Section 1: Summary Information

1. Project title: Minimizing impact of Mercury from BDCP Restoration Activities

2. Applicant Name: San Jose State University Research Foundation on behalf of the Moss Landing Marine Laboratories at San Jose State University

3. Contact Person: Kenneth Coale, Principal Investigator
4. Address: Moss Landing Marine Laboratories 8272 Moss Landing Rd
5. City, State, Zip: Moss Landing, CA 95039-9647
6. Telephone #: (831) 771-4406
7. Fax #: (831) 632-4403
8. Email address: coale@mlml.calstate.edu

9. Agency Type: Non-Profit Organization

10. Certified Nonprofit Organization: Yes, non-profit organization registration number: Not yet received.

11. New grantee: No

12. Amount requested: $300,000

13. Total project cost: $300,000

14. Topic Area(s): Water and Sediment Quality

15. ERP Project Type: Research primary, monitoring secondary

16. Ecosystem Element: Seasonal wetlands, contaminants secondary

17. Water Quality Constituent: Total Mercury and Methyl Mercury

18. At-Risk species benefited: Delta Smelt; Least Terns, Salmon, Splittail, Giant Garter Snake

19. Project Objectives:
1. Survey Bypass soil Hgt concentrations; 2. Collect detailed information on proposed BDCP projects that would occur in areas with high levels of Hgt; 3; Prepare engineering reports evaluating solutions to minimizing MMHg loads to Delta.

20. Time frame: Three years in duration from start of grant, approximately 9/1/11-8/31/14

Section 2: Location Information

1. Township, Range, Section: and the 7.5 USGS Quad map name.

USGS Quad Map Name	*Township*	*Range*	*Section(s)*
Knight's Landing	*T 11 N*	*R 3 E*	*27-29, 32, 33, 34*
Grays Bend	*T 11 N*	*R 3 E*	*32, 33, 34*
	T 10 N	*R 3 E*	*4, 5, 7-9, 16, 17, 20, 21, 28, 29, 32, 33*
	T 9 N	*R 3 E*	*3, 4, 5, 8-10, 15-17*
Taylor Monument	*T 9 N*	*R 3 E*	*10, 14, 15*
Davis	*T 9 N*	*R 3 E*	*15, 16, 21, 22, 27, 34*
	T 8 N	*R 3 E*	*3, 10, 15, 19-22, 27-34*
	T 8 N	*R 2 E*	*22-27, 34-36*
Sacramento West	*T 9 N*	*R 3 E*	*14, 15, 22-27, 34-36*
	T 8 N	*R 3 E*	*1-3, 10-15, 22-27, 34-36*
	T 8 N	*R 4 E*	*6, 7, 18*
Clarksburg	*T 8 N*	*R 3 E*	*34-36*
	T 7 N	*R 3 E*	*1-3, 10-15, 22-24, 26, 27, 34, 35*
	T 6 N	*R 3 E*	*2, 3, 10*
Saxon	*T 7 N*	*R 3 E*	*9, 10, 15-17, 19-22, 27-34*
	T 7 N	*R 2 E*	*25, 36*
	T 6 N	*R 3 E*	*3-10*
Liberty Island	*T 6 N*	*R 3 E*	*7-10, 15-21, 28-32*
	T 5 N	*R 3 E*	*4-9, 17-20, 29-32*
Rio Vista	*T 5 N*	*R 3 E*	*31-32*

2. Latitude, Longitude (in decimal degrees, Geographic NAD83)
The Yolo Bypass study area is located within the following positions.

Location Id	Latitude	Longitude
NW	38.76728	121.71458
NE	38.76728	121.62990
SW	38.17368	121.71458
SE	38.17368	121.62990

3. Location description: The location is the Yolo Bypass
4. Counties: Yolo
5. Directions: There are various access roads to the Yolo Bypass, and each one is on all maps such as Google Maps.
6. Ecological Management Regions: Delta and Bay Regions
7. Ecological Mangagement Zones: Sacramento San Joaquin Delta, Yolo Basin, Sacramento River
8. Ecological Mangement Units: Sacramento San Joaquin Delta, North Delta
9. Watershed Plans: There are no watershed plans recommending this proposed site
10. Project Area: 41,267 acres (167 square kilometers)

11. Land Use Statement: Multiple uses for the Delta-fish habitat, fishing, farming, drinking water, tourism, water for waterfowl, water for endangered species, water for wildlife and fish.

12. Project area ownership: % Private 25 % State 75 % Federal 0

13. Project area with landowners support of proposal: Project is on state lands with the exception of Conaway Ranch. No letters of support were solicited. Conaway Ranch access is being negotiated with California Department of Fish and Game.

Section 3: Landowners, Access and Permit

All work will be conducted on Public Land in Yolo Bypass with the exception of samples collected on Conaway Ranch. Conaway Ranch access is being negotiated with California Department of Fish and Game. No permits are required.

Section 4: Project Objectives

1. List task information:

From ERP Strategic Goals and Objectives:

Goal 4: Habitats
Protect and/or restore functional habitat types in the Bay-Delta estuary and its watershed for ecological and public values such as supporting species and biotic communities, ecological processes, recreation, scientific research, and aesthetics.

