ERP Proposal Application Form

For DFG use only	
Proposal No.	Region

(Pages A13-A18)

Section 1: Summary Information

1. Project title:	**Mercury Water Analysis at a State Wildlife Area in the Grassland Region**
Applicant name:	California Department of Fish and Game
2. Contact person:	Andrew G. Gordus, PhD
3. Address:	1234 East Shaw Ave
4. City, State, Zip:	Fresno, CA 93710
5. Telephone #:	(559) 243-4014 ext 239
6. Fax #:	559) 243-4020
7. Email address:	agordus@dfg.ca.gov
8. Agency Type:	Federal Agency ☐ State Agency ☒ Local Agency ☐ Nonprofit Organization ☐ University (CSU/UC) ☐ Native American Indian Tribe ☐
9. Certified nonprofit Organization:	Yes ☐ No ☒ If yes, specify the nonprofit organization registration number:
10. New grantee:	Yes ☒ No ☐
11. Amount requested:	$307,069
12. Total project cost:	$307,069
13. Topic Area(s):	Ecosystem Water and Sediment Quality, Shallow Water and Marsh Habitat
14. ERP Project type:	Research, Monitoring
15. Ecosystem Element:	Contaminants, Seasonal Wetlands
16. Water Quality Constituent:	Mercury (i.e. methyl mercury)
17. At-Risk species benefited:	Giant Garter Snake, Central Valley Fall/Late Fall-Run Chinook Salmon; Spring–Run Chinook Salmon, Sacramento Splittail
18. Project objectives:	Our first objective is to determine if mercury is present in our source water to the wildlife area. Our second objective is determine if mercury is being methylated within our pond system no matter where the mercury source is coming from and our third objective is to determine if mercury is being

	discharged from State owned managed wetland wildlife areas. Should it be determined that mercury is present in our source water, we plan to eventually identify the mercury source to the wildlife area and Grassland Region in general. A final objective is to prevent mercury from entering and passing through the wildlife areas and to prevent mercury flowing further down the San Joaquin River watershed that could have passed through our lands. Should we be able to meet these objections, other private managed wetlands within the Grassland Water District and the U.S. Fish and Wildlife Service refuge system will benefit from this information because they are all part of the same watershed, have similar wetland management programs, and discharge into the San Joaquin River. If the Department meets these objectives, this will provide support for further focused mercury monitoring efforts and the ability to manage existing wetlands, especially experimenting with other water management options.
19. Time frame:	Water collection period: August 2011 through June 2012. Final report preparation September 2012 through December 2012.

Section 2: Location Information

1. Township, Range, Section: and the 7.5 USGS Quad map name.	T9S, R10E Sec 7,16,17,18,19,20,21,29,30,32 and R11E Sec 13,24,25,36 Los Banos
2. Latitude, Longitude (in decimal degrees, Geographic, NAD83):	Latitude/Longitude Coordinates: 37° 5.99'N 120° 49.04W (NAD27)
3. Location description:	Los Banos Wildlife Area, north and east of Los Banos, CA
4. County(ies):	Merced
5. Directions:	From Los Banos, CA, north on Highway 165, then east for approximately 2 miles to Los Banos WA headquarters on the left side.
6. Ecological Management Region:	San Joaquin Basin #2 Alluvial River Flood Plain
7. Ecological Management Zone(s):	West San Joaquin Basin

8. Ecological Management Unit(s):	West San Joaquin Basin
9. Watershed Plan(s):	N/A
10. Project area:	6,300 acres
11. Land use statement:	Rangeland, Agriculture, Managed Wetlands
12. Project area ownership:	% Private_____ % State_100_% Federal_____
13. Project area with landowners support of proposal:	Owned by the Department of Fish and Game

Section 3: Landowners, Access and Permits

1. Landowners Granting Access for Project: (Please attach provisional access agreement[s]) Owned by the Department of Fish and Game	
2. Owner Interest: N/A	
3. Permits:	None.
4. Lead CEQA agency:	N/A
5. Required mitigation:	Yes ☐ No ☒

Section 4: Project Objectives Outline

1. List task information:

Goal 6: Water and Sediment Quality. Improve and/or maintain water and sediment quality conditions that fully support healthy and diverse aquatic ecosystems in the Bay-Delta estuary and watershed; and eliminate, to the extent possible, toxic impacts to aquatic organisms, wildlife, and people.

> **Objective 1:** Reduce the loadings and concentrations of toxic contaminants in all aquatic environments in the Bay-Delta estuary and watershed to levels that do not adversely affect aquatic organisms, wildlife, and human health.

This project will reduce the effect of stressors (i.e. mercury) that degrade fish and wildlife habitats within the seasonal wetlands, as well as downstream tributaries to the San Joaquin River, the San Joaquin River proper, and the Bay-Delta Region. Improve and provide high quality habitat for waterfowl, water birds and other fish such as pelagic fish and spring-run and fall-run salmon and wildlife. The Project will provide suitable background information related to restoration efforts for the San Joaquin River channel and riparian habitat restoration project.

