Attachment C – Wetland Management and Agricultural Organic Matter Reduction to Decrease Methylmercury Loads from the Cosumnes River Preserve

F. Scope of Work and Grant Agreement Readiness

This project will implement modifications to land use practices across several dominant wetland types within the Central Valley (rice fields, seasonal wetlands, and permanent wetlands) to reduce methylmercury production and discharge to the Sacramento-San Joaquin Delta. In rice fields, we will modify management of post-harvest rice straw to reduce available labile organic matter within rice fields, which has been shown to be the limiting driver of methylmercury production in rice fields within the nearby Yolo Bypass (Windham-Myers et al. 2009). Additionally, we will alter water management in seasonal wetlands to control organic matter sources and timing of inundation to reduce methylmercury production and discharge. This project will encompass more than 600 acres of rice fields, seasonal wetlands, and permanent wetlands, as well as slough channels that either provide water, or receive drainage from managed wetlands, and several locations within the Cosumnes River itself.

This study is divided into three primary tasks as follows (1) Wetland Management and Organic Matter Reduction, (2) Mercury Load Reduction Determination, and (3) Reporting and Administration. Each task will be identified in greater detail below.

Task 1. Wetland Management and Organic Matter Reduction.

Manage water levels in wetlands and post-rice harvest stubble in rice fields. Three spring-flooded wetlands will be inundated with water in May 2011 and 2012, and drained in September 2011 and 2012. Three fall-flooded wetlands will be inundated in November 2010, and water will be held until September 2012. Experimental rice harvest will include (1) mowing rice straw to remain in fields, (2) tilling rice straw into the fields, and (3) bailing rice straw and removing it from fields. Three fields will be used for each of the above treatments, and straw management will occur approximately in September 2010 and 2011. Progress for this task will be documented through quarterly and annual reports.

Task 2. Mercury Load Reduction Determination.

2a. Determine methylmercury concentrations in inflowing and outflowing water from wetlands and rice fields. One month after initial flood-up (approximately May), water will be sampled following EPA-approved clean hands-dirty hands method at the inlet and outlet of each wetland and rice field. Water sampling will also occur on the main-stem of the Cosumnes River at one site upstream and one site downstream of the Cosumnes River. Additionally, several slough locations will be sampled for water methylmercury concentrations. Slough sites will be a combination of irrigation source water and receiving water. Water sampling will occur at all locations on three occasions per year during the growing season (May through September), and from all locations except rice fields on three occasions during the winter between 2011 and 2012 growing seasons. In total, there will be six sampling events from 48 locations, and 3 sampling events from 30 locations, resulting in a total of 126 water samples being collected and analyzed for methylmercury through the duration of this project.

2b. *Determine mercury bioaccumulation in biosentinel fish from wetlands and rice fields*. Western mosquitofish (*Gambusia affinis*) will be acquired from the Sacramento-Yolo County Vector Control District rearing ponds, and placed into 450 liter caged enclosures following methods similar to Ackerman and Eagles-Smith, 2010 at all 48 locations where water sampling will occur. Prior to placement in enclosures, fish will be measured to the nearest 1 mm and weighed to the nearest 0.01 g. Fish will be randomly placed in various cages, with a density of up to 30 individual per enclosure. Enclosures will be placed in wetlands within 30 days of spring/summer inundation and held in the wetlands for 30 or 60 days. When enclosures are removed from the fields, each fish will again be weighed and measured, then sacrificed and placed in individually-labeled containers prior to mercury analysis. Each fish will be analyzed for total mercury. It has been well-documented that approximately 90-95% of all mercury in mosquitofish is in the methylmercury form, therefore considerable cost savings can be realized by analyzing for total mercury. An additional 30 to 50 fish per year will be analyzed prior to placement of enclosures in wetlands to provide an estimate of baseline levels of mercury in fish at introduction.

Progress for Tasks 2a and 2b will be documented through quarterly and annual reports.

Task 3. Reporting and Administration

Prepare quarterly, annual, draft final, and final reports. Upon execution of the contract, quarterly updates will be provided to CVRWQCB staff. An annual report will be provided 12 and 24 months after the project start date, a draft final report will be provided 32 months after project start date, and a final report will be delivered 36 months after project start date. Project team members will participate in monthly or semi-monthly Delta Tributaries Mercury Council meetings, and the Project Team will hold a public outreach meeting to report the findings sometime during the third year of the project.

Work item	**Task**	**Deliverable**	**Due Date**
Wetland inundation-Spring	1	Quarterly updates	March-June 2011 and 2012
Wetland inundation-Fall	1	Quarterly updates	Sept.-Nov. 2010
Rice harvest	1	Quarterly updates	Sept.-Nov. 2010, 2011
Water sampling/analysis	2a	Quarterly updates, draft report, final report	9 events between March 2011 and Nov. 2012
Biota sampling/analysis	2b	Quarterly updates, draft report, final report	March-August 2011, 2012
Reporting	3	Quarterly updates	Every three months for duration of project
Reporting	3	Annual Reports	12 and 24 months after contract signature
Reporting	3	Draft Final Report	32 months after contract signature
Reporting	3	Final Report	36 months after contract signature
Public Outreach	3	Public meeting to present findings relative to wetlan Best Management Practic	30 months after contract signature

G. Schedule

This project is anticipated to begin April 2011, with the initial wetland management actions occurring during the fall of 2010 with the use of matching funds (see tabular schedule below for details). If contract cannot be executed by April 2011, then the project could be held off until the following growing season with no negative influence on project outcome/success. Assuming a start date in spring 2011, the project will end in July 2013.

