Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

Project Information

1. **Proposal Title:**

   Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

2. **Proposal applicants:**

   Catherine Dickert, Grassland Water District
   Dennis Woolington, USFWS
   Glenn Wylie, USGS-BRD
   Michael Eacock, USBR
   Michael Casazza, USGS-BRD
   Robert Allen, CA DFG

3. **Corresponding Contact Person:**

   Michael C.S. Eacock
   U.S. Bureau of Reclamation
   1243 N St. Fresno, CA 93721
   559 487-5133
   ceacock@mp.usbr.gov

4. **Project Keywords:**

   Endangered Species
   Habitat Evaluation
   Wetlands Ecology

5. **Type of project:**

   Research

6. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   No

7. **Topic Area**:

   At-Risk Species Assessments

8. **Type of applicant:**

   Federal Agency

9. **Location - GIS coordinates:**

Latitude: 37.09

Longitude: -120.47

Datum: wgs84

Describe project location using information such as water bodies, river miles, road intersections, landmarks, and size in acres.

The geographic focus of this study is the Grassland Wetlands of the northern San Joaquin Valley. This 165,000 acre area includes private wetlands, and state and federal wildlife refuges in central California.

10. **Location - Ecozone:**

    12.2 Merced River to Mendota Pool, West San Joaquin Basin

11. **Location - County:**

    Fresno, Merced

12. **Location - City:**

    Does your project fall within a city jurisdiction?

    No

13. **Location - Tribal Lands:**

    Does your project fall on or adjacent to tribal lands?

    No

14. **Location - Congressional District:**

    18

15. **Location:**

    California State Senate District Number: 12

    California Assembly District Number: 26

16. **How many years of funding are you requesting?**

    3

17. **Requested Funds:**
    a) Are your overhead rates different depending on whether funds are state or federal?

       No

If no, list single overhead rate and total requested funds:

Single Overhead Rate: 0% on subcontracts, 90% on labor involving contractee

Total Requested Funds: 1,606,726.61

b) Do you have cost share partners already identified?

No

c) Do you have potential cost share partners?

No

d) Are you specifically seeking non-federal cost share funds through this solicitation?

No

If the total non-federal cost share funds requested above does not match the total state funds requested in 17a, please explain the difference:

18. **Is this proposal for next-phase funding of an ongoing project funded by CALFED?**

No

Have you previously received funding from CALFED for other projects not listed above?

Yes

If yes, identify project number(s), title(s) and CALFED program.

00FC200154 **Adaptive real-time water quality management of seasonal wetlands in the Grassland Water District**

for others, see comment in section 22

19. **Is this proposal for next-phase funding of an ongoing project funded by CVPIA?**

No

Have you previously received funding from CVPIA for other projects not listed above?

Yes

If yes, identify project number(s), title(s) and CVPIA program.

1448-0001-96951	**Monitoring giant garter snakes at Colusa National Wildlife Refuge**	**Habitat Restoration Program**
1448-11420-97-11300-1933-CM01	**Investigations of giant garter snakes in the Natomas Basin: 1998-1999**	**Habitat Restoration Program**

20. **Is this proposal for next-phase funding of an ongoing project funded by an entity other than CALFED or CVPIA?**

No

Please list suggested reviewers for your proposal. (optional)

Julie Vance	**California Department of Water Resources**	**(559) 230-3302**	**jvance@water.ca.gov**
Robert Hansen	**California State University-Fresno**	**(559) 323-7170**	**rwh13@csufresno.edu**
John Shelton	**CA Dept. of Water Resources**	**(559) 230-3315**	**jshelton@water.ca.gov**

21. **Comments:**

U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, and California Department of Fish and Game have received money from both CVPIA and CALFED for ecosystem restoration projects. However, none of these grants have dealt with giant garter snakes, the subject of this proposal. More information on the other projects is available upon request.

Environmental Compliance Checklist

Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

1. **CEQA or NEPA Compliance**
   a) Will this project require compliance with CEQA?

      No
   b) Will this project require compliance with NEPA?

      Yes
   c) If neither CEQA or NEPA compliance is required, please explain why compliance is not required for the actions in this proposal.

      This project, if approved, will not qualify for CEQA's definition of a project, in that it does not involve any direct physical change nor cause a reasonably foreseeable indirect physical change in the environment.

2. **If the project will require CEQA and/or NEPA compliance, identify the lead agency(ies).** *If not applicable, put "None".*

   CEQA Lead Agency:
   NEPA Lead Agency (or co-lead:) Bureau of Reclamation
   NEPA Co-Lead Agency (if applicable):

3. **Please check which type of CEQA/NEPA documentation is anticipated.**

   CEQA
   -Categorical Exemption
   -Negative Declaration or Mitigated Negative Declaration
   -EIR
   Xnone

   NEPA
   XCategorical Exclusion
   -Environmental Assessment/FONSI
   -EIS
   -none

   If you anticipate relying on either the Categorical Exemption or Categorical Exclusion for this project, please specifically identify the exemption and/or exclusion that you believe covers this project.

   516 DM 6 Appendix 9.4.A.3. Research activities, such as nondestructive data collection and analysis, monitoring, modeling, laboratory testing, calibration, and testing of instruments or procedures and non-manipulative field studies.

4. **CEQA/NEPA Process**
   a) Is the CEQA/NEPA process complete?

No

If the CEQA/NEPA process is not complete, please describe the dates for completing draft and/or final CEQA/NEPA documents.

The NEPA process is underway as of October 1, 2001.

b) If the CEQA/NEPA document has been completed, please list document name(s):

CEC_calfed_ggs2001

5. **Environmental Permitting and Approvals** (*If a permit is not required, leave both Required? and Obtained? check boxes blank.*)

LOCAL PERMITS AND APPROVALS

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

Scientific Collecting Permit	Required
CESA Compliance: 2081	Required
CESA Compliance: NCCP	
1601/03	
CWA 401 certification	
Coastal Development Permit	
Reclamation Board Approval	
Notification of DPC or BCDC	
Other	

FEDERAL PERMITS AND APPROVALS

ESA Compliance Section 7 Consultation	Required
ESA Compliance Section 10 Permit	Required
Rivers and Harbors Act	
CWA 404	
Other	

PERMISSION TO ACCESS PROPERTY

Permission to access city, county or other local agency land. Agency Name:	
Permission to access state land. Agency Name: CA Department of Fish and Game	Required, Obtained
Permission to access federal land. Agency Name: USFWS	Required, Obtained
Permission to access private land. Landowner Name: Grassland Water District	Required, Obtained

6. **Comments.**

Land Use Checklist

Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

1. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   No

2. **Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?**

   Yes

3. **Do the actions in the proposal involve physical changes in the land use?**

   No

   If you answered no to #3, explain what type of actions are involved in the proposal (i.e., research only, planning only).

   Research only.

