herons. Each egg will be analyzed for total Hg. Due to complex interactions between Hg and selenium in relation to wildlife toxicity, we will also analyze selenium in each egg. Since most Hg in eggs is in the MeHg form, we will analyze only total Hg levels in eggs (Schwarzbach and Adelsbach 2002). Hg levels in eggs will be compared to Lowest Observable Adverse Effect Levels (LOAELs) developed from lab studies (Schwarzbach et al. 2005, CALFED Ecosystem Restoration Program grant number ERP-02D-C12).

In controlled laboratory studies, mallard diets containing as little as 0.5 ppm MeHg (dry-weight, which is equivalent to about 0.1 ppm Hg on a wet-weight basis) caused a reduction in reproductive success (Heinz 1979). Moreover, mallards are not the most sensitive avian species to Hg and several other species have even lower toxicity thresholds (Heinz 2002). Black-necked Stilt eggs collected in the San Francisco Bay had concentrations near this toxicity threshold in previously funded CALFED studies (Schwarzbach and Adelsbach 2002, Schwarzbach et al. 2005), and therefore are an important species for monitoring Hg levels in birds.

5.1.3. Hg Levels in Giant Garter Snakes

Up to 30 giant garter snakes will be captured over a two-year period and blood will be collected from each snake as part of Task 4.3 above. Whole blood will be analyzed for MeHg levels to assess ecotoxicological risk.

Deliverables associated with Task 5.1 include semi-annual progress reports, as required by CBDA, participation in CBDA-sponsored workshops to convey research findings, and a detailed report of research findings presented as part of the larger group's Final Report to CBDA.

Subtask 5.2. Sediment Characterization

Surface sediment (top 0-2 cm interval) will be sampled four times over a two-year period, at each of the eight sites listed above. To best answer the questions listed above, the specific timing of sampling events will be determined in coordination with the activities of the participating rice farmer and other research team members. Consideration will be give to multiple factors including the growth stage of the rice crop, the timing of field flooding/draining events, the planned usage of sulfate amendments, and the life stage and presence of key biota species.

At each of the eight sampling locations, a composite sediment sample representative of the site will be made from surface sediment collected at 10-20 points within a large spatial area. The sample will be collected in a 1-liter acid-cleaned mason jar. Sediment collected for microbial rate assays (MeHg production and SO_4^{2-}reduction) and ancillary C, Fe, and S chemistry will be stored on wet ice until further sub-sampling (within 24 hours). Samples collected for in-situ MeHg, HgT and $Hg(II)_R$ concentrations will be frozen on dry ice immediately upon collection in the field.

Sediment from each location will be well homogenized prior to sub-sampling for microbial assays, whole sediment constituents, and pore water. Sediment pore water will be collected via centrifugation and assayed for concentrations of sulfate, sulfide, and Fe(II). All sample processing will be conducted under strict anaerobic conditions (using an N_2-flushed glove bag) to minimize oxidation of reduced sediment species. Table 1 summarizes the specific sediment parameters to be measured, their relative importance, a brief methods description and the associated methods reference.

Deliverables associated with this task include semi-annual progress reports, as required by CBDA,

participation in CBDA-sponsored workshop to convey research findings, and a detailed report of research findings presented as part of the larger group's Final Report to CBDA.

Subtask 5.3. Overlying Water Characterization

Water samples will be collected in parallel with the four planned sediment sampling events at the eight sample sites listed above, plus an additional sample will be taken during each sampling event from the Toe Drain that boarders the eastern edge of the Yolo Bypass and is the irrigation water source. Composite water samples will be taken that integrate water over a wide spatial area, in a similar manner to the sediment collection in Subtask 5.2. For all overlying water samples, concentrations of total mercury (HgT), methylmercury (MeHg), and suspended sediment will be determined in unfiltered water, and of sulfate in filtered water. During one of the four sampling events, a more complete chemical characterization will be done, including HgT and MeHg in filtered water, dissolved and particulate organic carbon, and various nutrients including five forms of nitrogen (one unfiltered and four filtered) and three forms of phosphorus (one unfiltered and two filtered) as detailed in Table 1. Water samples will be collected using standard trace-metal clean techniques developed for environmental aqueous Hg sampling (Gill and Fitzgerald 1985). Table 1 details the specific water-column parameters to be measured.

Deliverables associated with this task include quarterly progress reports, as required by CBDA, participation in CBDA sponsored workshops to convey research findings, and a detailed report of research findings presented as part of the larger group's Final Report to CBDA.