2. Additional objectives:

The Department lacks good scientific data about mercury within its own managed wetlands. This proposed project will provide the Department with good science to better manage its own lands, plus provide information related to the San Joaquin River restoration project downstream of the managed wetlands, where discharge waters eventually flow. The results of this project will also help improve both the selection and management of future wetlands and floodplain restoration projects on the San Joaquin River.

A mercury study was completed on managed wetlands at San Luis NWR, but it appears the results are proprietary information. This is the major reason we are seeking funding to evaluate our own department lands. We need the science to protect and manage our own lands and learn what is occurring in our managed wetlands once we begin to flood our ponds. The Regional Board is also proposing mercury TMDL's for the San Joaquin River upstream of Vernalis, an area that includes drainage to the San Joaquin River from managed wetlands. In the future, Department managed wetlands may be regulated by the Regional Water Quality Control Board and currently we do not have any data to support a defensive argument that mercury may or may not originate from our wetlands.

3. Source(s) of above information:

Heim et al. 2010.

Chris Foe (CRWQCB), pers. comm.

Section 5: Conflict of Interest

To assist ERP staff in managing potential conflicts of interest as part of the review and selection process, we are requesting applicants to provide information on who will directly benefit if your proposal is funded. Please provide the names of individuals who fall in the following categories:

- Persons 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; and/or
- Subcontractors listed in the proposal, who will perform tasks listed in the proposal, or will benefit financially if the proposal is funded.

Primary Contact for Proposal: Andrew G. Gordus, PhD

Primary Investigator: Andrew G. Gordus, PhD

Co-Primary Investigator: Rachel McNeal

Supporting Staff: GIS staff (mapping), Secretary (report formatting/typing/copying), and Scientific Aids (field work).

Subcontractor: Mark Stephenson at San Jose State University Research Foundation at Moss Landing Marine Laboratory.

Provide the list of names and organizations of all individuals not listed in the proposal who helped with proposal development along with any comments.

Last Name	First Name	Organization	Role
Shelton	John	Dept Fish and Game	Reviewer

Section 6: Project Tasks and Results Outline

1. Detailed Project Description

The Regional Water Quality Control Board has collected water samples results that suggest methyl mercury is being discharged from managed wetlands in the Grassland Region in the San Joaquin Valley (Chris Foe, pers. com.). A methyl mercury spike tends to occur soon after the fall flood-up. These discharge waters flow into the San Joaquin River, eventually reaching the San Francisco Bay-San Joaquin Delta system. The purpose of this study will *determine if* mercury is present in the 1) source water, 2) in our managed wetland pond water and 3) present in the discharge water from Los Banos Wildlife Area in the Grassland Region. If mercury is discovered, we plan to identify the upstream source and to discuss with stake holders about policy and management techniques to decrease or prevent that source from entering our state wildlife areas and Grassland Region in general. Identifying upstream sources will require additional research beyond this proposed project.

Los Banos WA has two primary water sources: the Grasslands Water District and the Delta Mendota Canal via the San Luis Canal Company. Source water will be collected weekly from representative inlets (72/73 Lateral and San Pedro Canal) to the Wildlife Area during the fall "flood-up" period which usually runs from Mid-August through October or November. Pond water will be analyzed weekly from approximately 20 representative ponds during the fall and winter months (October through March). Discharge water will be collected weekly from two representative drainage points (Buttonwillow Drain and Field 38 Drain) during the pond draw-down period which is usually from mid-March through May. All water samples will be analyzed for total mercury and methyl mercury.

The California Department of Fish and Game does not use mercury based products on our wildlife areas. We do not believe that methyl mercury is being discharged from our managed wetlands. However, if mercury compounds are being discharged from our managed wetlands, we believe the contaminant source is from the watershed, particularly the coastal mountain range to the west of the Grassland Region or from the San Francisco Bay-San Joaquin Delta System via the Delta-Mendota Canal. This study will provide critical results that will determine if mercury is in our source water and whether mercury is being methylated within our managed wetland ponds during the fall and winter months. Should it be determined that the mercury source is upstream of our water supply inlets, we propose, at a later date, to follow the water source upstream to determine the location of mercury contamination. However, the point source identification would be a separate future phase of this study and not included in this proposal.

Water samples will be collected per protocol and shipped to the Department of Fish and Game Office of Spill Prevention and Response (OSPR) mercury analytical laboratory at Moss landing. Mercury concentration results will be statistically analyzed between source, pond and discharge waters for each wildlife area. Since the passage of the Central Valley Project Improvement Act (CVPIA)in the 1990's our level 2 water supply is fairly consistent for Los Banos WA, so we believe a one study is sufficient. As such, the proposed project period is for one year.

2. Background and Conceptual Models

The Regional Water Quality Control Board has collected water sample results that suggest methyl mercury is being discharged from managed wetlands in the Grassland Region in the San Joaquin Valley (Chris Foe, pers. comm..). These waters eventually flow into the San Joaquin River, eventually reaching the San Francisco Bay & San Joaquin River Delta system (Bay-Delta). Mercury has no known purpose for organic living systems and is considered a very serious heavy metal contaminant to the environment. Methyl mercury production has been documented at other Fish and Game managed wetlands in the Yolo Bypass WA (Alpers et al. 2008, Fleck et al.