Objective 1: Restore large expanses of all major habitat types, and sufficient connectivity among habitats, in the Delta, Suisun Bay, Suisun Marsh, and San Francisco Bay to support recovery and restoration of native species and biotic communities and rehabilitation of ecological processes. These habitat types include tidal marsh (fresh, brackish, and saline), tidal perennial aquatic (including shallow water and tide flats), nontidal perennial aquatic, tidal sloughs, midchannel island and shoal, seasonal wetlands, riparian and shaded riverine aquatic, inland dune scrub, upland scrub, and perennial grasslands.

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.

In this proposal we intend to collect enough data for agencies concerned with restoration to inform them about which areas in Yolo Bypass are the best for restoration. In addition, we will provide economic estimates of construction projects aimed at isolating or avoiding high levels of

mercury in sediments. These results will enable applicants for new wetlands to answer many of the Regional Water Quality Control Boards (RWQCBs) questions about the impacts of mercury as a result of their proposed restoration efforts. The applicants will need permits from the RWQCBs and demonstrate there will be no net increase in MeHg as a result of their project. This could require research projects that could take years and slow the restoration projects significantly.

2. Additional objectives: None

3. Source(s) of above information:

ERP Strategic Goals and Objectives (Appendix D), ERP Stage 2 Conservation Strategy.

Section 5: Conflict of Interest

Primary Contact for Proposal:

Kenneth Coale, Moss Landing Marine Labs (MLML), San Jose State University

Primary Investigator:

Kenneth Coale, Moss Landing Marine Labs (MLML), San Jose State University

Co-Primary Investigators:

Wes Heim, MLML, San Jose State University Research Foundation
Mark Stephenson, California Department of Fish and Game (DFG) (see also Subcontractor)

Supporting Staff:

Amy Byington, MLML, Research Technician
Adam Newman, MLML, Research Technician
John Negrey, MLML, Research Technician
Billy Jakl, MLML, Research Technician
Sean Mundell, MLML, Research Technician
Gary Ichikawa, DFG, Environmental Scientist

Subcontractor:

Burleson Consulting, Inc. (Greg Reller)
California Department of Fish and Game (Mark Stephenson)

No others helped with proposal development

Section 6: Project Tasks and Results Outline

1. Detailed Project Description

Proposal Title: Minimizing the Impacts of Mercury Due to Bay Delta Conservation Plan Restoration Activities in the Yolo Bypass by Isolating or Removing High Mercury Soils.

Introduction

Between 1850 and 1980 California was the nation's leading producer of mercury (Hg) at about 100 million kilograms (Churchill, 2000). Inefficient Hg mine processing and placer and lode gold mining resulted in an estimated loss of 41 million kilos between the Coastal and Sierra ranges (Churchill, 2000). As a result there is widespread Hg contamination in fish, sediment, and water in the Central Valley and Sacramento-San Joaquin Delta (Delta) (Davis et al., 2008; Wiener et al., 2003). Davis et al., (2008) reported approximately half of the Delta has top level fish predator species (catfish, bass) above the EPA guidelines for Hg. The Hg species of greatest concern to human and wildlife health in the Delta is monomethylmercury (MMHg). Consumption of MMHg contaminated fish and shellfish is a primary route of exposure and risk to human health (US EPA, 2001). Health advisories and interim health advisories have been posted in the Delta recommending no consumption of large striped bass and limited consumption of other sport fish (http://www.oehha.ca.gov/fishgen/eral/sfbaydelta.html). Elevated concentrations of MMHg in fish tissue also represent a hazard to piscivorous wildlife (Ackerman et al., 2007; Wiener et al., 2003).

Wetland habitat has a high MMHg production potential (Heim et al., 2007; Hurley et al., 1995; Krabbenhoft et al., 1999; Rudd, 1995; St. Louis et al., 1994; St. Louis et al., 1996). MMHg produced in wetland habitats may be adversely affecting concentrations in local fish assemblages. Many researchers fear increasing the percent coverage of wetland habitat through California Bay-Delta Authority's (CBDA) Ecosystem Restoration and Bay Delta Conservation Plan (BDCP) efforts could proportionally increase the number of fish that are above EPA guidelines for Hg.

About sixty percent of the MMHg loads come from the Delta Tributaries compared to forty percent MMHg loads produced within the Delta (Wood et al., 2010). Wetlands are responsible for about nineteen of the forty percent MMHg loads produced within the Delta (Wood et al., 2010). Yolo Bypass has the highest average annual concentrations of MMHg which may be a result of associated wetlands (Wood et al., 2010). At times the Yolo Bypass has contributed loads of MMHg equal to those of the Sacramento River (Foe et al., 2008) and soils and sediments at the mouth of Putah and Cache Creeks are among the very highest reported in the Delta (Heim et al., 2010).