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Task 6. Public Outreach

The Yolo Basin Foundation is uniquely suited to provide public outreach. The primary vehicle for this will be the Yolo Bypass Working Group. In 1998 the Foundation founded the Working Group under a CALFED Ecosystem Restoration Grant. The Foundation continues to coordinate the Working Group with funding from CALFED Grant ERP-01-N12, which ends in April 2007. The Working Group is an ad hoc organization of landowners, farmers, hunters, conservation organizations and local, state, and federal agency staff with an interest in land and resource issues specifically in the Yolo Bypass. It meets periodically throughout the year, providing a focused opportunity for participants to discuss issues related to the Yolo Bypass including farming in the floodplain, improvements to the flood control system, habitat restoration projects, mosquito control, water quality and public access. Over 50 people participate in each meeting. Some of the participants are local farmers, ranchers, duck hunters, and staff from Department of Water Resources, State Reclamation Board, Department of Fish and Game, US Fish and Wildlife Service, State Department of Food and Agriculture, Natural Resources Conservation Service, Dixon and Yolo Resource Conservation Districts, Sacramento Area Flood Control Agency, Yolo County, City of Davis, City of West Sacramento, California Waterfowl Association, Ducks

Unlimited, National Oceanic and Atmospheric Administration, US Geological Survey, Sacramento Yolo Mosquito Vector Control District, Port of Sacramento, and others.

The people involved in the Working Group represent the stakeholders that will be interested in the proposed project. The project will be introduced to the Working Group when the project is initiated. They will be kept informed through semi annual Working Group meetings. During the meetings stakeholders will have the opportunity to ask questions and voice concerns. The Working Group will continue to be facilitated by Dave Ceppos a senior mediator with the Center for Collaborative Policy.

Other forms of outreach will include creation of interpretive signs at the project site, fact sheets, tours for stakeholders, and presentations to selected stakeholder groups. Community outreach may include articles in the Foundation's newsletter, The Flyway, press releases, and information on the Foundation website.

This scope includes the design and construction of an on-site interpretive sign describing the project in Year 1. This sign would be modified in Year 3 to interpretive project findings.

Two site tours led by project partners for selected stakeholders would be organized, one in Year 1 and one in Year 3. These tours would take place by bus or van.

The Project Director would coordinate three presentations to selected stakeholder group including the Yolo County Board of Supervisors, the Central Valley Joint Venture, and a farming related organization.

Deliverables: Working Group Minutes, electronic versions of interpretive signs, fact sheets, tour materials and newsletter articles.

5. Performance Evaluation

The performance evaluation of the project will be the investigators' ability to collect and interpret the data gathered. Broken down by task the performance measures are:

Task 2. Rice Rotation-Data gathered on field yield, herbicide use, disease, and weeds in rotated fields compared with other traditional fields. The results will be presented to farmers and agencies through the Working Group (see Task 6). The long term success will be measured by farmers and other wildlife refuges switching to our rotation, but that is beyond the scope of this grant.

Task 3. Fallow Field Rotation for Shorebirds- Success in interpreting the data will be the documentation of the numbers and densities of shorebirds and other aquatic species using the shallowly flooded fields as habitat during fall migration. By comparing these data with similar information from other studies we will get a measure of the value of this management practice relative to others in the Central Valley. Another measure of success will be determining the relative values of the two flooding regimes on shorebird abundance, density and biomass; use by other aquatic bird species; and quality of invertebrate food resources.

Task 4. Giant Garter Snake – Success can be measured by the timeliness, quantity, and quality of the monitoring activities in accordance with study design.

Task 5. Mercury Investigation – Our work will contribute to the understanding of Hg cycling in fields in different rice farming practices and will be of sufficient of scientific quality to suggest changes in farming practices. Success can be measured by the timeliness, quantity, and quality of our research including sampling all matrices successfully, submission of semi-annual reports, presentations of results at meetings, and publishing results in peer review journals.

Task 6. Outreach-A measure of Yolo Basin Foundation's success with outreach is the attendance at the Working Group meetings and tours to the project site.

6. Feasibility

The rice rotation has been implemented at the Yolo Wildlife Area on a small scale before, so there is every reason to believe that it can be put into practice on a larger scale. There are many variables when farming in the Bypass, such as weather and flooding, which may affect the results in any given year. The farmers and the Wildlife Area Manager are accustomed to making adjustments to account for such variables.

PRBO has a long history of collecting survey data on shorebirds and other aquatic species in wetlands in western North America. We do not anticipate any difficulty conducting the proposed avian counts, and documenting bird behavior. We also believe we can obtain feeding observations of focal birds but it may be difficult to document success rate if some species are eating very small prey. We don't anticipate difficulty sampling vegetation cover. We are most uncertain of the invertebrate sampling, as depending on the amount of vegetation in the sample and the abundance of prey, each one could take up to 5 hours to process (Chris Elphick pers. comm.). Our challenge will be to obtain a sufficient number of samples to capture the variability within a field and determine any differences between fields. We have proposed to do this phase of the project in year 2 and to use bird feeding observations and preliminary invertebrate sampling in year 1 as a basis for developing the final invertebrate sampling design for year 2.