2008, Windham et al. 2008, Ackerman et al. 2008).

Current water quality monitoring in the Grassland Region includes the Westside Watershed Coalition monitoring for the Regional Board's Agriculture Waiver requirements, the Grassland Bypass Project and site-specific managed wetland research studies. These monitoring programs primarily test for salts, trace elements such as selenium and boron, and pesticides. To date, no mercury studies have been conducted on Department of Fish and Game wildlife areas in the Grassland Region.

The primary water source for Los Banos WA originates from the Delta Mendota Canal (DMC) via the San Luis Canal Company, the Grassland Water District, the east side of the coastal range watershed during run-off periods, and during wet years from the San Joaquin River. Delta Mendota Canal water originates from the Federal pump stations in the Delta near Tracy, California. The most likely mercury source is from abandoned mines in the coastal range, from natural soils on the west side of the San Joaquin Valley and from the Delta via the DMC. Currently, the Regional Water Quality Control Board is developing mercury Total Maximum Daily Loads (TMDL) for the Bay-Delta Region.

Conceptional Model

The conceptual model for managed wetlands is that inorganic mercury is methylated by sulfate reducing bacteria in the sediments during initial flood-up during the fall. Methyl mercury bioaccumulates into the aquatic biota, including aquatic plants and invertebrates raised for waterfowl food, and can biomagnify up the aquatic food chain, such as waterbirds and fish. As the aquatic biota dies and decomposes, methyl mercury is released and re-bioaccumulates in the aquatic biota. Aquatic vegetation becomes a mercury "bank" during the growing season in the spring and summer. The vegetation dies during the dry summer period and during fall flood-up the dead vegetation decomposes releasing methyl mercury into the aquatic system, as well as, inorganic mercury is being methylated by the microflora.

We are proposing to analyze total and methyl mercury from the water because we do not know the level of mercury methylation in our waters on managed wetlands and whether we are discharging and contributing mercury loads to the San Joaquin River and eventually to the Delta.

3. Approach and Scope of Work

Los Banos WA has 10 water inlet sites and four primary discharge locations (Table 1). Water samples will be collected weekly at two representation inlet sites and two representation discharge points and approximately 10 flow through ponds (20 ponds total) in between each representation inlet and outlet point. Source water will be collected during the fall "flood-up" period which usually runs from Mid-August through October or November. Pond water will be analyzed from ponds during the fall and winter months (October through March) and discharge water will be collected from during the pond draw-down period which is usually from mid-March through May. Two grab water samples from each collection point will be collected in pre-cleaned glass containers. The water samples will be shipped overnight to the Department's mercury analytical laboratory at Moss Landing. All samples will be analyzed for methyl mercury and total mercury using EPA 1630 and 1631 techniques, respectively. Mercury water concentrations will be statistically analyzed between the inlet point, the inlet's representation ponds and discharge point.

Table1. Los Banos WA Main Water Inlets and Outlets

Main Inlets	Water Source	Main Outlets	Final WA Outlet
72/73 Lateral	GWD* (Camp 13)	Buttonwillow Drain	Mud Slough
San Luis 1	GWD (Camp 13)	Field 38 Drain	Mud Slough
San Luis 2	GWD (Camp 13)	Field 38 Drain	Mud Slough
Blake Porter Bypass @ Henry Miller Road	GWD (Camp 13)	Mud Slough	Mud Slough
San Pedro Canal	DMC/SJR**	Field 38 Drain	Mud Slough
Boundary Drain Pumps	DMC/SJR	Field 38 Drain	Mud Slough
West Delta Canal	DMC/SJR	Buttonwillow Drain	Mud Slough
Sand Dam Pumps @ Salt Slough	DMC/SJR	Buttonwillow Drain	Mud Slough
Island Pump@ Salt Slough	DMC/SJR	Mud Slough	Mud Slough
Mud Slough	Watershed	Mud Slough	Mud Slough

*Grassland Water District

**Delta Mendota Canal or the San Joaquin River (high water years) via the San Luis Canal Company.

4. Deliverables

Task 1. Project Management. Prepare quarterly invoices and quarterly progress reports.

Task 2. Collect water samples from two representative Wildlife Area inlets during the fall flood-up period (mid-August through November). Over night ship water samples to the Department of Fish and Game's Office of Spill Prevention and Response (OSPR) mercury analytical laboratory at Moss landing analytical laboratory within 24 hours from collection.

Task 3. Collect water samples from 20 representative Wildlife Area ponds during the fall/winter months (October through March). Over night ship water samples to the analytical laboratory.

Task 4. Collect water samples from two representative Wildlife Area discharge points during the draw-down period (mid-March through May). Over night ship water samples to the analytical laboratory.

Task 5. Summarize data and conduct a statistical analysis for mercury concentrations between the source, pond and discharge waters.

Task 6. Prepare final Project report and disseminate results to stakeholders such as the Grassland Water District, USFWS Refuge System, the Regional Water Quality Control Board, and the San Joaquin River Restoration Program.