4. **Comments.**

Conflict of Interest Checklist

Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

Please list below the full names and organizations of all individuals in the following categories:

- Applicants listed in the proposal who wrote the proposal, will be performing the tasks listed in the proposal or who will benefit financially if the proposal is funded.
- Subcontractors listed in the proposal who will perform some tasks listed in the proposal and will benefit financially if the proposal is funded.
- Individuals not listed in the proposal who helped with proposal development, for example by reviewing drafts, or by providing critical suggestions or ideas contained within the proposal.

The information provided on this form will be used to select appropriate and unbiased reviewers for your proposal.

Applicant(s):

Catherine Dickert, Grassland Water District
Dennis Woolington, USFWS
Glenn Wylie, USGS-BRD
Michael Eacock, USBR
Michael Casazza, USGS-BRD
Robert Allen, CA DFG

Subcontractor(s):

Are specific subcontractors identified in this proposal? Yes

If yes, please list the name(s) and organization(s):

Catherine Dickert	Grassland Water District
Glenn Wylie	USGS-BRD
Dennis Woolington	USFWS
Michael Casazza	USGS-BRD

Helped with proposal development:

Are there persons who helped with proposal development?

Yes

If yes, please list the name(s) and organization(s):

Bob Allen	**CA Department of Fish and Game**

Comments:

Budget Summary

Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

Please provide a detailed budget for each year of requested funds, indicating on the form whether the indirect costs are based on the Federal overhead rate, State overhead rate, or are independent of fund source.

Independent of Fund Source

Year 1												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary** ***(per year)***	**Benefits** ***(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
1	GGS private and state lands	10736	174928	3524	4600	40200		46000		269252.0	57371.80	326623.80
2	GGS trappping NWR lands	2300	40980	0	1000	10500		4500		56980.0	10370	67350.00
3	Water availability assessment	888	12732	166	500	500	0	0	1500	15398.0	3208.20	18606.20
4	Effect of nonnative Bullfrogs	704	10000			500				10500.0	1995.00	12495.00
5	Project management	3312	69111	14986	3000	250		3000		90347.0	22321.95	112668.95
6	Analysis of selenium levels in prey items	72	1000	0	0	1500	10000			12500.0	2375	14875.00
7	Analysis of GGS habitat at landscape level and advising	704	20000	0	3000	3000				26000.0	1300	27300.00
		18716	328751.00	18676.00	12100.00	56450.00	10000.00	53500.00	1500.00	480977.00	98941.95	579918.95

Year 2												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary *(per year)***	**Benefits *(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
1	GGS private and state lands	10736	181925.12	3665	4780	5250		23920		219540.12	48202.07	267742.19
2	GGS trappping Federal lands	2300	42620	0	1040	1560		4680		49900.0	10360	60260.00
4	Effect of nonnative Bullfrogs	704	10400	0	0	0	0	0	0	10400.0	1976	12376.00
5	Project management	3312	71875.44	15585.44	3116	260	0	0	0	90836.88	22618.43	113455.31
6	Analysis of selenium levels in prey items	72	1000			1500	10000			12500.0	2375	14875.00
7	Analysis of GGS habitat at landscape level and advising	704	20000		3000	3000				26000.0	1300	27300.00
		17828	327820.56	19250.44	11936.00	11570.00	10000.00	28600.00	0.00	409177.00	86831.50	496008.50

Year 3												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary *(per year)***	**Benefits *(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
1	GGS private and state lands	10736	189202.12	3811.60	4967.20	5400		25000		228380.92	50237.96	278618.88
2	GGS trappping Federal lands	2300	44325	0	1085	1625		4867.20	1500	53402.2	11170	64572.20
4	Effect of nonnative Bullfrogs	704	10816	0	0	0	0	0	1500	12316.0	2340.04	14656.04
5	Project management	3312	74750.46	16208.86	3236.64	270.40	0	0	3000	97466.36	24089.57	121555.93
6	Analysis of selenium levels in prey items	72	1000			1500	10000			12500.0	2375	14875.00
7	Analysis of GGS habitat at landscape level and advising	704	20000		3000	3000				26000.0	1300	27300.00
		17828	340093.58	20020.46	12288.84	11795.40	10000.00	29867.20	6000.00	430065.48	91512.57	521578.05

Grand Total=1597505.50

Comments.

Budget Justification

Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

Direct Labor Hours. Provide estimated hours proposed for each individual.

Task 1- The 8 field technicians will work 1,061 hours a year (six months). 1 additional technician will work 2,112 hours (full year). The USBR GIS analyst will work 176 hours a year. Task 2- The 2 field technicians will work 1,061 hours a year (six months). Their GS-9 supervisor will work 531 hours a year (three months). Task 3- The technician will work 880 hours (5 months)in year 1 on the project. Personnel assisting the process from USBR will work 8 hours/year. Task 4- The technician will work 704 hours (4 months). Task 5- The Principal Investigator will work 2,112 hours a year (full year). The Contract Manager will work 144 hours/year. The Project Administrator will work 1,061 hours a year (1/2 time for a full year). Task 6- The technician will work 72 hours/year. Task 7- The GIS analyst will work 704 hours/year.

Salary. Provide estimated rate of compensation proposed for each individual.

Task 1- The 8 field technicians will each make $15,000/year, one additional technician will make $30,000/year, and the GIS analyst will make $4,928/year with a 4% cost of living adjustment in year 2 and 3. Task 2- The 2 field technicians will each make $15,000/year and the GS-9 biologist will make $10,980/year with a 4% cost of living adjustment in year 2 and 3. Task 3- The technician will make $12,500 in year one. Personnel assisting the process from USBR will make $232 in year one. Task 4- The technician will make $10,000/year with a 4% cost of living adjustment in year 2 and 3. Task 5- The Principal Investigator will make $43,290/year and the Project Manager will make $21,645/year. Both will have a 4% cost of living adjustment in year 2 and 3. Task 6- The technician will make $1,000/year. Task 7- BRD's GIS analyst will make $20,000/year.

Benefits. Provide the overall benefit rate applicable to each category of employee proposed in the project.

Tasks 1- Benefits provided to USBR's GIS analyst at a rate of $3,524/month. No benefits provided to technicians. Tasks 2, 4, 6, and 7- No benefits provided. Task 3- Benefits provided to personnel assisting the process from USBR at the rate of $166 for year one. Task 5- The Principal Investigator and Project Adminstrator will each receive $6,000/year in benefits with a 4% cost of living adjustment in year 2 and 3. The Contract Manager will be provided with $2,986/year in benefits with a 4% cost of living adjustment in year 2 and 3.

Travel. Provide purpose and estimate costs for all non-local travel.

Task 1- $4,600 for the 9 technicians and GIS analyst to visit the Sacramento Valley to see other GGS location and attend other trainings with a 4% cost of inflation in year 2 and 3. Task 2- $1,000 for the 9 technicians and GIS analyst to visit the Sacramento Valley to see other GGS location and attend other trainings with a 4% cost of inflation in year 2 and 3. Task 3,4- No travel costs. Task 5- $3,000/year for costs of attending conferences, non-local meetings, and trainings for the Principal Investigator, Contract Manager, and Project Adminstrator. Task 7-$3,000/year for travel to attend conferences and non-local meetings.