The mercury investigators have substantial experience in the field of Hg research, biogeochemical cycles, microbial ecology, and wetland plant ecology, as evidenced by peer-reviewed publications and funding histories. All of the permanent equipment needed to complete this project currently exists among the participating institutions. We have proposed a time-line that is reasonable for the completion of all tasks. The timing of specific sampling events will be chosen based on hydrologic conditions and plant life phases and are not dependent on fixed dates.

The Giant Garter Snake biologist has the proper permits to trap, handle and take blood from the snakes **(**CDFG Scientific Collecting Permit 003881 and Federal Fish and Wildlife Permit TE018177-3 [ESA section 10(a)(1)(A)]). He has extensive experience working in the Bypass as well as other areas.

Yolo Basin Foundation has extensive experience in public outreach. We are very confident that we can reach out to the agricultural community through the existing Yolo Bypass Working Group as well as offering tours for stakeholders to learn about the project.

7. Data Handling and Storage

Vital project information will be initially documented in field and laboratory notebooks and data collection sheets. Entries will be legible, complete, written in black ink, dated, signed by the individual making the entry, and accurate enough to permit reconstruction of activities. The accurate and complete transfer of data to electronic media (e.g. Excel spreadsheets) will be verified by a designated QA manager at each research institution. All investigators will use a common electronic data platform (e.g. Microsoft Excel), to facilitate data sharing. Databases generated by each investigator will be primarily maintained by that individual, and will be routinely backed-up on electronic media for security assurance. All notebooks, files, and electronic media related to this project will be securely maintained for a minimum of three years from the time of project completion. Once data quality has been assured, data will be made available to the public. Copies of data will be sent to Yolo Basin Foundation for report preparation. The Foundation has off-site backup storage.

8. Information Value

Rice rotation and shorebirds- The Central Valley Joint Venture (CVJV) is a partnership of 18 Federal and State agencies and conservation organizations with a mission to protect, restore, and enhance migratory bird habitat in the Central Valley, which is the single most important waterfowl wintering area in the Pacific Flyway. The results of the aquatic bird surveys in this proposal can be used directly in the process of CVJV planning, particularly in respect to informing the bioenergetic modeling efforts used to establish habitat and agricultural enhancement objectives for the entire Valley. Currently, there is limited data regarding invertebrate availability in different habitats, including agriculture, in the Valley. Current invertebrate data used for modeling are from post-harvest flooded wheat and tomato fields in the Tulare Basin. Seasonal wetlands and rice fields comprise the majority of habitat in the Central Valley Basins, and data from this project will allow the CVJV to improve its conservation objectives for non-breeding shorebirds and waterfowl in these basins and habitats. Specifically, these data will allow refinement of objectives during the late summer-early fall period, a period identified in the draft 2005 CVJV Implementation Plan as being limiting in terms of habitat and food availability to shorebirds in the Valley. PRBO biologists involved in this proposal sit on the CVJV Technical Committee and will be responsible for integrating results of the aquatic bird use study into JV decision-making processes.

Mercury-The proposed work will provide information that will be integral to developing BMP's for rice farming in relation to aquatic habitat and methylmercury production, and with specific regard to white rice and wild rice. Although additional pilot studies would be needed in other parts of the Central Valley, the BMP's would be of great regional significance because about 500,000 acres of the Sacramento Valley (about half of the wetlands) consist of actively farmed rice fields

Giant Garter Snake- The results of this study will lead to publication of rice farming practices that

allow farmers and the snake to co-exist. The results will also be useful for the management of the Yolo Wildlife Area and other refuges.

9. Public Involvement and Outreach

The Yolo Bypass Working Group, for which we are asking continued funding, is the ideal means of reaching the farmers, agencies, conservationists and any others interested in Bypass issues as the project progresses. See Task 6 Public Outreach for more detail. In addition research results will be published in peer-reviewed journals, and other periodicals such as USGS Fact Sheets, agricultural and agency publications, and through CBDA-sponsored on-line publications.

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

1. ERP Priorities

All of the following information is from the ERP's August 6, 2001 Draft Stage Implementation Plan

Multi-regional Priorities:

2. Develop programs for wildlife-friendly agriculture and conduct studies to better understand relationships between farming and wildlife habitat. (p.43)

5. Ensure that restoration is not threatened by degraded environmental water quality.

Mercury: "In particular, it is important to understand and compare mercury methylation in restored wetlands and implications for loadings to the Bay and Delta." (p.45)

Attachment 1. EPR-MSCS Milestones

Habitats. "In the Sacramento-San Joaquin Delta EMZ cooperatively enhance at least 15% of the ERP target for wildlife friendly agricultural practices." GGS to benefit. (p. 111)

Stressors reduction. Mercury studies. (p. 115)

Attachment 2. CALFED Ecosystem Restoration Strategic Goals and Objectives.