5. Feasibility

This is a very simple project. Weekly water samples can be collected during the flood-up, maintenance and

draw-down periods from established water control structures, roads and dikes throughout the wildlife area. It is estimated that is will take approximately a half day per week to collect representative samples from the wildlife area.

6. Relevance to the CALFED ERP

Los Banos WA is within the Grassland Region of the San Joaquin Basin which is a significant part of the San Joaquin River Basin.

Methyl mercury is the toxic form of mercury that biomagnifies in the aquatic food web impacting fish and wildlife that eat fish and other aquatic organisms in wetlands. Methyl mercury reduces reproduction and affects the central nervous system which could result in increased predation by prey species. Naturally occurring microflora in the sediments transform inorganic mercury to methyl mercury. Seasonal wetlands that are inundated and dried on an annual seasonal basis facilitate the formation of methyl mercury (Heim *et al.*, 2003; Gilmour *et al.*, 1998)**.** Increased methyl mercury concentrations are related to wetting and drying cycles of seasonal ponds or reservoirs. Managed wetlands in the Grassland Region fit this scenario, but little to no information exist as to the magnitude of methyl mercury production and discharges from Fish and Game managed lands exists or other managed wetlands on the San Joaquin River. Grassland Region managed wetlands may be sources of methyl mercury, but some wetlands act as net methyl mercury sinks (Stephenson *et al.*, 2008; Slotton et. al, 2006).

A significant portion of the mercury loading to the Delta occurs from San Joaquin River Basin run-off through streams, sloughs and the main stem of the San Joaquin River. A significant portion of the mercury loading to the Delta occurs from San Joaquin River Basin run-off through streams, sloughs and the main stem of the San Joaquin River. Foe 2008). Foe et al. (2008) determined that the San Joaquin River Basin tributaries to the Delta are important sources of total and methyl mercury to the Delta that the Delta is a sink for total mercury from those tributaries (Foe et al. 2008). Foe et al. (2008) reported that increases in methyl mercury concentrations were observed in waters downstream of the Cosumnes and San Joaquin Rivers and in Prospect Sloughs after upstream flooding in 2005 and 2006. The increase in water concentration was associated with an increase in the mercury concentrations in juvenile silverside fish in other studies conducted concurrently (Foe et al. 2008). The results are consistent with the hypothesis that aqueous unfiltered methyl mercury concentrations are an important factor controlling fish tissue levels that inhabit the Delta. It is hypothesized that most of the methyl mercury produced in the upper San Joaquin River Basin was transported down the river in a conservative fashion (Foe et al. 2008).

Mud Slough, which is a significant drainage waterway for managed wetlands, provides 9% of the water and 49% of the methyl mercury load in the San Joaquin River at Vernalis (Chris Foe, pers. comm.). It is imperative that the Department determine if any of this mercury loading is from our managed wetlands.

The Fish Mercury Project sponsored by the California Department of Health Services has identified more than 80 water bodies in the San Joaquin River Basin as impaired by excess levels of methyl mercury in fish muscle tissue. Some of these waters include the Mendota Pool and lower San Joaquin River upstream from the Los Banos WA. During flood years Los Banos WA receives some of its water from the San Joaquin River.

The Regional Water Quality Control Board is developing mercury Total Maximum Daily Loads (TMDL) for the Bay-Delta Region and proposes to begin the TMDL process for the San Joaquin River above Vernalis. As part of the TMDL process for the Delta and the upper San Joaquin River, the Board will require mercury load reductions from the watershed, including the Grassland Region where most of the manage wetlands exist in the San Joaquin Valley. In addition, public agencies plan to restore wetlands and

flood plains in the delta and main stem of the San Joaquin River, as such, information from managed wetlands will enable the Bay Delta Conservation Plan planning agencies to estimate the amount of methyl mercury produced and transported to the Delta as a result of wetland restoration.

7. Expected quantitative results (project summary):

It is difficult to predict methyl mercury results from Los Banos WA because no data is available which is why we are asking for funding to answer this question.

Based on soils samples collected in 2006,very little mercury is present in the soil (see number 8 below). One methyl mercury sink maybe from decomposing vegetation which occurs during flood up (Marvin et al. 2008, Windham et al. 2008). The purpose of this study proposal is to determine if methyl mercury is being produced on Fish and Game managed wetlands.

8. Other products and results:

Mercury concentrations from managed wetland soils at Los Banos Wildlife Area.

10/3/2006

Field	Crop	Total Hg (ppm dry wt)
69	Fallow for cattail control	0.045
36A	Swamp timothy	0.038
36B	Swamp timothy/Salt grass	0.022
33	Swamp timothy	0.031
18	Swamp timothy	0.015

Composite sample from 3 locations within each field.

All results are within uncontaminated site concentrations from 0.02 to 0.06 ppm (Eisler 1987).

9. Qualifications

See attached CV.

10. Literature Cited

Ackerman, J.T., C.A. Eagles-Smith, K. Miles, and M. Ricca. 2008. Mercury Cycling in Agricultural and Non-Agricultural Wetlands in the Yolo Bypass Wildlife Area, California: Bioaccumulation in Small Fish and Invertebrates. 5th Biennial CALFED Science Conference, Global Perspectives and Regional Results: Science and Management in the Bay-Delta System. 225.