Supplies & Expendables. Indicate separately the amounts proposed for office, laboratory, computing, and field supplies.

Task 1- $1,200 for office supplies in year one and then $750 for year 2 and $900 in year 3. $10,500 for computing costs for year 1. No laboratory costs. $44,020 for field supplies in year one, and $1,000 for year two, and $1,500 for year three. Task 2- $800 each year for office supplies. No laboratory costs. No computing supplies. Field supplies are $10,500 in year one, and $728 in year 2 and $757 in year 3. Task 3- Office supplies are $500 in year one. Task 4- Office supplies are $100, and $400 for field supplies. Task 5- Office supplies are $250 a year with a 4% cost of inflation in year 2 and 3. Task 6- Office supplies (coverages postage of samples)are $1,500 a year. Task 7- $3,000/year for computing supplies.

Services or Consultants. Identify the specific tasks for which these services would be used. Estimate amount of time required and the hourly or daily rate.

Task 6- $10,000/year for laboratory analysis of prey samples. Rate is approximately $100/sample and the amount of time spent by the lab on the sample is unknown.

Equipment. Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items.

Task 1- Equipment will run $46,000 in year one and includes the purchase of 2 computers, 4 boats, 4 boat motors, and the leasing of 4 pick-up trucks. This cost will be $23,920 in year 2 and $24,876.80 in year 3 (cost for continued rental of trucks). Task 2- Equipment costs are $4,500 for the leasing of a truck in year 1 with a 4% cost of inflation in year 2 and 3. Task 3, 4- No equipment costs. Task 5- Purchase of a computer and software ($3000).

Project Management. Describe the specific costs associated with insuring accomplishment of a specific project, such as inspection of work in progress, validation of costs, report preparation, giving presentatons, reponse to project specific questions and necessary costs directly associated with specific project oversight.

Task 5- The Principal Investigator, Contract Manager, and Project Manager will responsible for inspection of work in progress, validation of costs, report preparation, giving presentatons, reponse to project specific questions and project oversight. Costs are the full salary of the Project Administrator and Principal Investigator and 144 hours/year of the Contract Manager's time.

Other Direct Costs. Provide any other direct costs not already covered.

Task 2,3,4, and 5. Each includes the cost of printing and publishing reports, pamphlets, and articles. Task 2 costs $1,500 in year 3, Task 3 costs $1,500 in year 1, Task 4 costs $1,500 in year 3, and Task 5 costs $3,000 in year 3.

Indirect Costs. Explain what is encompassed in the overhead rate (indirect costs). Overhead should include costs associated with general office requirements such as rent, phones, furniture, general office staff, etc., generally distributed by a predetermined percentage (or surcharge) of specific costs.

The contractee charges a 90% overhead on labor costs only for general office staff, phones, and furniture- all other costs have 0% overhead. The subcontracters charge 19% (Grassland Water District), 4.5% (USFWS-payments to private vendors) and 20% (USFWS-salaries, leases), and 5% (BRD-USGS).

Executive Summary

Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

The federally threatened giant garter snake (ggs), the largest and most aquatic of garter snakes, is declining in the San Joaquin Valley. The goal of this project is to accurately characterize ggs habitat in the northern San Joaquin Valley leading to improved management, habitat restoration, and repatriation. The key uncertainties of this problem are the location of ggs populations, the density of these populations, and the habitat conditions in which they occur. Our main objective is to locate ggs populations through intense trapping effort and experimentation with new trap designs. We will collect information on vegetation, the physical environment, and prey density for each trap site. This information will be combined with ggs presence and absence data to form a description of ggs habitat. Additionally, we propose a water availability assessment. Our objective is to describe the sources and amount of water that has been available for ggs. Our hypothesis is that ggs populations are negatively impacted by lack of summer water. Predation by introduced bullfrogs may impact ggs populations. Our objectives for this portion of the research include quantification of relative abundance of bullfrogs in trapped areas and documentation of predation on juvenile giant garters. Our project will improve understanding of the life history of an at-risk species. This is a Draft Stage 1 PSP CALFED priority for the San Joaquin Region. Our proposal also addresses the following CALFED Science Program priorities: we will build a ggs population model, we will use an integrated approach to the problem, and we will address landscape-scale issues. This project targets CVPIA's goals to mitigate for adverse effects to fish and wildlife by the CVP and to provide water to Central Valley refuges. Our project would help refuge managers use CVPIA water in ggs restoration projects which could lead to establishment of new ggs populations.

Proposal

Grassland Water District

Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

Catherine Dickert, Grassland Water District
Dennis Woolington, USFWS
Glenn Wylie, USGS-BRD
Michael Eacock, USBR
Michael Casazza, USGS-BRD
Robert Allen, CA DFG

Characterization of giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley

Catherine Dickert (Grassland Water District), Robert Allen (California Department of Fish & Game, Los Banos Wildlife Area Complex), Dennis Woolington (U.S. Fish & Wildlife Service, San Luis National Wildlife Refuge Complex), Glenn Wylie (U.S. Geological Survey - Biological Resources Division, Western Ecological Research Center), Michael Casazza (U.S. Geological Survey - Biological Resources Division, Western Ecological Research Center), Michael C.S. Eacock (U.S. Bureau of Reclamation, South-Central California Area Office)

Abstract: The giant garter snake (*Thamnophis gigas*) is a large aquatic snake of the Central Valley of California. In recent years, surveys have shown a severe decline in populations south of Stockton, California. The reasons for this decline are unknown, but may include loss of habitat, changes in water management, and predation by non-native species. The goals of this study are to describe existing giant garter snake populations, assess water management, and investigate predation by bullfrogs. The three-year project will be coordinated by several agencies on 165,000 acres of private wetlands, and state and federal wildlife refuges.

A. 1. Problem

Background

The giant garter snake (*Thamnophis gigas*) is the largest (120 cm) and most aquatic of the garter snakes (Fisher, et al. 1994). It is endemic to the Central Valley, foraging in marshes and sloughs and basking on clumps of tules and cattails. Giant garter snakes use upland burrows, excavated by mammals, for aestivation during periods of extreme heat and for winter rest during cool months (Wylie et al. 1997). Historically, the giant garter snake ranged in the Central Valley from Butte County in the north to Buena Vista Lake in Kern County (U. S. Fish and Wildlife Service 1999). Beginning in the mid-1980's, surveys revealed a severe decline in giant garter snake populations south of Stockton (U. S. Fish and Wildlife Service 1999). Very few snakes were seen and none were captured, in areas where giant garter snakes had been abundant in the late 1970's (Hansen and Brode 1980). Reasons for this decline are currently unknown, but may include changes in water management, habitat destruction, and excessive predation on juvenile snakes by non-native species such as the bullfrog, *Rana catesbiana*. The U. S. Fish and Wildlife Service listed the giant garter snake as Threatened in 1993 (U.S. Fish and Wildlife Service 1993).