The Central Valley Regional Water Quality Control Board (CVRWQCB) has adopted a Basin Plan amendment to control mercury bioaccumulation in the Delta (Wood et al., 2010) (http://www.swrcb.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/delta_hg/index.shtml). The Basin Plan amendment has several phases. The first phase requires sources of MMHg (including wetlands) to undertake studies to determine best management practices (BMPs) to reduce their loads. BMPs selected by wetland managers as a result of phase one

studies would be implemented in a second phase. To date there are no plans to control MMHg levels on the wetlands themselves, only loads discharged from wetlands to Delta channels. MMHg loads can be reduced by either decreasing the amount of discharge water and/or decreasing MMHg concentration of the discharge water. The basin plan amendment requires a seventy-eight percent load reductions in the Yolo Bypass. Any new projects will require permits from the CVRWQCB which will evaluate each project as to its potential to increase MMHg loads.

Scientists are being asked by agencies preparing BDCP documents what can be done about MMHg loadings. Agencies want to propose projects that do not produce an increase in MMHg loads to the Delta but are at somewhat of a loss to come up with concrete ideas that could meet the requirements of the CVRWQCB for load reductions. There are several projects proposed as part of the BDCP that may result in an increase in MMHg loads to the Delta. The first one is the notching of the Fremont Weir resulting in greater inundation of the Bypass. This project would enhance salmon, splittail, and sturgeon fisheries. It would involve annual flooding of the Bypass (perhaps multiple times per year) to create habitat and passage for fish. Annual flooding could release more MMHg to the Delta (Foe et al. 2008). The second project is reconfiguring the mouth of Putah Creek. This would involve creating a more defined channel for water to flow downward from Putah Creek into the Prospect Slough area of the Bypass. This project could also increase future MMHg loadings to the Delta if historical deposits of high total Hg (Hgt) concentration soils are exposed to water. MMHg releases from the first two projects could be mitigated to some extent if water from these projects did not flow over high levels of mercury in soils and sediments. Since there are high levels of mercury at the mouths of both Cache and Putah Creeks these are the areas where restoration projects could take measures to minimize exposure of water to these sediments. In addition, to these two projects the Yolo Bypass is also envisioned to have a greater percentage of created wetlands, especially near the Conaway Ranch (which is at the mouth of Cache Creek). It would probably be a mistake to site these new wetlands on top of the highest Hgt sediment in the bypass. Despite the problems listed above regarding increasing the Hgt and MMHg loads from the new projects there may be ways to minimize or eliminate increased MMHg loads to the Delta from these projects. The work proposed here would provide detailed descriptions of the Hgt in sediment in the Bypass and also suggest methods to remove the highest Hgt sediments or isolate them from the majority of water flow. The engineering solutions to reduce MMHg loads include: 1) Removal of the sediments with the highest levels of Hgt; 2) Isolation of the sediments with the highest levels of Hgt with the use of berms; 3) Location of wetlands in areas that have the lowest levels of Hgt; and incorporation of settling ponds whenever possible to settle out Hg and MMHg. These engineering solutions are dependent on obtaining accurate information on the distribution of Hgt in soils in the Bypass.

2. Background and Conceptual Models

Site Description

The Yolo Bypass is the largest flood control bypass of the Sacramento River Flood Control Project. The Yolo Bypass originates on the south bank of the Sacramento River directly south

of the Sutter Bypass Terminus. The northern beginning of the Bypass is Fremont Weir, which is the rate limiting control on flow; flow and sediments are received from the Sacramento River, the Sutter Bypass, and the Feather River when flows exceed ~70,000 $ft^3 s^{-1}$. Currently, the Yolo Bypass floods 7 out of 10 years with inundation occurring as early as October and as late as June (Smalling et al., 2007; Sommer et al., 2008). Other inputs of flow and sediment occur several km downstream from Cache and Putah Creeks and occasionally from the Sacramento Bypass. The Yolo Bypass is 240 km^2 and is 65 km long and only 4 km wide. The topography tilts north to south and west to east. Water flows through the bypass into the Bay-Delta and also eastward into the Toe Drain, a low-flow channel along the eastern edge of the Bypass. The capacity of the Toe Drain is ~1800-3,500 $ft^3 s^{-1}$ above which adjacent lands are inundated. The Yolo Bypass watershed is a complex and ever changing drainage area as a result of frequent changes in management, seasonally operated control structures, and diverse hydrology. Land usage is dominated by agricultural fields and waterfowl management which make up approximately 90% of the floodplain area (Larry Walker and Associates, 2005).

Existing information on Hgt in sediment in the Yolo Bypass

A previous survey of the Yolo Bypass was conducted by California Department of Fish and Game (DFG) and funded by the CVRWQCB. Results are shown in Figure 1. High levels of Hgt in soils (>.5 ppm Hg) are found at mouths of both Putah and Cache Creeks. This was attributable to both watersheds having large historic mercury mines. Unfortunatley, there is a conspicuous lack of stations south of the mouth of Cache Creek because access to the Conaway ranch could not be secured.

Proposed BDCP projects in the Yolo Bypass

1. Notching of the Fremont Weir

This project would enhance salmon, splittail, and sturgeon fisheries. It would involve annual flooding of the Bypass to create habitat and passage for fish. Flooding may be an issue with the CVRWQCB as they have documented increase loadings of MMHg due to flooding in the bypass (Foe et al. 2008). It is of concern that reflooding the Bypass on a regular basis would increase MMHg loads to the Delta.