Alpers, C.N., J.A. Fleck, P. Bachand, C.A. Stricker, M. Stephenson, R.C. Antweiler, H.E. Taylor, and M. Marvin-DiPasquale. 2008. Mercury Cycling in Agricultural and Non-Agricultural Wetlands in the Yolo Bypass Wildlife Area, California: Concentrations and Loads of Inorganic Surface-water Constituents. 5th

Biennial CALFED Science Conference, Global Perspectives and Regional Results: Science and Management in the Bay-Delta System. 221.

Fleck, J.A., G.R. Aiken, C.N. Alpers, P. Bachand, M. Marvin-DiPasquale, L. Windham-Myers, M. Stephenson, and B.A. Bergamaschi. 2008. Mercury Cycling in Agricultural and Non-Agricultural Wetlands in the Yolo Bypass Wildlife Area, California: The Influence of Organic Matter in the Water Column. 5th Biennial CALFED Science Conference, Global Perspectives and Regional Results: Science and Management in the Bay-Delta System. 222.

Foe, C. Pers comm.. Regional Water Quality Control Board. Rancho Cordova, CA.

Foe, C., S. Louie, and D. Bosworth. 2008. Task 2. Methyl mercury Concentrations and Loads in the Central Valley and Freshwater Delta. CALFED Final Report, Task 2, Methylmercury. 101 pp.

Gilmour, C.C., G. S. Riedel, M. C. Ederington, J. T. Bell, J. M. Benoit, G. A. Gill and M. C. Stordal. 1998. Methyl mercury concentrations and production rates across a trophic gradient in the northern Everglades. Biogeochemistry 40:327-345.

Heim, W. K. Coale, and M. Stephenson. 2003. Methyl and Total Mercury Spatial and Temporal Trends in Surficial Sediments of the San Francisco Bay-Delta. Final Report to Calif. Bay Delta Authority. http://mercury.mlml.calstate.edu/wp-content/uploads/2008/12/finalrpt-task-4a-calfed-mercury-project-mlml-final-repo.pdf.

Heim, W.A, M. Stephenson, A. Bonnema, A. Byington, A. Newman, D. Feliz, L. Sousa, and K. Coale. 2010. Methylmercury concentrations and exports from seasonal wetlands in the Yolo Wildlife Area, California. California Department of Fish and Game. 22 pp.

Marvin-DiPasquale, M.C., J.L. Agee, E. Kakouros, P. Heredia-Middleton, L. Windham-Myers, M.H. Cox, C.N. Alpers, J.A. Fleck, and C. Coates. 2008. Mercury Cycling in Agricultural and Non-Agricultural Wetlands of the Yolo Bypass Wildlife Area, California: Sediment Biogeochemistry. 5th Biennial CALFED Science Conference, Global Perspectives and Regional Results: Science and Management in the Bay-Delta System. 223.

Slotton, D.G., S.M. Ayers, and R.D. Weyand.2007. California Bay-Delta Program Biosentinel Mercury Monitoring Program, Second Year Draft Report. UC Davis Dept. Env. Science & Policy, May. Available at: http://www.sfei.org/cmr/fishmercury/DocumentsPage.htm#tech

Stephenson M., A. Bonnema, W. Heim and K. Coale. 2008. Methylmercury loading studies in Delta wetlands; Grizzly Island. Transport, cycling, and fate of mercury and Monomethylmercury in the San Francisco Delta and tributaries: and integrated mass balance assessment approach, Final Report to CALFED, http://mercury.mlml.calstate.edu/wp-content/uploads/2008/10/14_task5_3a_grizzly_final.pdf.

Windham-Myers, L., M. Marvin-DiPasquale, J. Agee, E. Kakouros, M. Cox, P. Heredia-Middleton, and C. Coates. 2008. Mercury Cycling in Agriluctural and Non-agricultural Wetlands of the Yolo Bypass: Plant Influences on Biogeochemistry. 5th Biennial CALFED Science Conference, Global Perspectives and Regional Results: Science and Management in the Bay-Delta System. 224.

Section 7: Project Budget

1. **Detailed Project Budget** ***(Excel spreadsheets can be used)***

Budget			
Project Title			
Mercury Water Analysis at a State Wildlife Area in the Grassland Region			**Totals**
PERSONAL SERVICES			
Staff Level	**Number of Hours**	**Hourly Rate**	
Scientific Aid	540	13.34	7203.60
Subtotal			7203.60
Staff Benefits @ 37 %			2665.73
TOTAL PERSONAL SERVICES			**9868.93**
OPERATING EXPENSES			
Description			
Subcontractor Costs (Lab Analysis at DFG Moss Landing Marine Laboratory)			296100
Materials			500
Photographic Supplies			
Printing and Duplicating			300
Office Supplies			300
General Expense			
Travel and Per Diem			
Training			
Add/delete line items above for work to be performed by the contractor			
Total Operating Expenses			**297,200**
EQUIPMENT			
SUBTOTAL			307,069
OVERHEAD @ % (Less Equipment)			
GRAND TOTAL			**307,069**

2. Budget justification:

All costs are related to laboratory analysis, shipping, field and office supplies and Scientific Aid field work.