In 1995, biologists with the U. S. Geological Survey, Biological Resources Division (BRD), began trapping giant garter snakes in the Sacramento Valley. Using modified funnel traps (Casazza, et al. 2000), visual searches, and radio telemetry, researchers began a life history study of the giant garter snake. Since beginning this study, researchers have been able to determine snake densities through trapping in ditches, and monitor snake activity levels and habitat use through use of radio transmitters (Wylie et al. 1997, Wylie et al. 2000). In 1996, radio-marked snakes were found to use irrigation canals most frequently both in summer and winter at two different study sites. Freshwater marsh was the second most heavily utilized giant garter snake habitat type. Rice fields were important for snakes in the Sacramento Valley in summer at both of these study sites (Wylie et al. 1997).

There are several important differences between the Sacramento and San Joaquin Valley populations that prevent direct application of knowledge gained in Sacramento to those populations in the San Joaquin Valley. Giant garter snakes in the Sacramento Valley make use of rice fields, especially in summer, but rice farming is a very small component of the landscape in the San Joaquin Valley. There may be differences in trap efficiency between Sacramento and San Joaquin Valley habitats. The standard trapping methodology is to set funnel traps along the banks of waterways. Snakes are captured as they travel down these waterways. In the Sacramento Valley, giant garter snakes can be trapped in ditches with steep sides that act as drift fences, funneling snakes into the traps. In the San Joaquin Valley, many sites lack steep sides and have thick emergent vegetation that decreases the efficiency of funnel traps. This thick vegetation also makes hand captures difficult at many sites.

In 1998, locations within the San Joaquin Valley were surveyed through a collaborative effort between BRD and California Department of Fish and Game (DFG) (Wylie 1998). Since 1999, DFG's biological staff at the Los Banos Wildlife Area has conducted surveys in the northern San Joaquin Valley. Twelve giant garter snakes were captured and marked during the 1998 season, 14 during the 1999 season, 2 in 2000, and 15 in 2001 (CDFG 1998, CDFG 1999, CDFG 2000, CDFG 2001). In 2001, trap effort was approximately twice that of other years, but catch was not very different from the first three years, suggesting giant garter snakes have a patchy distribution (CDFG 2001). The location of these populations has provided us with a basis for understanding the environmental conditions in which these snakes occur, but sample sizes are too low to attempt to characterize habitat requirements.

Giant garter snakes in the Sacramento Valley occur in high densities at specific locations (Wylie et al. 2000). Insufficient trapping effort may have prevented us from locating the high-density giant garter snake areas if they are still to be found in the San Joaquin Valley. Site

conditions in the San Joaquin Valley may compound our problems by preventing the efficient use of funnel traps as they have been used in the Sacramento Valley. Many sites where giant garter snakes have previously been found in the San Joaquin Valley are wetlands with tule and cattail lined edges. These wetlands do not provide the hard edges found in irrigation canals that work well with the current design of funnel traps.

Study area

The geographic focus of this study is the Grassland Wetlands of the northern San Joaquin Valley. This area is approximately 165,000 acres in size and constitutes the largest contiguous wetlands left in California. The area also contains some of the largest grassland and riparian stands left in the San Joaquin Valley. The Grassland Wetlands are centered around the City of Los Banos, about 2 hours south of Sacramento in the Central Valley. See map in Appendix A for details.

Goals, objectives and hypothesis

The goal of this project is to accurately determine use areas and characterize giant garter snake habitat in the Grassland Wetlands of the northern San Joaquin Valley so that management of this habitat can be improved, restoration projects can begin, and populations re-established. We will approach this problem by satisfying the objectives below.

Objective 1. Describe giant garter snake populations in the Grassland Wetlands

To locate giant garter snake populations more efficiently, we will intensify our yearly trapping efforts, expand trapping onto National Refuge Lands, and experiment with new trap designs. We will collect habitat and environmental information at each trap site. We will also quantify prey density for each trap site. Selenium load in potential prey will be measured in each waterway we trap. This information will be combined with giant garter snake presence or absence data to form a description of giant garter snake habitat requirements in the Grassland Wetlands. A practical result of this portion of the research will be a more accurate understanding of giant garter snake habitat needs. This will allow for identification and restoration of suitable giant garter snake habitat. It will also help us to identify where habitat corridors might be created to help connect the currently isolated San Joaquin populations. This will directly contribute to the identification and restoration of 100 acres of giant garter snake habitat in the Grassland Wetlands, thus allowing CALFED to achieve one of its ERP-MSCS Milestones for the San Joaquin River Basin.

Objective 2A. Water Availability Assessment

CVPIA has provided the Grasslands Wetlands with sufficient water for optimum habitat development for wintering migratory waterfowl. However, the current management allows large

areas to dry up during the summer. It is our hypotheses that giant garter snake populations in the Grassland Wetlands are negatively impacted by the lack of summer water. Our objective is to review the past and present management of water in the Grasslands Wetlands and make recommendations for improving summer habitat for giant garter snakes. This assessment would involve research into water use records for state and federal refuges, and interviews with landowners and managers of private wetlands.

Objective 2B. Water Quality Assessment

Since 1996, the Grassland Bypass Project (GBP) has separated agricultural drainwater from wetland water supply channels, significantly improving the quality of water delivered to the Grassland Wetlands. However, there are still measurable amounts of selenium in these channels from other sources. In addition, the GBP discharges seleniferous drainwater to a six-mile long portion of Mud Slough (North), a tributary of the San Joaquin River. The load of selenium in this discharge will diminish under waste discharge requirements set by the State and US EPA. It is our hypotheses that giant garter snakes have been beneficially and adversely affected by the GBP. We will be looking for trends in the presence or absence of the snakes in the Grassland Wetlands that correspond to the contamination of the region prior to 1996, and the subsequent implementation of the GBP. Our assessment will involve a review of historic water quality data for the Grassland Wetlands, and of new data for the GBP.

Objective 3. Investigation of effects of non-native bullfrogs on giant garter snake populations

Predation by introduced bullfrogs is another possible cause for giant garter snake decline. BRD researchers have discovered juvenile giant garter snake remains in the stomach contents of bullfrogs in the Sacramento Valley (M. Casazza per. comm.). In the past four years, no juvenile giant garter snakes have been captured in surveys in the San Joaquin Valley (CDFG 1998, CDFG 1999, CDFG 2000, CDFG 2001). Our objectives for this portion of the research include the quantification of relative abundance of non-native bullfrogs in areas where giant garter snakes have historically occurred and documentation of predation on juvenile giant garter snakes by bullfrogs if it is occurring. The limited availability of water in summer in the Grassland Wetlands may concentrate bullfrogs and neonate giant garter snakes in a few waterways where predation on juvenile giant garter snakes by bullfrogs is intense. To test this hypothesis, we propose to quantify bullfrog abundance at sites with and without giant garter snakes through listening surveys. We will also collect samples of bullfrogs at sites with giant garter snakes and examine their stomach contents for snake remains.