Figure 2 shows the Yolo Bypass with areas estimated to be flooded as a result of the proposed Fremont Weir Notch project and Hgt concentrations in soil measured by (Heim et al., 2010). As one can see there are areas that could be flooded that have high levels of Hgt in their soils. This is especially apparent with the highest level of flooding proposed.

Realignment of Putah Creek Channel in the Bypass

The second project is reconfiguring the mouth of Putah Creek. This would involve creating a more defined channel for water to flow downward from Putah Creek into the Prospect Slough

area of the Bypass. The concern is that the water flow would be directed over areas with the high levels of Hg in soils, thus potentially adding to loads of Hgt and MMHg.

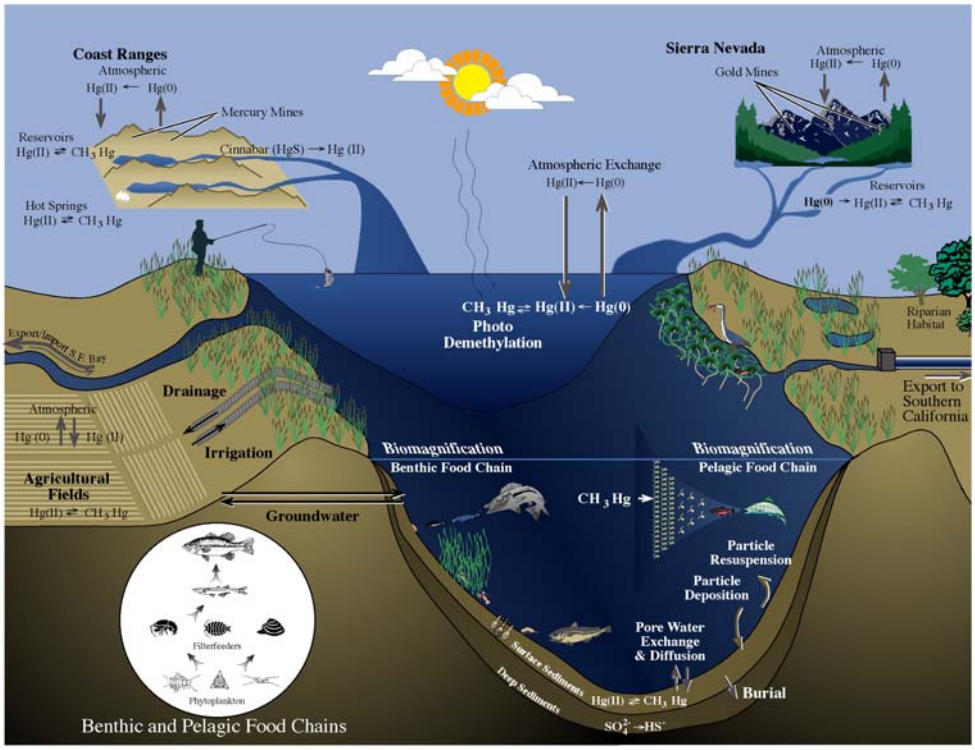
Creation of New Wetlands

One of the goals in draft BDCP documents is to create more wetlands in the Yolo Bypass and other areas. The wetlands would be an asset to fish and wildlife and also put land in permanent non development status. One of the concerns of agencies is they will also release MMHg. The release can be mitigated somewhat if the wetlands are located away from the high Hg soils.