Principle investigator, co-investigator, GIS staff, and secretarial staff time and vehicles will be supplied as in-kind services.

3. Administrative overhead:

Funding source is through Department and Fish and Game, Water Branch, therefore, overhead should be minimized.

The overhead at San Jose State University Research Foundation at Moss Landing Marine Laboratory is 26%, in addition the overhead for DFG contracts is capped at 26%.

Andrew G. Gordus, Ph.D. California Department of Fish and Game, 1234 East Shaw Avenue, Fresno, California 93710

Staff Environmental Scientist, Senior Environmental Scientist, Supervisor, **Environmental Specialist III**. California Department of Fish & Game, May 2000 - present. Water Quality and Food Safety Biologist. Project Manager for Food Safety-Wildlife studies for E. coli O157:H7. Conduct biotic monitoring and sampling in relation to water quality issues. Protect water quality objectives for refuge water supplies. Analyze water quality data and review water quality environmental documents. Developed mitigation habitat criteria for selenium and salinity impacts. Reviewed mitigation and monitoring criteria for selenium and salinity impacts in the San Joaquin River watershed. Conduct site visits that entail complex or controversial projects. Negotiate mitigation measures pursuant to CEQA and Fish and Game Codes. Negotiate settlement agreements for Fish and Game violations. Prepared Lake and Streambed Alteration Agreements, Incidental Take Permits and Natural Damage Assessment Reports. Prepared Negative Declarations pursuant to CEQA. Review and comment on CEQA documents.

Wildlife Biologist/Ecotoxicologist, H.T. Harvey and Associates, 1993-2000. Project Manager. Private ecological consulting for environmental contaminates to wildlife. Prepared development and management plans, and mitigation and monitoring plans for mitigation upland and wetland habitats. Preparing EIR on the negative impacts (risk assessment) of selenium (and other constituents) contaminated drainage water on shorebirds and waterfowl. Wrote monitor waterbird use and nest success at evaporation ponds and mitigation wetlands. Setup study design to collect and prepare waterbird eggs for selenium analysis. Wrote hazing plans. Provided expert oral testimony. Prepared a monitoring plan for a storm water storage pond. Conducted small mammal trapping surveys at a remediation sites.

Staff Research Associate II, U.C. Davis, Dept. of Vet. Microbiology and Immunology, 1990 - 1993.
Differentiated bacterial strains through the use of DNA fingerprinting. Trained undergraduates and graduate students on microbiology techniques. Isolated chromosomal and plasmid DNA, cleave DNA. Did agarose gel electrophoresis, Southern Blot and Western Blots. Analyzed turkey sera from a vaccine trial. Prepared bacterial antigenic proteins. Did SDS-PAGE electrophoresis and test sera using immunoblots. Introduced mini-SDS-PAGE technique to laboratory.

Post Graduate Researcher, U.C. Davis, 1987 - 1990. Department of Epidemiology and Preventative Medicine. Did bacterial isolation and identification. Analyzed bacterial strains using DNA fingerprinting. Analyzed turkey sera using serum rapid plate agglutination assay, hemagglutination, hemagglutination inhibition assay, immunodiffusion assay, and enzyme-linked immunosorbent assay (ELISA).

Laboratory Technician/Mold Counter, Campbell Soup, Sacramento, CA, Summers 1985, 1986, 1987, 1990. Responsible for quality control testing of tomato products. Analyzed total solids, pH, acid and sugar concentrations, color, % mold, and serum viscosity in tomato paste and diced tomatoes.

Wildlife Biologist 1980 -81. **Cooperative Education Student Trainee** 1978-80. U.S. Fish and Wildlife Service. Refuge System. Collected and reported data for all Refuge Output Reports. Wrote refuge narratives, marsh management and soil reports. Revised Environmental Impact Assessment (EIA) for botulism control. Answered public and congressional inquiries. Presented refuge tours for public. Assist in law enforcement. Waterfowl and wetland habitat management. Analyzed pheasant hunter and waterfowl population data. Banded waterfowl and collected dead and sick birds. Analyzed pheasant and swan gizzards for lead shot. Assisted in a forest habitat analysis.

EDUCATION

Ph.D. Comparative Pathology, University of California Davis, 1992. Dissertation title "Prevalence of Lyme borreliosis in rodents and ticks from northeastern California."

M.S. Natural Resources (Wildlife Management), Humboldt State University, 1985. Thesis title "Lead concentration in liver and kidneys of snow geese during an avian cholera epizootic at Delevan National Wildlife Refuge, California."

B.S. Wildlife Management, Humboldt State University, 1980. Emphasized general wildlife management, waterfowl management, wetland habitat management, aquatic plant taxonomy and ornithology.

PUBLICATIONS

GORDUS, ANDREW G. 1993. Letter to the Editor... Notes on the first reported avian cholera epizootic in wildfowl in North America. Journal of Wildlife Diseases 29:367.