A. 2. Justification and Adaptive Management Model

Because giant garter snakes are a component of functional native grassland wetlands in the San Joaquin Valley, it is desirable to manage habitat in such a way that their numbers increase. Furthermore, extreme loss of San Joaquin Valley wetlands in recent history (over 90% of the original wetlands have been lost) makes habitat restoration essential to giant garter snake recovery. Unfortunately, giant garter snake habitat requirements cannot be characterized accurately, making such projects unfeasible at this time. Giant garter snakes are notoriously difficult to locate and capture in the San Joaquin Valley. Attempts to trap and capture snakes by hand have been conducted by both the BRD and DFG in the San Joaquin Valley and have resulted in only 43 captured snakes over four years, a sample too small to accurately characterize habitat requirements. Although studies conducted in the Sacramento Valley over the past 6 years have produced knowledge of giant garter snake densities and habitat use, land use patterns differ significantly between the Sacramento and San Joaquin Valleys thus preventing direct comparisons and predictions. Because the key uncertainties of this problem are the location of giant garter snake populations in the Grassland Wetlands, the density of these populations, and the habitat conditions in which they persist, we propose intensive trapping. Once habitat requirements are known, we can accurately identify giant garter snake habitat in re-establishment and restoration attempts.

Ultimately, our goal is to collect sufficient data on giant garter snake distribution, in relation to environmental factors such as prey availability, density of non-native predators, and water availability, that we can make recommendations on management of giant garter snake habitat and on restoration and re-establishment plans. Throughout the trapping period, we will be evaluating new trapping methods in an attempt to find a system that suits the diffuse wetland edge that characterizes many potential giant garter snake habitats. Greater effort and improved efficiency will allow us to construct a larger sample of giant garter snake presence and absence and a correspondingly larger database of environmental attributes, including non-native predator densities. As this information is collected, it will be entered into a GIS where we can begin to form a picture of giant garter snake habitat. From this, we can deduce patterns in the data and evaluate the hypotheses in light of emerging trends. If we find strong patterns, we will fine-tune our perception of giant garter snake habitat use by concentrating our trapping efforts in areas suggested by the pattern to be suitable for giant garter snakes. This will allow us to rate parcels in the surrounding landscape for probability of being good giant garter snake habitat and create a map of current and potential giant garter snake habitat. These ratings will also consider availability of water on each particular area throughout the year and the source of that water. We will be able to estimate giant garter snake population densities, and ascertain the effect of

bullfrogs on giant garter snakes in the Grassland Wetlands. In the third year of this project, we will attempt to apply what we have learned about giant garter snake habitat to part of a state managed Wildlife Area and study the response of a giant garter snake population to these changes in management.

We will attempt to link giant garter snake presence to habitat variables collected at capture locations. We recognize that correlations between capture locations and habitat variables are of limited value as trapping methods are not random and if population size permits, we recommend using radio-telemetry to quantify habitat use and movements of giant garter snakes in the Grassland Wetlands.

If we are unable to recognize patterns between giant garter snake presence/absence and habitat characters that we have measured we may also recommend a study on the effects of selenium in a giant garter snake surrogate, such as commercially available common garter snakes (*Thamnophis sirtalis*).

There is also the possibility that even with intensified trapping effort, we will not find a large enough sample of giant garter snakes to be able to form a description of their habitat requirements. In this case, further actions would be based on the outcomes of the non-native predator density estimations and water availability assessment.

Review of hypotheses and research goals

1) Intensive trap effort will result in location of giant garter snake populations, estimation of their population densities, and characterization of giant garter snake habitat.
2a) Giant garter snake presence in the Grassland Wetlands is restricted to areas where there are adequate amounts of summer water.
2b) Giant garter snakes have been affected by the Grasslands Bypass Project.
3) Reduction of summer water in the Grassland Wetlands concentrates non-native bullfrogs and neonate giant garter snakes in the same wetlands where predation on giant garter snakes by bullfrogs is detrimental to recruitment.

A. 3. Approach

We will identify the potential locations of giant garter snake populations by reviewing historical records and recent survey results and by interviewing people who have studied them in the past. We will focus on trapping in these areas. Separate teams will work on Wildlife Areas, National Wildlife Refuges, and on private lands. The principal investigator who will oversee trapping methodology, data collection, and database management will coordinate this work.

Training in trap methodology, giant garter snake handling and passively induced transponder (PIT) tag implantation will be done by BRD personnel who have 6 years of experience in this area. We will begin trapping using modified funnel traps (Casazza et al. 2000), and work to make improvements to this trap design to suit environmental conditions in the San Joaquin Valley. All snakes captured in traps will be identified to species according to Stebbins (1985), and all garter snakes will be identified to species according to Rossman et al. (1996). Giant garter snakes will be taken into a cool, indoor environment where they can be examined and marked safely. We will measure length of snakes from snout to vent, weigh them, and determine sex. We will implant a PIT tag into each giant garter snake, so individuals will be recognizable in the field. All snakes will be released either the same day they were captured or the following day.

We will collect information on trap site conditions on a per trap basis. We will determine the geo-coordinates of each trap using GPS, and record the vegetation at each trap site according to Jepson (Hickman 1993). Prey density will also be recorded per trap, per day. Prey will be classified according to basic type and size, for example 2-inch long fish. All trap site condition information will be entered into a GIS as attributes of trap sites.

Some information will be collected on a waterway basis. We will record the air and water temperature twice daily, as well as whenever a giant garter snake is trapped. We will also measure electric conductivity of each waterway in which we trap. For electric conductivity we will repeat measurements whenever water enters the waterway that we are trapping and may alter the electric conductivity downstream. Additionally, samples of potential prey will be collected from funnel traps set for giant garter snakes. These samples will be tested for selenium and related bioactive compounds. Samples will be preserved and sent to DFG's Wildlife Investigations Laboratory for analysis. Information that is collected on a waterway basis will be generalized for all traps in that waterway when incorporated into a GIS.

We will be using ArcGIS software for spatial analysis (ESRI 2001), and CAPTURE for population density estimates (Rexstad and Burnham, Colorado Coop. Fish and Wildl. Unit, Ft. Collins, 1991).

Trends in water availability and densities of bullfrogs will also be examined spatially, but on a smaller scale, such as per waterway. Hard copy records of water use on state Wildlife Areas and National Wildlife Refuges will be converted to digital information so that it can be compared with giant garter snake capture records and environmental data. Private land water availability will be assessed by conducting interviews with Grassland Water District managers and private land owners.

Bullfrog abundance estimates will be relative among the study sites. Listening surveys will be conducted every 0.5 miles along trap lines. Selection of bullfrog collection sites will be determined once giant garter snakes have been captured, indicating a population of giant garter snakes exists in an area and may be impacted by frog presence. Control sites will be selected at random from among all trap sites. Frog collection will take place during the months of July and August, when giant garter snakes give birth (Rossman et al. 1996). Inspection of stomach contents will be visual and results descriptive. Remains of giant garter snakes will be counted and bullfrog stomach contents compared among sites.