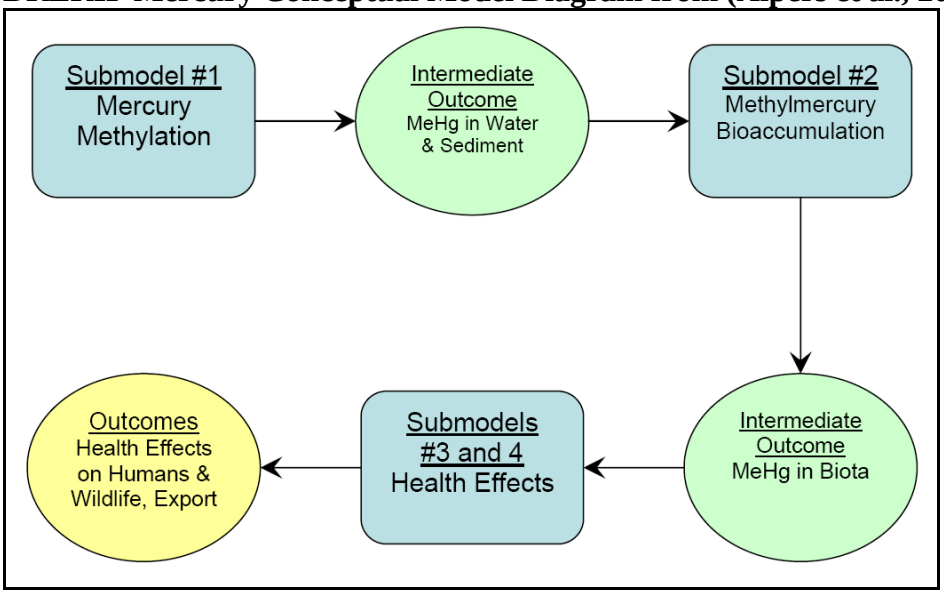
Conceptual Model

The conceptual model for this work will be described verbally with reference to conceptual model from a Bay Delta Mercury Conceptual model and a conceptual model from DRERIP. Methyl Mercury is continuously made by sulfate reducing bacteria in sediment (pore water exchange in the first conceptual model and upper left hand box in the DRERIP model. To produce methyl mercury bacteria need inorganic Hg. We are proposing to analyze Hg because it is required for production of MeHg in sediments. From the sediments it can flux out of sediments and produce unacceptable loads to the Delta or can bioaccumulate at the site where it is produced.

Bay-Delta Mercury Conceptual Model



DRERIP Mercury Conceptual Model Diagram from (Alpers et al., 2008)



3. Approach and Scope of Work

Goal: Inform larger planning of BDCP Conservation Measurement 2 – Yolo Bypass Fisheries Enhancement Plan on ways to minimize MMHg loadings from the Yolo Bypass to the Delta

Objective 1. Three dimensional survey of Yolo Bypass soils for Hgt concentrations

The survey of Hgt in soils in the Yolo Bypass, we propose to expand on the existing survey of Yolo Bypass conducted by (Heim et al., 2010). This project will fill in the following data gaps of the Heim et al. (2010) study: 1) add stations to increase coverage of Hgt distribution; 2) access and sample extensively the area of Conaway Ranch; 3) sample Hgt distribution in soils with depth.

Approximately 100 stations will be selected throughout the Bypass (Figure 1). High priority will be placed to select stations where there is a noticeable lack of coverage after evaluation of the existing random survey (Heim et al., 2010). Downstream of the mouths of Putah and Cache Creeks intensive surveys of 50 stations each will be conducted. These are the areas where the previous study documented the highest concentrations of Hgt in soils. Samples will be collected at 3 depths in these two areas (surface, 1 m, and 2 m). Surficial samples will be composite samples collected with scoops following trace metal clean techniques (Heim et al., 2007). Samples collected at depth will be acquired using coring machinery. Hgt will be measured at MLML using EPA 7473. MMHg will be analyzed at MLML on a subset of 50 sediment samples selected from these two areas following EPA method 1630 following Copper Sulfate/Potassium Hydroxide and Methylene Chloride extraction. Quality assurance and quality control (QA/QC) will be comprised of field and laboratory components. Field duplicates will be collected randomly and simultaneously along with the sediment (native) sample at five percent of the sites. The relative percent difference between native and duplicate field samples will be used to

determine field variability. Laboratory QA/QC samples will include a certified reference material, spike recoveries of Hgt preformed on native samples and analytical duplicates of native samples for each batch of twenty samples. These measurements will provide information about the accuracy and precision of the Hg analysis.

Objective 2. Collect detailed information on proposed BDCP projects that would occur in areas that have soils with high levels of Hgt.

This objective will be met by relating BDCP projects to conceptual models of mercury occurrence and methylation, and prepareing a project summary for each candidate project that highlights possible mercury control actions. Greg Reller of Burleson Consulting, Inc (Burleson). is experienced with such evaluations and will support the project by collaborating with other project personnel to complete this task.

Objective 3. Prepare engineering reports that evaluate solutions to minimizing MMHg loadings to the Delta as a result of BDCP projects.

Burleson will conduct an engineering evaluation of alternatives to minimize impacts of the high Hgt levels in sediments when the bypass undergoes restoration. Alternatives will be evaluated with respect to effectiveness, implementability, and cost. The engineering alternatives to reduce MMHg loads are likely to include: 1) Removal of the sediments with the highest levels of Hgt; 2) Isolation of the sediments with the highest levels of Hgt with the use of berms or moving high Hgt soils to areas where they would have less water contact; 3) Locating wetlands in areas that have the lowest levels of Hgt; and 4) Incorporation of settling ponds whenever possible to settle out particulate bound Hg and MMHg. The engineering solutions to be considered are dependent on the results of the Hgt sediment surveys proposed herein, the CSM, and relevant BDCP project. This study will define each solution and provide an associated cost estimate. These estimates will be of use to BDCP in that they will provide alternatives to the decision making entities for mitigating potential Hgt and MMHg releases. For example, information from this study would be able to inform other projects such as re-alignment of Putah Creek water movement on the Bypass to reduce Hg transport out of the Bypass.