GORDUS, ANDREW G. and JEROLD H. THEIS. 1993. Isolation of Borrelia burgdorferi from the blood of a bushy-tailed woodrat in California. Journal of Wildlife Diseases 29:478-480.

GORDUS, ANDREW G. 1993. Lead concentrations in tissues of snow geese during an avian cholera epizootic. Journal of Wildlife Diseases 29:582-586.

GORDUS, ANDREW G. J. Seay, and S. Terrill. 1996. Bird use of an evaporation basin and a mitigation wetland. Proceedings of the North American Water and Environment Congress '96 and Destructive Water. American Society of Civil Engineers. Reston, Virginia.

GORDUS, ANDREW G. 1999. Selenium concentrations in eggs of American Avocets and black-necked stilts at an evaporation basin and freshwater wetland in California. The Journal of Wildlife Management 63:497-501.

GORDUS, ANDREW G. 1999. A blood fluke from a northern pintail in California. California Fish and Game 85:85-86.

GORDUS, ANDREW G. and H. L. Shivaprasad. 2002. Salt toxicosis in ruddy ducks that winter on an agricultural evaporation basin. Journal of Wildlife Diseases 38:124-131.

ERP Proposal Application Form

Rachel McNeal, California Department of Fish and Game, 1234 East Shaw Ave,
Fresno, CA 93710 rmcneal@dfg.ca.gov (559) 243-401 ext 256

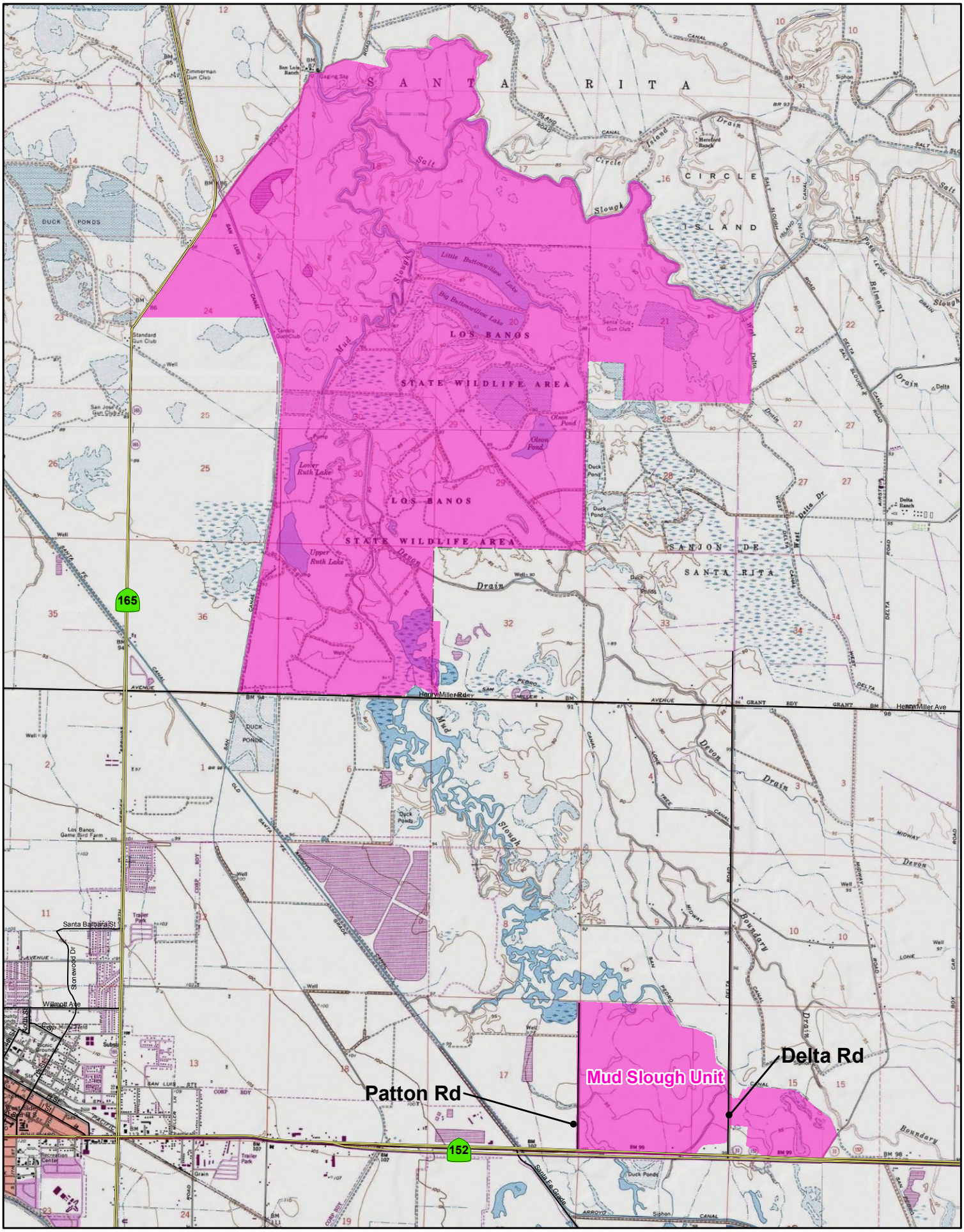
Education	**1981-1987** CA State University, Fresno Fresno, CA ▪ B.A. Chemistry
Experience	**2008- present California Dept. of Fish and Game** Fresno, CA Environmental Scientist -Reviews waste discharge requirements and other water quality related documents. Provide comment letters to environmental and health issues concerning the Department. Assists in other programs. ▪ Water Quality Monitoring ▪ Assist in Water Pollution Cases ▪ Assists with fish Surveys/ Wild Trout Program ▪ Assists with fish Surveys/ Kings River Conservation District ▪ Grasslands By Pass Project – Selenium Monitoring ▪ Fish Mercury Project ▪ Algal Toxin Statewide Committee ▪ Dissolved Oxygen Monitoring at Stockton Deep Ship Channel ▪ Assist San Joaquin Hatchery with instrument calibrations ▪ Writing comment letters concerning water quality ▪ Statistical Analysis of sample data (e.g. 303(d) water temperatue) ▪ Sample preparation/ fish tissue ▪ Equipment maintenance and troubleshooting (pH, Hydrolab, DO probe) ▪ Microsoft Access / PowerPoint presentation ▪ Microsoft Office –Word/Excel
	2009-2010 Golden Pacific Laboratory Fresno, CA Research Chemist -Assisted in new product analysis and method development. Set up sample runs and review results. ▪ Set-up and analysis ▪ Analysis with LC/MS/MS
	2002-2008 BSK Laboratories Fresno, CA Senior Chemist -performed EPA Methods for analysis of drinking water, wastewater and soil in the organic section. Performed maintenance and troubleshooting for GC equipments I operate. Order supplies for GCs and HPLCs. Attends safety training and ethics review. ▪ EPA Method 505, 515.3, 515.4, 525, 548, 549, 608, 8141, 615/8151, 8081, 8082, 8270(604 and 625) ▪ Use of Gas Chromatographs(GC) with Electron Capture Detector, Thermionic Selective Detector