Our approach to the problem as described above is valuable to decision-makers in wildlife management and endangered species conservation. Intensive trapping will reveal the locations of snake populations as well as potential locations in which snakes have not been found, but that they may disperse to in the future. Managers and landowners can take appropriate precautions when working on canals and wetlands or when building or repairing water control structures so that snakes are not negatively impacted. We may also make recommendations for improvements in giant garter snake Take Avoidance Measures issued by U.S. Fish and Wildlife Service currently used to govern waterway maintenance (U.S. Fish and Wildlife Service 2000). For conservation biologists, the results of this study will allow for long term planning in the San Joaquin Valley. The spatial analysis of the information gathered through intensive trapping will be used to plan restoration and re-establishment projects in the context of the surrounding landscape.

A. 4. Feasibility

This is a highly feasible project. The partners on this proposal bring a diverse set of experiences and expertise to the project. BRD investigators have been at the forefront of giant garter snake research in recent years and will serve as advisors ensuring the feasibility of our project. DFG and Grassland Water District have worked together for the past 3 years monitoring giant garter snakes using similar methodology as proposed in this PSP. We are unlikely to be affected by adverse weather because the duration of our project is long enough to allow for flexibility in trapping locations.

U.S. Fish and Wildlife Service and DFG researchers will be covered through research permits through their respective agencies. Grassland Water District researchers will acquire permits upon acceptance of this proposal.

Access to private land will be arranged through Grassland Water District once specific waterways have been selected for trapping. Grassland Water District owns many right-of-ways to

water delivery systems within the private lands of the Grassland Wetlands. The team of researchers assigned to survey National Wildlife Refuges will coordinate their trapping activities with the supervisory wildlife biologist at the San Luis National Wildlife Refuge Complex. Surveying on DFG managed Wildlife Areas will be facilitated by a DFG liaison who will coordinate trapping in the Los Banos Wildlife Area Complex and gather information concerning trapping in previous years.

A. 5. Performance measures

Because we propose a research project, our performance measures are chiefly project outputs such as publications and presentations.

Objective 1. Describe giant garter snake populations in the Grassland Wetlands

We will use three measures to evaluate progress on this portion of the project. Project activities will be measured using the trap line distances as the metric and a target of 40 linear miles per year. Project outputs will consist of publications, presentations, data reports, and fact sheets. Each will be aimed at a different audience. Publications will be peer-reviewed submittals to journals in wildlife conservation, and intended for the scientific community. We will present the results of this project to wildlife professionals at meetings and workshops of The Wildlife Society.

Additionally, Grassland Water District, DFG, U. S. Fish and Wildlife Service, and area irrigation district employees will be invited to a yearly workshop in which current results of this work will be explained. Biologists from these organizations as well as the BRD and U. S. Bureau of Reclamation, will be kept up to date on this project through yearly data reports that will present our results and summarize findings. Finally, the findings of this research will be summarized in a fact sheet that will be made available to landowners through Grassland Water District. In all project outputs, the metric will be number of publications submitted or presentations given per year. Our target for this metric is to present our information in both written and presentation formats six times per year. This target is broken up into one professional presentation, four workshops for local personnel, and one data report to local biologists per year. Findings will be submitted to peer reviewed journals for publication at the conclusion of the project.

Objectives2A and 2B. Water availability and quality assessment

Progress on this objective will be measured by a data report to all biologists in the Grassland Wetlands describing historic and current water availability patterns. We will also write a report describing trends in giant garter snake populations as they relate to the Grassland Bypass

Project. At the conclusion of this project, we will produce a pamphlet for private landowners describing the importance of water for giant garter snakes at different times of the year.

Objective 3. Investigation of effects of non-native bullfrogs on giant garter snake populations

Our project activity metric for this objective is the linear miles of habitat assessed for frogs. Our target for this objective will match that of the giant garter snake trapping target, 40 linear miles per year. Project outputs we will use to evaluate this portion of the research will be a publication and a data report at the conclusion of the research.

A. 6. Data handling and storage

Raw data from the trapping portion of this project will be stored in Microsoft Excel (Microsoft Corp. 1999) until combined with spatial information in ArcGIS. The completed GIS data layers will be stored at the Dixon Field Station of the BRD and at the Los Banos Wildlife Area. This information will be made available to qualified interests upon request, although it will be distributed with caution, as giant garter snakes are sought after by snake collectors (for example, see www.thamnophis.com). Finished products will be available to a wide audience as described in performance measures.

A. 7. Expected products and outcomes

The expected products are detailed in the section describing performance measures. Peer-reviewed papers, presentations to biologists and managers, and fact sheets for interested landowners will be among our products. We will also produce final recommendations for the future of giant garter snake research in a report made available to all interested parties.

A. 8. Work schedule

We would begin work on this project in October 2002 by laying the groundwork for the field seasons. This would involve selection of trap sites, ordering of supplies and building traps, hiring personnel, and acquiring GIS data layers. We would also begin the water availability assessment at this time. The water availability assessment would be completed in year 1 of the project.

Field work would begin in April of 2003 and continue through August each year. Field work includes giant garter snake trapping, gathering of habitat information, bullfrog inventories, and potential prey collection. Grassland Water District biologists will conduct trapping on private lands and Wildlife Areas. U.S. Fish and Wildlife Service biologists will carry out trapping on National Wildlife Refuges. From September through March, analysis of the field

data will take place and will be used to plan trapping in the following season. The bulk of this work will be completed by Grassland Water District personnel, especially the principal investigator, who will receive assistance from Bureau of Reclamation and BRD personnel. At the conclusion of the third year of trapping, final reports and recommendations will be made.

It should be recognized that giant garter snake trapping on Wildlife Areas, National Wildlife Refuges, and on privately owned lands is the core of the project. The trapping as described in tasks 1 and 2 of the budget are considered inseparable in completing intensive giant garter snake trapping in the Grassland Wetlands. In order to get an accurate picture of giant garter snake distribution in the Grassland Wetlands trapping should occur a wide variety of lands sustaining different habitats.

Tasks 3 and 4 complement giant garter snake trapping, but could be funded at a later date if necessary. Task 3 will require only one year of funding to complete. Task 4 will be performed all three years concurrent with giant garter snake trapping.

Task 5, Project Administration, is critically important to the operation of this project and includes a contract manager, a principal investigator, and a project administrator. All three of these positions will work throughout the duration of the project. The contract manager, a U.S. Bureau of Reclamation employee, will manage the CALFED process. The Principal Investigator will oversee the technical operation of the project and perform much of the analysis and report writing. The principal investigator will be a Grassland Water District biologist. The project administrator will write programmatic and quarterly reports, track the budget and perform associated accounting.