Goal 1: Endangered and other at-risk species and native biotic communities

Objective 2. Contribute to the recovery of the GGS (p.140)

Objective 3. Enhance and/or conserve as-risk native species including wading birds, shore birds and waterfowl and terrestrial biotic assemblages associated with aquatic and wetland habitats. (p.140)

Goal 4: Habitats

Objective 1 and 2: Restore major habitat types including seasonal wetlands, fresh emergent wetlands and other floodplain habitats. (p. 141)

Objective 3: Protect tracts of existing high quality major wetand habitats (p. 141)

Objective 4: Manage ag lands in ways that are favorable to birds and other wildlife. (p.142)

Objective 5: "Manage the Yolo and Sutter Bypasses as major areas of seasonal shallow water habitat to enhance native fish and wildlife…" (p.142)

Goal 6: Water and Sediment Quality

Objective 1: Reduce contaminants in all aquatic environments in the Bay-Delta (p. 142)

Attachment 3. Study Needs for at risk species from MSCS

Giant Garter Snake. Conduct research to better determine the GGS's ecological requirements. (p.143)

From "5.0 Restoration Implementation and Science Issues"

"Additionally, information is needed to better understand the wildlife benefits of existing agricultural lands and agricultural practices. Important questions remain about how agricultural practices can be enhanced or modified to improve ecological conditions and species' health. Pilot projects are needed to evaluate alternative pest management and fertilizer practices, cropping patterns, the use of no-till agriculture or winter flooding, etc." (p.33)

"Farmers, others from the agricultural community, and local leaders should be partners in investigating these issues to develop a collaborative program that is friendly to both agriculture and wildlife." (p. 33)

"Research will be necessary to understand the links between contaminant cycling or effects and wetlands restoration. Does wetland restoration in locations contaminated with mercury-laden sediments or hydraulic mining debris accelerate mercury methylation?" (p. 37)

2. Relationship to Other Ecosystem Restoration Actions or Program Investments

The proposed project is closely related with two ongoing CBDA/ERP-funded projects that involve mercury cycling in the Bay-Delta ecosystem. Dr. Marvin-DiPasquale is PI on both projects: a) "Evaluation of Mercury Transformations and Trophic Transfer in the San Francisco Bay/Delta: Identifying Critical Processes for the Ecosystem Restoration Program" (ERP-02-P40) and b) "Mercury and Methylmercury Processes in North San Francisco Bay Tidal Wetland Ecosystems" (ERP-02D-P62). In all of these projects, similar data is being generated with identical methods on total mercury, reactive mercury, and methylmercury species in sediment, pore water, overlying water, and associated biota, which will provide some useful opportunities for comparison among several different environments, habitats, and ecoregions in the SF Bay-Delta system. The project is also related to the CBDA/ERP-funded "Upper Yuba River Studies Program Water Quality and Sediment Studies" (ERP-02-C01D, Dr. C. Alpers, PI) in that the proposed work looks at the fate of mercury downstream of historical mining sources in the Yuba and Feather rivers. The upper Yuba River project is evaluating the possible consequences of releasing mercury in sediment trapped behind Englebright Dam in conjunction

with habitat restoration and improved fish passage. In addition, the proposed project is related closely to a pilot project on mercury cycling in wetlands of the Sacramento River watershed, funded by the State Water Resources Control Board as a "special study" within a Proposition-50 grant to the Sacramento River Watershed Program (SRWP). Drs. Marvin-Di-Pasquale and Alpers are co-PI"s on the SRWP wetland project. The SRWP-funded study is comparing mercury methylation in water and sediment in seasonally flooded (non-agricultural) wetlands with permanently flooded wetlands. The two primary sampling areas for the SRWP wetland project are: 1) the Yolo Basin Wildlife Area, directly adjacent to the proposed rice-field-rotation field of the proposed study) and 2) the Cache Creek Settling Basin, adjacent to the Yolo Bypass about 5 km north of the I-80 causeway. The project is also related to the CBDA/ERP-funded "Mercury in birds of the San Francisco Bay-Delta: trophic pathways, bioaccumulations and ecotoxicological risk to avian reproduction (ERP-02D-C12, Dr. S. Schwartzbach, PI). This study examines Hg levels in biota (invertebrates and birds) in the San Francisco Bay and Examines ecotoxicological risk to avian reproduction.