	▪ Use High Performance Liquid Chromatography (HPLC)-Fluorescence Detector ▪ GC- Varian 3350, 3400, 3600 with autosampler 8100 and 8200 ▪ HPLC ▪ GC- HP 5890 Series II/ 5971 MSD ▪ Varian GC3400 Varian Saturn 2000 MSD ▪ Single analyte analyses ▪ QA/QC-MDL Study ▪ Proficiency samples: National Environmental Laboratory Accreditation Conference (NELAC) and National Environmental Laboratory Accreditation Program (NELAP), EPA ▪ Equipment maintenance and troubleshooting ▪ Prepare reagents and standards ▪ Method Development ▪ Microsoft Office –Word/Excel 2005 ▪ Microsoft Office 95/98/2000
	1988-2002 **CA Dept. of Food and Agriculture** Fresno, CA Agricultural Chemist -performed a CA Food and Agriculture modified multi-residue pesticide analysis for organophosphates, Chlorinated hydrocarbons and carbamates in fruits and vegetables, soil, water and other matrices. ▪ Use of Gas Chromatographs(GC) with Flame Photometric Detector, Electron Capture Detector, µECD, Nitrogen Photometric Detector, Halogen Selective Detector, Electrolytic Conductivity Detector ▪ Use High Performance Liquid Chromatography (HPLC)-Fluorescence Detector (HP 1046A) and Diode Array detector (1040M) ▪ GC- HP5890, HP 5890 Series II, HP 6890, Varian 3300 ▪ HPLC- HP 1050, HP 1090, Agilent 1100, Varian 5000 ▪ Single analyte analyses ▪ QA/QC ▪ Proficiency samples: AOAC, DHS, EPA ▪ Equipment maintenance and troubleshooting ▪ Sample receiving and log-in ▪ Sample preparation and extraction ▪ Prepare reagents and standards, wash glassware ▪ Filing and inventory

	1987-1988 **Bianchi Winery/Bottling** Kerman, CA Laboratory Technician - Performed wine and beverage analysis (before, during and after bottling). Take line samples for analysis. ▪ Test for color, sugar, alcohol, pH, sulfites ▪ Quality control ▪ Microbiology testing ▪ Beverage analysis- Test for carbonation and content level ▪ Wash glassware ▪ Order supplies
	1986-1987 **Fresno Co. Dept. of Health.** Fresno, CA Laboratory Assistant -performed various laboratory duties depending on rotation schedule (receiving, media preparation, washroom and laboratory analysis). Collect samples from the Health Clinic. ▪ Sample receiving and collection ▪ Collect, wash and distribute glassware ▪ Do gram stains ▪ Water analysis- color, pH, total dissolved solids, titration, DBCP extraction ▪ Prepare reagents and agar media ▪ Dairy analysis- total bacterial count

ERP Proposal Application Form

ERP Proposal Application Form



Los Banos WA

N

Los Banos Wildlife Area