	2010		2011				2012				2013		
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer
Rice growing	X				X				X				
Water management	X				X				X				
Organic matter reduction		X				X							
Water sampling					X		X		X				
Fish sampling					X		X		X				
Reporting (quarterly and Annual reports)				X	X	X	X	X	X	X	X	X	
Final report complete													X

H. Financing/Funding Match

We have identified a funding match of $270,260 which is 25% of the total project cost. As the Project Lead and principle land owner/manager, the Bureau of Land Management is providing $190,000 in matching costs as in-kind services. US Geological Survey is providing $60,000 in matching costs, California Dept of Fish and Game, Moss Landing Marine Lab is providing $10,000, and U.S. Fish and Wildlife Service is providing $10,260 as in-kind services. Please see the attached letters of support (Attachment G) for further details. The project leverages base funding to BLM for management of the Cosumnes River Preserve, and to USGS and CDFG-MLML for Principle Investigators to oversee the project.

I. Cost Estimate/Budget

Costs are outlined in additional detail in the budget table below. Wetland management and organic matter reduction is estimated to cost $85,449, but we are only requesting $45,449 with the other 47% included as matching costs. This task includes staff time, and application of new rice harvest methods. Determination of mercury load reduction will cost $677,308. We are providing a 21% match of $142,000 and requesting $535,308 for this task. Approximately half the cost of this task comes from analytical laboratory expenses for mercury determination in water and fish. Finally, we estimate that management, oversight, implementation, and reporting will cost $291,293. We are offering $88,260 as a 30% match and requesting $203,033 for this task. These cost estimates were determined using current pay rates for the principle investigators, technicians for the field work, and lab expenses. We also have included costs to reimburse farmers for implementing alternative straw management practices that are above what they normally pay for rice straw management.

Budget Estimate Table

	Year 1						
		319h Funding				**Non-State Match**	**Project Total**
Tasks	Salary and Benefits	Mercury Analysis	Supplies and Travel	Farm Operations			
Wetland management and organic matter reduction	$ 14,550	$ -	$ -	$ 11,580		$ 20,000	$ 46,130
Mercury load reduction determination	$ 116,031	$ 99,515	$ 14,375	$ -		$ 71,000	$ 300,921
Reporting and contract management	$ 47,927	$ -	$ -	$ -		$ 13,420	$ 61,347
Total	**$ 178,508**	**$ 99,515**	**$ 14,375**	**$ 11,580**			
Grand Total				**$ 303,978**		**$ 104,420**	**$ 408,398**

	Year 2						
		319h Funding				**Non-State Match**	**Project Total**
Tasks	Salary and Benefits	Mercury Analysis	Supplies and Travel	Farm Operations			
Wetland management and organic matter reduction	$ 7,739	$ -	$ -	$ 11,580		$ 20,000	$ 39,319
Mercury load reduction determination	$ 134,721	$ 157,415	$ 13,250	$ -		$ 71,000	$ 376,386
Reporting and contract management	$ 37,400	$ -	$ -	$ -		$ 13,420	$ 50,820
Total	**$ 179,860**	**$ 157,415**	**$ 13,250**	**$ 11,580**			
Grand Total				**$ 362,105**		**$ 104,420**	**$ 466,525**

	Year 3						
		319h Funding				**Non-State Match**	**Project Total**
Tasks	Salary and Benefits	Mercury Analysis	Supplies and Travel	Farm Operations			
Wetland management and organic matter reduction	$ -	$ -				$ -	$ -
Mercury load reduction determination	$ -	$ -				$ -	$ -
Reporting and contract management	$ 115,081	$ -	$ 2,625			$ 61,420	$ 179,126
Total	**$ 115,081**	**$ -**	**$ 2,625**	**$ -**			
Grand Total				**$ 117,706**		**$ 61,420**	**$ 179,126**

	All YEARS						
Tasks	Salary and Benefits	Mercury Analysis	Supplies and Travel	Farm Operations		**Non-State Match**	**Project Total**
Wetland management and organic matter reduction	$ 22,289	$ -	$ -	$ 23,160		$ 40,000	$ 85,449
Mercury load reduction determination	$ 250,753	$ 256,930	$ 27,625	$ -		$ 142,000	$ 677,308
Reporting and contract management	$ 200,408	$ -	$ 2,625	$ -		$ 88,260	$ 291,293
Total	**$ 473,449**	**$ 256,930**	**$ 30,250**	**$ 23,160**			
Grand Total				**$ 783,789**		**$ 270,260**	**$ 1,054,049**

Cost Estimate Table: *Wetland Management and Agricultural Organic Matter Reduction to Decrease Methylmercury Loads from the Cosumnes River Preserve*			
Budget Category	Non-State Share (Funding Match)	Requested State Share (Grant Funding)	Total
(a) Direct Project Administration Costs	$88,260	$203,033	$291,293
(b) Planning/Design/Engineering/Environmental	$182,000	$580,756	$762,756
(c) Construction/Implementation			
(d) Environmental			
(e) Project Summary			
(f) Construction Administration			
(g) Other			
(h) Grant Total	$270,060	$783,789	$1,054,049

Matching costs will come from Bureau of Land Management ($190,000), US Geological Survey ($60,000), Moss Landing Marine Lab ($10,000), and U.S. Fish and Wildlife Service ($10,260).