Finally, the proposed work is related to the CBDA/ERP-funded project "A Pilot Program for Monitoring, Stakeholder Involvement, and Risk Communication Relating to Mercury in Fish in the Bay-Delta Watershed" (ERP-02D-P67). Sampling of small fish for Hg by UC Davis scientists (D. Slotton and colleagues) as biosentinels is ongoing in the Yolo Bypass and additional fish samples will be taken in the proposed study area and analyzed for Hg and/or MeHg, in coordination with the proposed work

3. Additional Information for Proposals Involving Land or Easement Acquisition N/A

C. Qualifications and Organization

We have assembled a highly qualified team to implement our proposal. Our partners are listed as subcontractors only for budgetary purposes. Dave Feliz, the Manager of the Yolo Wildlife Area, is not only an excellent biologist, he is very well respected in the local agricultural community and has an excellent relationship with DeWit Farms, the rice farmers in the Wildlife Area. Jack and Mike DeWit are proponents of innovative farming practices.

Point Reyes Bird Observatory is the premier shorebird biology and conservation organization in the western U.S. Their biologists work closely with farmers and industry groups, such as the CA Rice Commission, in their research efforts. Similarly the scientists from the USGS who are completing the mercury component of the grant are the best in their field, as evidenced by the number of CALFED grants they have worked on. Eric Hansen is a Giant Garter Snake specialist and holds all relevant permits to study the Giant Garter Snake. He has extensive experience trapping and studying snakes in and around the Yolo Bypass.

Robin Kulakow and Ann Brice of Yolo Basin Foundation have project management experience from other CALFED grants. Both have active ties to local agriculture. Ms. Kulakow heads the Yolo Bypass Working Group, and Dr. Brice is board chair of the Yolo Co. Flood Control and Water Conservation District.

On-Farm Conservation Efforts

This proposal represents an excellent collaboration with the Department of Fish and Game and its Strategic Plan (www.dfg.ca.gov/html/stratplan.html). The shorebird management techniques proposed satisfy two key themes within the Strategic Plan. Working with local farmers, the Wildlife Area staff has taken a cooperative approach to the stewardship of natural resources (Theme II). This cooperation has fostered a sense of good will within the conservation community resulting in enthusiastic participation of local farmers in the long term management of the Wildlife Area. This reaction illustrates the far reaching benefits of implementing such an approach.

The Department has also declared that the management of large ecosystems should be the focus of its habitat management perspective (Theme III). The management techniques employed on the Wildlife Area may be applicable to thousands of acres of rice lands in the Sacramento Valley, an area of critical importance to shorebirds.

The shorebird - rice rotation adds another tool to the array of wetland management techniques available to wildlife habitat managers. Teamed with cooperative management agreements with local Resource Conservation Districts, this practice can also generate valuable income for land managers while meeting the needs of migratory shorebirds and waterfowl.

Farmers enrolled in the Conservation Securities Program (CSP) through the Natural Resources Conservation Service will be able to receive compensation by implementing the described rotation of white rice – wild rice – shorebird management. This practice would fit into CPS' approved compensable practice entitled "Wildlife Habitat Management Enhancement, Component #11 – Manage Fallow Cropland Areas for Shorebird Habitat." This project will provide valuable evidence of the value of the approved practice in the CSP. This is critical for justification of the CSP and to attract willing landowners to participate in the program.

D. Cost

1. Budget –See attached file

2. Cost Share and Matching Funds

Information on cost share budget items: PRBO will make an inkind contribution to the project of one month's salary of Catherine Hickey to cover time to prepare and give presentations at scientific meetings and CVJV Technical Committee meetings. Dave Feliz, the Yolo Wildlife Area manager (Wildlife Habitat Supervisor II) will provide a minimum of 100 hours per year of project involvement as an inkind contribution with a value of $11,690. The project will account for an estimated 20% of Dr. Marvin-DiPasquale's annual effort for the first two years and 10% during year 3 for a total inkind contribution of $84,584.

3. Long-term Funding Strategy

Implementing a three-year rotation including one year of fallow shorebird management is a strategy easily implemented by public wetland managers in rice growing regions. The income generated from the two production years more than pays for the work necessary to manage for migratory shorebirds during the fallow year. Additionally the post harvest flooding of production rice is a valuable food source for migratory waterfowl. In the private sector landowners may enroll their property in the NRCS Conservation Security Program, which will compensate them for implementing this practice. Agricultural and water quality benefits documented during this study will also provide long-term benefits for rice farmers.

5

Tasks And Deliverables

Task ID	Task Name	Start Month	End Month	Personnel Involved	Deliverables
1.1	Project Managemet–Communications with Primary Subcontractors (Partners)	1	36	Brice, Ann Kulakow, Robin	meeting notes from semi–annual meetings
1.2	Invoicing and Budgeting	1	36	Brice, Ann Kulakow, Robin	invoices
1.3	Reporting	6	36	Brice, Ann Kulakow, Robin	semi–annual fiscal and programmatic reports
1.4	Final Report	35	36	Brice, Ann Kulakow, Robin	final project report
3.1	Aquatic Bird Use of Fallow Fields	4	29	Hickey, Catherine Page, Gary	semi–annual reports; final report
3.2	Measuring Shorebird Foraging Rates and Identifying Potential Prey	4	5	Hickey, Catherine Page, Gary	semi–annual reports; final report
3.3	Measuring Shorebird Prey Availability	16	18	Hickey, Catherine Page, Gary	semi–annual reports; final report
3.4	Reports	9	36	Hickey, Catherine Page, Gary	semi–annual reports; final report
2.1	White and Wild Rice Production	4	29	Feliz, Dave DeWit, Jack DeWit, Mike	semi–annual reports; final report
2.2	Preparation of New Field	2	4	Feliz, Dave DeWit, Jack DeWit, Mike	report of completion in semi–annual report