The analysis of potential giant garter snake prey items for selenium is task 6 and will help in characterizing giant garter snake habitat. The field biologists will collect potential prey items as they check traps for giant garter snakes. One of these biologists will also be charged with the preservation and transfer of samples. We will work on this task during giant garter snake trapping each year of the project.

Task 7 is the analysis by BRD personnel of data collected in this project. They will integrate the information into their existing database of giant garter snake habitat use in the Sacramento Valley. BRD researchers will analyze these data at the landscape level. This task also covers the training of field biologists by experienced BRD biologists and BRD advising duties throughout the project. This includes cooperative work between Grassland Water District biologists and U.S. Fish and Wildlife Service biologists on trap design improvements. This task will be in progress all three years of the project.

This project could be funded incrementally, although uncertainty in subsequent years' funding may work against the adaptive nature of this project. In this situation, resources could be directed toward completion of final reports instead of alteration of working hypotheses and creation of new strategies for trapping.

B.1 ERP, Science Program and CVPIA priorities

Our proposed project will improve understanding of the life history of an at-risk species, the giant garter snake, in the San Joaquin Valley. This is a Draft Stage 1 PSP CALFED priority for the San Joaquin Region. We also propose to assess the impact of non-native invasive bullfrogs on giant garter snakes in the San Joaquin Region, which is another Draft Stage 1 PSP CALFED priority.

Our proposal also addresses several of the CALFED Science Program priorities. Because we will be collecting information on the distribution, sex ratio, age class, and habitat requirements of the giant garter snake, we will be able to build a model of the population in the San Joaquin Valley. Our integrated approach to understanding the relationship of the giant garter snake to its environment involves a combination of field work, spatial analysis, and information gathering from local refuge managers and private duck club personnel. Interviews with managers and duck club personnel will be used to document wetlands where giant garter snakes occurred historically and to gain insight into patterns of water availability on these properties. Another CALFED Science Program priority is to address landscape scale issues. Once giant garter snake ecology is better understood in the San Joaquin Valley, we can begin to find commonalties and differences between populations in the Sacramento Valley and those in the San Joaquin Valley, thus creating a landscape level description of giant garter snake habitat in the Central Valley.

Our project targets CVPIA's goal to mitigate for adverse effects to fish and wildlife by the CVP. The Central Valley has lost over 90% of its historic levels of wetlands and 400,000 wetland acres since CVP deliveries began. This extreme loss of wetland habitat has undoubtedly impacted the giant garter snake, a highly aquatic snake. Another CVPIA goal is to provide water to Central Valley refuges, an action that could help increase numbers of giant garter snakes, if refuges have the knowledge to restore habitat in ways that benefit giant garter snakes. Our project would help refuge managers use CVPIA water in giant garter snake restoration projects so that giant garter snake populations could be established in new habitat.

B. 2. Relationship to other ecosystem restoration projects

The work proposed in this document is an original investigation. There are no past or current CALFED or CVPIA restoration projects for giant garter snakes in the San Joaquin Valley. U.S. FWS has restored giant garter snake habitat at the Colusa National Wildlife Refuge using CVPIA funds, and BRD is monitoring giant garter snakes in this restoration. This project is in the monitoring stage and will provide insight into habitat preferences of giant garter snakes in the Grassland Wetlands. For reasons described in the body of this proposal direct application of techniques being used in the Sacramento Valley may not be appropriate.

B.3. Requests for next-phase funding

This proposal is not a request for next-phase funding.

B.4. Previous recipients of CALFED program or CVPIA funding

U.S. Bureau of Reclamation, San Luis National Wildlife Refuge Complex, and California Department of Fish and Game have received money from both CVPIA and CALFED for many ecosystem restoration projects. However, none of these grants have dealt with giant garter snakes, the subject of this proposal. More information on the other projects is available upon request.

BRD's Western Ecological Research Center has received CVPIA funding for giant garter snake projects. The Habitat Restoration Program, CVPIA, funded their work on giant garter snakes at the Colusa National Wildlife Refuge. Funding was provided in accordance with Cooperative agreement number 1448-0001-96951 between the FWS and USGS. We are finishing the second field season and have generated a progress report on the first field season (Wylie et al. 2000).

They also received the same CVPIA funding in 1998 and 1999 to conduct studies on giant garter snake conservation in the Natomas Basin (#1448-11420-97-11300-1933-CM01). They have produced a final report for this project (Wylie and Casazza 2000).

Grassland Water District has received one CALFED grant, #OOFC200154, titled Adaptive real-time water quality management of seasonal wetlands in the Grassland Water District. This project is still in progress.

B.5. System-wide ecosystem benefits

Wetland restoration for giant garter snakes benefits many other wetland dependent plants and animals. Restoration to wetland habitat is particularly important in the Central Valley, where over 90% of the original wetlands have been lost. The remaining habitat winters 60% of the

waterfowl of the Pacific Flyway, and supports a variety of wildlife such as shorebirds, mammals, and invertebrates. The Grassland Wetlands is approximately 165,000 acres in size and is the largest contiguous block of wetlands remaining in the Central Valley. Identifying areas for wetland restoration in this area would benefit wildlife because these areas would be surrounded by protected land increasing connectivity among wetland habitats, and buffering restoration areas from neighboring land use.

B.6. Additional information for proposals containing land acquisition

There are no plans for land acquisition in this proposal.

C. Qualifications

Robert Allen (California Department of Fish and Game) works as a Wildlife Biologist and has been with the Department since 1997. He received a BA from Rutgers University in 1994 and has a MS from Humboldt State University in Wildlife Biology. He has worked on DFG's giant garter snake projects in the San Joaquin Valley since 1999.

Michael L. Casazza (U.S. Geological Survey-Biological Resources Division) MS, Wildlife Biologist, Western Ecological Research Center, 1989 to present. Mr. Casazza has served as Co-Investigator on several studies examining the life history, and population biology of giant garter snakes in the Central Valley of California from 1995 to present. Five Selected Publications: **1.** Casazza, M. L., G. D. Wylie, and C. J. Gregory. 2000. A funnel trap modification for surface collection of aquatic amphibians and reptiles. Herpetological Review 31(2), 91-92. **2.** Wylie, G. D. and M. L. Casazza. 2000. Investigations of Giant Garter Snakes in the Natomas Basin:1998-99 - Project Summary. **3.**Wylie, G. D. and M. L. Casazza. 2000. Investigations of Giant Garter Snakes in the Natomas Basin: 2000 Field Season. **4.** Wylie, G. D., Casazza, M. L., and N. M. Carpenter. 2000. Monitoring Giant Garter Snakes at Colusa National Wildlife Refuge:2000 Progress Report. **5.** Casazza, M. L. and M. R. Miller. 2000. The Northern Pintail. In: Goals Project 2000. Baylands Ecosystem Species and Community Profiles: Life histories and environmental requirements of key plants, fish, and wildlife. Prepared by the San Francisco Bay Area Wetland Ecosystem Goals Project. P.R. Olofson, editor. San Francisco Bay Regional Water Quality Control Board, Oakland, Calif.