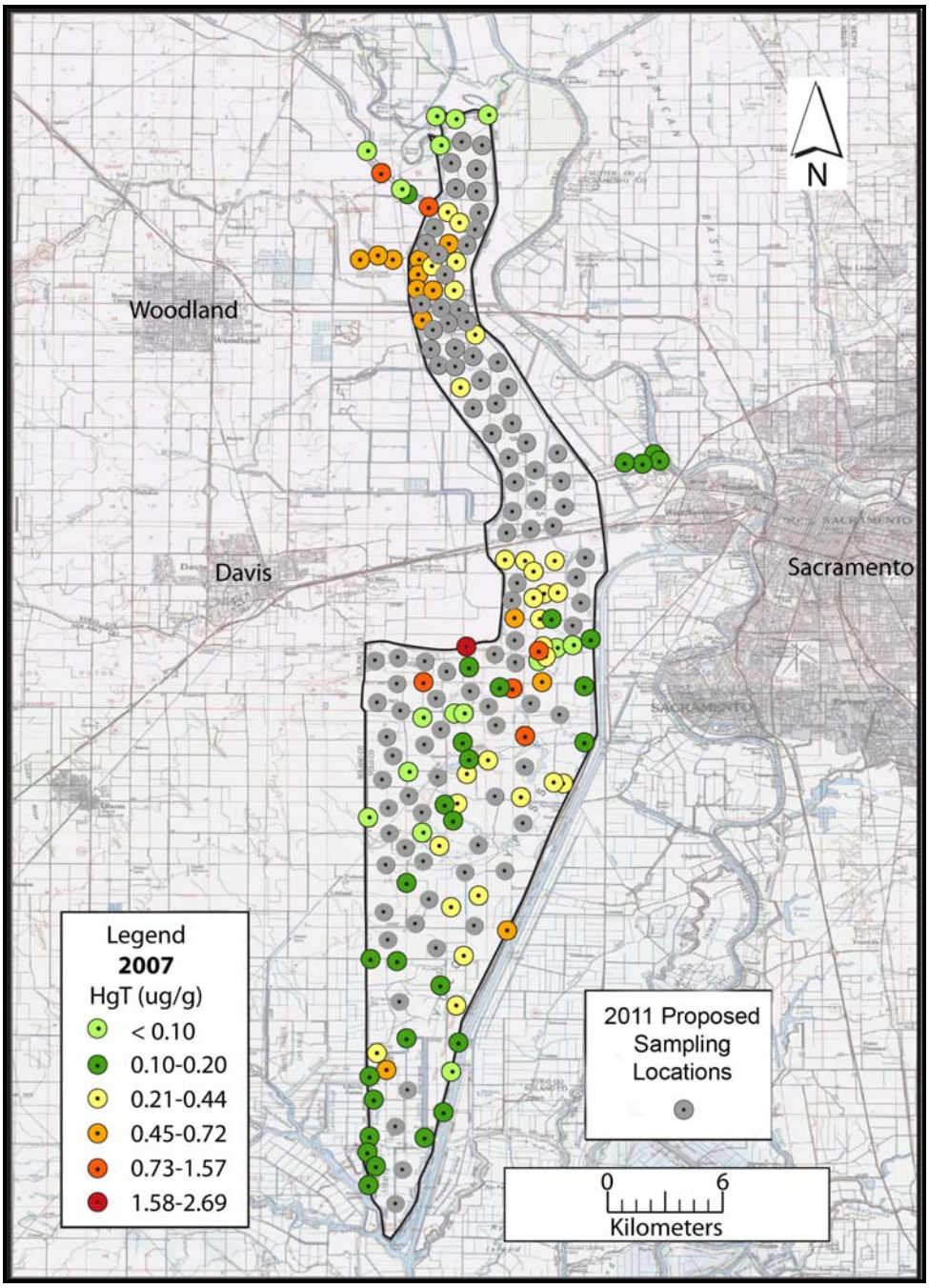


Figure 1. Total mercury (Hgt) distribution in bulk soils within the Yolo Bypass. Locations and Hgt concentrations from 2007 are reported by Heim et al., 2010. Gray circle markers show proposed sampling sites.