2.3	Fallow Field Preparation and Maintenance	3	30	Feliz, Dave DeWit, Jack DeWit, Mike	semi-annual reports; final report
4.1	GGS Presence-Absence &Distribution Survey	1	27	Hansen, Eric	semi-annual reports; final report
4.2	GGS Seasonal Distribution Survey	4	30	Hansen, Eric	semi-annual reports; final report
4.3	GGS Report	6	36	Hansen, Eric	semi-annual reports; final report
5.1	Hg Biota Characterization	1	36	Ackerman, Josh Miles, A. Keith Takekawa, John	semi-annual reports; final report
5.2	Hg Sediment Characterization	1	36	Marvin-DiPasquale, Mark	semi-annual reports; final report
5.3	Hg Water Characterization	1	36	Charles, Alpers Fleck, Jacob	semi-annual reports; final report
6.0	Public Outreach	1	36	Brice, Ann Kulakow, Robin	Working Group minutes, fact sheets, tour materials, electronic version of signs; newsletter articles

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	$ 29,230.13	$ 29,230.13	$ 46,713.00	$ 105,173.25
Total Costs for Task Two	$ 232,495.04	$ 65,204.24	$ 62,227.17	$ 359,926.45
Total Costs for Task Three	$ 47,871.90	$ 70,570.29	$ 68,057.76	$ 186,499.95
Total Costs for Task Four	$ 81,261.30	$ 59,984.00	$ 58,063.50	$ 199,308.80
Total Costs for Task Five	$ 130,277.75	$ 130,836.65	$ 53,389.90	$ 314,504.30
Total Costs for Task Six	$ 15,596.88	$ 11,873.75	$ 20,517.44	$ 47,988.06
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	$ 536,732.99	$ 367,699.06	$ 308,968.76	$ 1,213,400.81
1/Cost Share	$ 24,516.73	$ 25,346.73	$ 18,606.73	$ 68,470.19
2/ Other Matching Funds	$ -	$ -		$ -

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)

Detailed Budget Breakdown by Task and by Fiscal Year

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										
Robin Kulakow - Executive Director	$ 30,384.00	$ 72.00	130	$ 9,360.00	$ 72.00	130	$ 9,360.00	$ 72.00	162	$ 11,664.00
Ann Brice - Project Director	$ 39,168.00	$ 72.00	140	$ 10,080.00	$ 72.00	140	$ 10,080.00	$ 72.00	264	$ 19,008.00
Dee Feliz - Administrative Assistant	$ 1,612.00	$ 13.00	38	$ 494.00	$ 13.00	38	$ 494.00	$ 13.00	48	$ 624.00
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
Personnel Subtotal	**$ 71,164.00**			**$ 19,934.00**			**$ 19,934.00**			**$ 31,296.00**
										-
[1/] Benefits as percent of salary	25%			$4,983.50			$4,983.50			$7,824.00
Personnel Total (salary + benefits)	**$88,955.00**			**$24,917.50**			**$24,917.50**			**$39,120.00**
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)	$ 2,500.00			$ 500.00			$ 500.00			$ 1,500.00
2/ Travel and Per Diem	$ -			$ -			$ -			$ -
3/ Equipment	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ 2,500.00**			**$ 500.00**			**$ 500.00**			**$ 1,500.00**
[5/]Overhead Percentage (Applied to Personnel & Other Costs)	15%			$ 3,812.63			$ 3,812.63			$ 6,093.00
Total Costs for Task One	**$ 105,173.25**			**$ 29,230.13**			**$ 29,230.13**			**$ 46,713.00**

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

		Year 1			Year 2			Year 3		
BUDGET FOR TASK TWO	**TOTAL AMOUNT TASK 2 All Years**	**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										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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 - DeWitt Farms	$ 312,979.52			$ 202,169.60			$ 56,699.34			$ 54,110.58
	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ 312,979.52**			**$ 202,169.60**			**$ 56,699.34**			**$ 54,110.58**
[5/]Overhead Percentage (Applied to Personnel & Other Costs)	15%			$ 30,325.44			$ 8,504.90			$ 8,116.59
Total Costs for Task Two	**$ 359,926.45**			**$ 232,495.04**			**$ 65,204.24**			**$ 62,227.17**