Catherine Dickert (Grasslands Water District) works as a biologist for both Grasslands Water District and California Department of Fish and Game, Los Banos Wildlife Area. Ms. Dickert oversaw giant garter snake trapping in the San Joaquin Valley in 2001 and works with Grassland Water District to avoid accidental take of giant garter snakes during maintenance operations. She earned a BA in Biology from Bard College in 1994, and a MS in Wildlife and Fisheries Biology from the University of Vermont in 2001. The title of her thesis is "Ecological land types as the basis for conservation in the Green Mountain National Forest, Vermont". She has two scholarly articles in preparation.

Michael C. S. "Chris" Eacock (U.S. Bureau of Reclamation) is the Natural Resource Specialist for the San Joaquin Drainage Branch in the Bureau's South-Central California Area Office. He earned a B.Sc. (Agr) from McGill University, Macdonald College in 1977. His professional

experience includes work for the Peace Corps, in Lesotho, Southern Africa from 1980 –1983 and for the Bureau of Reclamation from 1983 to the present.

Dennis Woolington (U.S. Fish and Wildlife Service) is the Supervisory Wildlife Biologist for the San Luis NWR Complex. His responsibilities are Complex-wide and include overseeing a refuge biological program with up to ten personnel. Facets of that job include wetland/upland management, operational surveys, special studies and research, interagency coordination, and habitat restoration. Mr. Woolington earned a B.S. degree in Wildlife Sciences at Purdue University, Indiana (1974) and a M.S. degree in Wildlife Management at Humboldt State University, California (1980), and has over 27 years experience with state and federal resource agencies. From 1985 to 1991 he was worked as a Research Biologist with the FWS Division of Research and Development (now USGS-BRD) and has authored or co-authored 12 research publications.

Glenn D. Wylie, (U.S. Geological Survey-Biological Resources Division) Ph.D., Research Wildlife Biologist, Western Ecological Research Center, Dixon, CA, 1991 to present. Dr. Wylie has been project leader for the giant garter snake research initiative since 1995. Five Selected Publications: **1.** Paquin, M.M., E. Routman, and G.D. Wylie. (submitted). Genetic structure of populations of giant garter snakes (*Thamnophis gigas*). Copeia. **2.** Casazza, M.L., G.D. Wylie, and C.J. Gregory. 2000. A funnel trap modification for surface collection of aquatic amphibians and reptiles. Herpetol. Rev. 31(2), 91-92. **3.** Wylie, G.D., and M.L. Casazza. 2000. Investigations of giant garter snakes in the Natomas Basin: 2000 field season progress report. USGS-BRD, WERC, Dixon Field Station, 13 pp. **4.** Wylie, G.D., M.L. Casazza, and N.M. Carpenter. 2000. Monitoring giant garter snakes at Colusa National Wildlife Refuge: 2000 progress report. USGS-BRD, WERC, Dixon Field Station, 14 pp. **5.** Wylie, G.D., M.L. Casazza, E. Burns, M. Paquin, J. Daugherty. 1997. Surveys for giant garter snakes (*Thamnophis gigas*) at Stone Lakes National Wildlife Refuge. Final report. USGS-BRD, WERC, Dixon Field Station, 6 pp.

D. Budget

See online forms for budget information. There are no cost sharing commitments for this project.

E. Local involvement

Grassland Water District has coordinated trapping on private lands for the past three years during which time Grassland Water District and DFG worked cooperatively. They contacted land owners in the Grassland Wetlands and informed them about trapping methods and the giant garter snake and secured permission for DFG researchers to access the land. They will continue to work with private landowners in this fashion.

We will work with local irrigation districts by involving them in workshops and by distributing reports to their members describing our findings.

F. Compliance with standard terms and conditions

U.S. Bureau of Reclamation takes exception to several of the standard terms and conditions outlined in Attachment D, however, will comply with applicable replacement terms negotiated with the Department of Water Resources and formalized in DWR 4247 (Rev. 9/95), Standard Clauses -- Contracts with the United States Bureau of Reclamation.

U.S. Bureau of Reclamation further takes exception to Attachment D, Item 2. Payment Schedule and Item 3. Performance Retention, as it implies that payment for all work under the grant will be made on a reimbursable basis. Reclamation requires advances of funds in whole or part from non-Federal funding entities seeking services that do not fall within the rules and regulations promulgated in Office of Management and Budget Circular A-97.

The Fish and Wildlife Service (Service) cannot agree to a standard clause requested for State funded projects. Attachment 0, Terms and Conditions for State Proposition 204 Funds, Section 3, states "Performance Retention: Disbursement shall be made on the basis of costs incurred to date, less ten percent of the total invoice amount. Disbursement of the ten percent retention shall be made either: (I) upon the Grantee's satisfactory completion of a discrete project task (ten percent retention for task will be reimbursed); or (2) upon completion of the project and Grantee's compliance with project closure requirements specified by CALFED (ten percent retention for entire project will be disbursed)".

The Service's authorization to enter into agreements with no Federal entities was changed in EY2000. Their FY2001 Appropriations bill authorizes the Service to enter into contracts with State agencies when advance payment to the Service is not possible. In accordance with the requirements imposed by Congress in the FY2000 Appropriations bill and report language, the Service's Director must approve a project when advance payment is not possible and certify that payments will be made in full by the State within 90 days after the Service issues an invoice.

Specifically, the ten percent retention clause cannot allow timely payments for the following reasons:

In the Service's Federal Financial System (FFS) accounting program, a periodic invoice (either quarterly or monthly depending on the terms of the contract) is automatically issued from the finance center based on actual expenditures of the Service on a project. Invoices include a payment due date on the invoice and when payment is not received in full by that due date, the system automatically shows the unpaid balance as delinquent. Depending on how delinquent the payment is, interest, penalty and administrative charges may also accrue. With ten percent retention withheld on each invoice, the ten percent retention amount then causes applicable invoice record in FF5 to be partly delinquent and remain delinquent until the project or individual tasks identified in the contract are completed and the retention is released.

The Service's Finance Center must report to the Department of Treasury if the Service is owed funds by any entity. Therefore, when accounts remain delinquent due to the ten percent retention of payments owed the Service, that delinquency continues to be reported to Treasury.

The Service has previously entered into agreements with the State of California that do not contain the ten percent retention clause.

We have asked the States Deputy Attorney General to provide clarifying guidance to the Department of Water Resources that is general in scope, which can also be applied to contracts related to the CALFED program.

The Service's offices will continue to work with the State closely on State funded projects. If the State is not satisfied with the work performed by the Service, the State project manager should contact the Service's project manager to correct the performance problem. If needed, upon notification interim billings can be canceled until the State is satisfied with the Service's performance.

The Service can comply with all other State and Federal standard clauses.

U.S. Geological Survey – Biological Resources Division and Grassland Water District do not take exception to any of the standard terms and conditions.

G. Literature cited

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Appendix A. Map of the proposed study area.