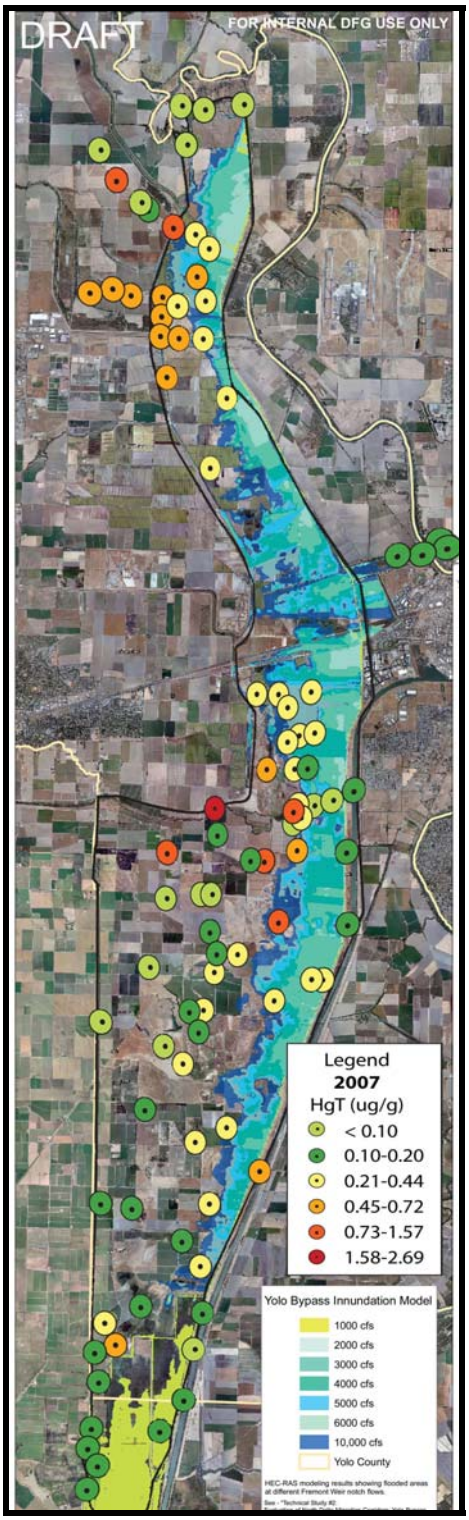


Figure 2. Yolo Bypass with areas estimated to be flooded as a result of the proposed Fremont Weir Notch project and Hgt concentrations in soil measured by Heim et al., (2010). Water inundation map provided by California Department of Fish and Game.

4. Deliverables

This project will provide quarterly reports, a final report, and a manuscript ready for submittal to a peer reviewed publication. Scientific talks will be given at two conferences such as the Delta Science Conference and State of the Estuary Conference, as well as updates to the Yolo Bypass Working Group and coordination with agency work efforts as BDCP moves forward.

5. Feasibility

This project requires no permits, access permissions, or not contingent on other programs. The sediment collections and analyses have been conducted by us in previous projects and methods have been developed and have an excellent chance of being completed in the time frame proposed (3 years).

6. Relevance to the CALFED ERP

The following Priorities listed in the PSP:

Restoration Projects that Restore or Enhance Aquatic Habitat in the Sacramento-San Joaquin Delta and Suisun Marsh and Bay

To meet immediate and long-term goals for restoration of floodplain and intertidal/subtidal environment, there is a need for projects that provide the following:

1. *Floodplain restoration to optimize salmon rearing and splittail spawning and rearing functions.*
2. *Intertidal restoration to estuarine productivity, provide spawning and rearing habitat for native fishes using the Delta, and which accommodate long-term habitat changes resulting from climate change.*
3. *Restore geomorphic processes and riparian vegetation and assess aquatic invertebrate production and the resulting effects on fish survival and growth.*

All of the potential aquatic restoration projects will require a permit from the CVRWQCB. The CVRWQCB will probably be somewhat reluctant to grant the permit unless the applicant can provide information that proves they will not have significant MMHg discharge. Currently there is not enough scientific evidence for applicants to use to justify no discharge of MMHg. This permit process, along with the requirement that the applicant may need to do extensive research, could hold up restoration projects for many years. This project should provide invaluable information to applicants regarding MeHg exports from restoration projects in the Yolo Bypass.

Projects using Constructed Facilities to Control Mercury or other Mine Drainage in the Bay-Delta or Dissolved Oxygen and Other Water Quality Problems in the Lower San Joaquin River and South Delta

To meet water quality goals and standards in the Delta for mercury and dissolved oxygen and to reduce mobilization of mercury into the foodweb or into the Delta there is a need for projects that implement and evaluate best management practices for reducing loads of these constituents to the Delta.

This project will help evaluate the magnitude of Hg contamination in soils in the Yolo Bypass and suggest areas where siting of projects would be optimal for limiting MMHg exports and will also present options for several construction orientated projects that would enable restoration efforts to avoid, or minimize impact with high level Hg soils.

7. Expected quantitative results (project summary):
The amount of area impacted by Hg contamination will be estimated. The amount of mercury contaminated soils, potential engineering alternatives to control mercury and their costs will be estimated.

8. Other products and results:
Results could be used to inform the DRERIP Mercury Model.

9. Qualifications
Kenneth Coale, Wes Heim (Moss Landing Marine Labs) and Mark Stephenson (Department of Fish and Game) have managed 10 mercury related projects over the past 10 years. Almost all of the projects involved mercury studies in the Central Valley. Three of the projects involved multi-investigator teams from different universities and agencies.

The mercury analytical chemist staff at Moss Landing Marine Labs consists of one lead chemist (Wes Heim) and two mercury chemists, all of whom have extensive experience in analyzing mercury and methyl mercury in water, tissue, and sediments. The lab's analytical results consistently exceed quality assurance and quality control requirements.