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

		Year 1			Year 2			Year 3		
BUDGET FOR TASK THREE	**TOTAL AMOUNT TASK 3 All Years**	**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										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -

-
-

	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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 - Point Reyes Bird Observatory	$ 162,173.87			$ 41,627.74			$ 61,365.47			$ 59,180.66
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ 162,173.87**			**$ 41,627.74**			**$ 61,365.47**			**$ 59,180.66**
5/ Overhead Percentage (Applied to Personnel & Other Costs)	15%			$ 6,244.16			$ 9,204.82			$ 8,877.10
Total Costs for Task Three	**$ 186,499.95**			**$ 47,871.90**			**$ 70,570.29**			**$ 68,057.76**

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

		Year 1			**Year 2**			**Year 3**		
BUDGET FOR TASK FOUR	**TOTAL AMOUNT TASK 4 All Years**	**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										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -

-
-

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 - Eric Hansen	$ 173,312.00			$ 70,662.00			$ 52,160.00			$ 50,490.00
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ 173,312.00**			**$ 70,662.00**			**$ 52,160.00**			**$ 50,490.00**
5/ Overhead Percentage (Applied to Personnel & Other Costs)	15%			$ 10,599.30			$ 7,824.00			$ 7,573.50
Total Costs for Task Four	**$ 199,308.80**			**$ 81,261.30**			**$ 59,984.00**			**$ 58,063.50**

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

		Year 1			Year 2			Year 3		
BUDGET FOR TASK FIVE	**TOTAL AMOUNT TASK 5 All Years**	**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										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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**

Detailed Budget Breakdown by Task and by Fiscal Year

Operating Expenses: (ex: seed, plant materials, irrigation supplies, software, office supplies, etc)	$ -			$ -			$ -			$ -
2/ Travel and Per Diem	$ -			$ -			$ -			$ -
3/ Equipment	$ -			$ -			$ -			$ -
4/ Sub-Contractor - USGS - WERC	$ 103,297.00			$ 45,323.00			$ 40,763.00			$ 17,211.00
4/ Sub-Contractor - USGS - WRD (Menlo Park)	$ 84,585.00			$ 30,270.00			$ 35,582.00			$ 18,733.00
4/ Sub-Contractor - USGS - WRD (Sacramento)	$ 85,600.00			$ 37,692.00			$ 37,426.00			$ 10,482.00
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ 273,482.00**			**$ 113,285.00**			**$ 113,771.00**			**$ 46,426.00**
[5/]Overhead Percentage (Applied to Personnel & Other Costs)	15%			$ 16,992.75			$ 17,065.65			$ 6,963.90
Total Costs for Task Five	**$ 314,504.30**			**$ 130,277.75**			**$ 130,836.65**			**$ 53,389.90**

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

		Year 1			Year 2			Year 3		
BUDGET FOR TASK SIX	**TOTAL AMOUNT TASK 6 All Years**	**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										
Robin Kulakow - Executive Director	$ 9,360.00	$ 72.00	35	$ 2,520.00	$ 72.00	40	$ 2,880.00	$ 72.00	55	$ 3,960.00
Ann Brice - Project Director	$ 5,760.00	$ 72.00	25	$ 1,800.00	$ 72.00	10	$ 720.00	$ 72.00	45	$ 3,240.00
Dee Feliz - Administrative Assistant	$ 663.00	$ 13.00	10	$ 130.00	$ 13.00	20	$ 260.00	$ 13.00	21	$ 273.00
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
Personnel Subtotal	**$ 15,783.00**			**$ 4,450.00**			**$ 3,860.00**			**$ 7,473.00**
										-
[1/] Benefits as percent of salary	25%			$1,112.50			$965.00			$1,868.25
Personnel Total (salary + benefits)	**$19,728.75**			**$5,562.50**			**$4,825.00**			**$9,341.25**
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)	$ 7,000.00			$ 3,000.00			$ 500.00			$ 3,500.00
2/ Travel and Per Diem	$ -			$ -			$ -			$ -
3/ Equipment	$ -			$ -			$ -			$ -
4/ Sub-Contractor- Center for Collaborative Policy	$ 15,000.00			$ 5,000.00			$ 5,000.00			$ 5,000.00
4/ Sub-Contractor	$ -			$ -			$ -			$ -

4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ 22,000.00**			**$ 8,000.00**			**$ 5,500.00**			**$ 8,500.00**
5/Overhead Percentage (Applied to Personnel & Other Costs)	15%			$ 2,034.38			$ 1,548.75			$ 2,676.19
Total Costs for Task Six	**$ 47,988.06**			**$ 15,596.88**			**$ 11,873.75**			**$ 20,517.44**

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

BUDGET FOR TASK SEVEN	**TOTAL AMOUNT TASK 7 All Years**	**Year 1** Amount per hour	**Year 1** Number of Hours	**Year 1** Total Amount for Year 1	**Year 2** Amount per hour	**Year 2** Number of Hours	**Year 2** Total Amount for Year 2	**Year 3** Amount per hour	**Year 3** Number of Hours	**Year 3** Total Amount for Year 3
Personnel										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
5/Overhead Percentage (Applied to Personnel & Other Costs)				$ -			$ -			$ -

Total Costs for Task Seven	**$ -**			**$ -**			**$ -**			**$ -**
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										

		Year 1			**Year 2**			**Year 3**		
BUDGET FOR TASK EIGHT	**TOTAL AMOUNT TASK 8 All Years**	**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										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
5/ Overhead Percentage (Applied to Personnel & Other Costs)				$ -			$ -			$ -
Total Costs for Task Eight	**$ -**			**$ -**			**$ -**			**$ -**
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										

BUDGET FOR TASK NINE	TOTAL AMOUNT TASK 9 All Years	Year 1 Amount per hour	Year 1 Number of Hours	Year 1 Total Amount for Year 1	Year 2 Amount per hour	Year 2 Number of Hours	Year 2 Total Amount for Year 2	Year 3 Amount per hour	Year 3 Number of Hours	Year 3 Total Amount for Year 3
Personnel										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
[5/]Overhead Percentage (Applied to Personnel & Other Costs)				$ -			$ -			$ -
Total Costs for Task Nine	**$ -**			**$ -**			**$ -**			**$ -**

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

BUDGET FOR TASK TEN	TOTAL AMOUNT TASK 10 All Years	Year 1 Amount per hour	Year 1 Number of Hours	Year 1 Total Amount for Year 1	Year 2 Amount per hour	Year 2 Number of Hours	Year 2 Total Amount for Year 2	Year 3 Amount per hour	Year 3 Number of Hours	Year 3 Total Amount for Year 3
Personnel										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -

-
-

	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
5/ Overhead Percentage (Applied to Personnel & Other Costs)				$ -			$ -			$ -
Total Costs for Task Ten	**$ -**			**$ -**			**$ -**			**$ -**

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

		Year 1			Year 2			Year 3		
BUDGET FOR TASK ELEVEN	**TOTAL AMOUNT TASK 11 All Years**	**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										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -

-
-

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	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
5/ Overhead Percentage (Applied to Personnel & Other Costs)				$ -			$ -			$ -
Total Costs for Task Eleven	**$ -**			**$ -**			**$ -**			**$ -**

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

BUDGET FOR TASK TWELVE	**TOTAL AMOUNT TASK 12 All Years**	**Year 1** Amount per hour	**Year 1** Number of Hours	**Year 1** Total Amount for Year 1	**Year 2** Amount per hour	**Year 2** Number of Hours	**Year 2** Total Amount for Year 2	**Year 3** Amount per hour	**Year 3** Number of Hours	**Year 3** Total Amount for Year 3
Personnel										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
5/ Overhead Percentage (Applied to Personnel & Other Costs)				$ -			$ -			$ -
Total Costs for Task Twelve	**$ -**			**$ -**			**$ -**			**$ -**

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

		Year 1			Year 2			Year 3		
BUDGET FOR TASK THIRTEEN	**TOTAL AMOUNT TASK 13 All Years**	**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										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -

4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
5/ Overhead Percentage (Applied to Personnel & Other Costs)				$ -			$ -			$ -
Total Costs for Task Thirteen	**$ -**			**$ -**			**$ -**			**$ -**

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

		Year 1			Year 2			Year 3		
BUDGET FOR TASK FOURTEEN	**TOTAL AMOUNT TASK 14 All Years**	**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										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
5/ Overhead Percentage (Applied to Personnel & Other Costs)				$ -			$ -			$ -

Total Costs for Task Fourteen	**$ -**			**$ -**			**$ -**			**$ -**

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

		Year 1			Year 2			Year 3		
BUDGET FOR TASK FIFTEEN	**TOTAL AMOUNT TASK 15 All Years**	**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										
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
	$ -	$ -		$ -	$ -		$ -	$ -		$ -
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	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
4/ Sub-Contractor	$ -			$ -			$ -			$ -
Other Costs Subtotal	**$ -**			**$ -**			**$ -**			**$ -**
[5/]Overhead Percentage (Applied to Personnel & Other Costs)				$ -			$ -			$ -
Total Costs for Task Fifteen	**$ -**			**$ -**			**$ -**			**$ -**

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

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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

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?
– 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?
– No. *Skip to the next set of questions.*
X Yes. *Answer the following question.*

Describe briefly the provisions made to secure this access.

We will work at the Department of Fish and Game's Yolo Wildlife Area. The Yolo Wildlife Area management is a partner in the proposed project.

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	**1000**	**X**
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.