Subcontractors:

Mark Stephenson is the Director of Marine Pollution Studies for the **Department of Fish and Game** and Moss Landing Marine Labs. Recent environmental water quality projects in which he has been principal investigator include: California State Mussel Watch, Coastal Fish Contaminants, the Bay Protection and Toxic Cleanup Program and the California State Surface Water Ambient Monitoring Program. Kenneth Coale is the director of Moss Landing Marine Labs. Wes Heim is a Research Associate at Moss Landing Marine Labs. Mark Stephenson, Kenneth Coale, and Wes Heim were the principal investigators of the CALFED mercury programs "Assessment of Ecological and Human Health Impacts of Mercury in the Bay-Delta Watershed and "Transport, Cycling and Fate of mercury and monomethylmercury in the San Francisco Delta and Tributaries—An integrated mass balance assessment approach. Study designs, data collection, and final reports for each 3.8 million (Federal and State funding) projects were completed according to the grant agreements and received positive reviews from an independent scientific panel. Currently they are investigators in studies involving mercury loadings from rice fields and managed wetlands in the Yolo Bypass Wildlife Area, mercury and low dissolved oxygen in Suisun Marsh, development of biological accumulation factors for mercury in California lakes and harbors, Central Valley Regional Water Quality Control Board's Methyl Mercury TMDL, and the State Water Resources Control Board's Biological Oversight Group of the State Ambient Water Assessment Program.

Greg Reller, P.G. Burleson Consulting Mr. Reller has more than 24 years experience at environmental monitoring and remediation, including significant practical experience assessing and mitigating mercury in the environment. He completed the engineering evaluation and cost analysis for abandoned mines in the Sulfur Creek and Cache Creek watersheds as part of the California Bay Delta Authority's (formerly CalFed) Environmental Restoration Program, and participated in a feasibility study that evaluated projects intended to comply with the San Francisco Bay mercury TMDL. He has assessed the geochemical and physical mechanisms that mobilize mercury to the environment at locations such as the Sulphur Bank Mercury Mine, the Sulfur Creek Mercury District, and numerous hydraulic gold mines in the Mother Lode Gold District of California. Mr. Reller has evaluated migration of mercury from mineralized cinnabar bearing rock to aquatic environments including lake and stream sediment as well as the occurrence of liquid elemental mercury associated with former gold mining activities. Mr. Reller also completed cleanup of the Deer Trail Mercury Mine near San Luis Obispo, the White Cap Mill near Bishop, and planned and managed the cleanup of the Boston Placer Mine near Nevada City, which was awarded the 2006 US Department of the Interior Environmental Achievement Award.

List of Projects:

ERP-99-B06: An Assessment of Ecological and Human Health Impacts of Mercury in the Bay-Delta Watershed — completed as contracted

ERP-02-C06-a and ERP-02-C06-b: Transport, Cycling, and Fate of Mercury and Monomethyl Mercury in the San Francisco Delta and tributaries—An Integrated Mass Balance Assessment Approach — completed as contracted

10. Literature Cited

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Section 7: Project Budget 3 Year Budget

Budget			
Minimizing the Impact of Mercury from BDCP Restoration Activities			
			Totals
PERSONAL SERVICES			
Staff Level	**Number of Hours**	**Hourly Rate***	
Project Assistant (1)	900	31.62	28,458
Project Assistant (2)	225	50.18	11,292
Project Assistant (3)	150	50.19	7,529
Project Assistant (4)	150	20.13	3,091
Subtotal			
Staff Benefits @ 36.2%, 37.2%, 38.2%			18,747
TOTAL PERSONAL SERVICES			
OPERATING EXPENSES			
Description			
Subcontractor Costs			130,000
Materials			10,645
Photographic Supplies			0
Printing and Duplicating			0
Office Supplies			0
General Expense			0
Travel and Per Diem			50,000
Training			0
Add/delete line items above for work to be performed by the contractor			
Total Operating Expenses			190,645
EQUIPMENT			0
SUBTOTAL			259,762
OVERHEAD @ % (Less Equipment)			40,238
GRAND TOTAL			**300,000**

*hourly rate is the average over the 3 years; rates may differ by 15%.
Funds not used in a fiscal year will roll-over and be available that next fiscal year through the life of the contract.

2. Budget Justification

No unusual cost items are requested.

Project staff will survey of Hgt in soils in the Yolo Bypass. The project will fill in the following data gaps of the Heim et al. (2010) study: 1) add stations to increase coverage of Hgt distribution; 2) access and sample extensively the area of Conaway Ranch; 3) sample Hgt distribution in soils with depth. Approximately 100 stations will be selected throughout the Bypass. High priority will be placed to select stations where there is a noticeable lack of coverage after evaluation of the existing random survey. Detailed information will be collected on proposed BDCP projects that would occur in areas that have soils with high levels of Hgt.

Mark Stephenson, CA Department of Fish and Game will assist with project management.

Greg Reller of Burleson Consulting, Inc (Burleson). is experienced with such evaluations and will support the project by collaborating with other project personnel to complete this task. Burleson will also conduct an engineering evaluation of alternatives to minimize impacts of the high Hgt levels in sediments when the bypass undergoes restoration.

The project team plans to provide quarterly reports, a final report, and a manuscript ready for submittal to a peer reviewed publication. Scientific talks will be given at two conferences such as the Delta Science Conference and State of the Estuary Conference, as well as updates to the Yolo Bypass Working Group and coordination with agency work efforts as BDCP moves forward.

3. Administrative Overhead

The SJSU Research Foundation has the Department of Health and Human Services as its cognizant federal agency that reviews, closely evaluates, and approves all indirect cost items included in the negotiated rate. The federally negotiated rate of 26% for off campus research is applied against direct costs, and only on the first $25,000 of subcontracts.