

PROJECT TITLE A Pilot Program for Monitoring, Stakeholder Involvement, and Risk Communication Relating to Mercury in Fish in the Bay-Delta Watershed (“the Fish Mercury Project”) - CBDA Project # ERP 02D-P67

INVESTIGATORS

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INTRODUCTION TO THE PROJECT

The Fish Mercury Project (FMP) is a multifaceted three-year project that will examine mercury in fish in the Bay-Delta watershed and increase public awareness of fish contamination issues, with the overall goal of reducing mercury exposure in humans and wildlife. The Project is closely following the recommendations of CBDA’s “Mercury Strategy” (Wiener et al. 2003) relating to monitoring mercury in the watershed in support of adaptive management.

Oversight for this project is provided by a Peer Review Panel (PRP) and a Steering Committee (SC). The Peer Review Panel consists of five experts in fish mercury monitoring, advisory development, and risk communication on fish contamination issues. The Steering Committee is a multidisciplinary, multi-institutional participatory group with members from government agencies, scientific and academic institutions, community-based organizations, and other groups with interests in ecosystem health, environmental management, environmental justice, and public health.

The FMP began in March of this year with a first meeting of the SC. This was followed by a two-day meeting of the PRP in April, and another SC meeting in May. At these meetings, the SC and PRP reviewed the goals and objectives of the Project and a preliminary proposed sampling design. The final statement of goals and objectives of the Project is presented in Table 1. The SC and PRP provided additional input on the written draft sampling plan at a SC meeting in August, and via email.

PROJECT TIMETABLE AND PROGRESS

Starting Date November 2004

Target Completion Date October 2007

Project Status

Is the Project on schedule? The Project is on schedule. Due to delays in getting the contract between CBDA and SFEI fully executed, there was a considerable initial challenge in completing the necessary work (establishing the SC and PRP, refining the Project goals and objectives with the SC and PRP, and developing a sampling plan incorporating SC and PRP input) prior to initiating a round of sampling in late summer. However, thanks to cooperation of all involved, we were able to complete this process and get out into the field with an agreed upon sampling plan beginning in August.

Sampling has gone well. Approximately 1600 sport fish have been collected from 43 sites for the FMP. In general, the sampling crew has been successful in obtaining the targeted numbers and species of fish needed at each sampling location. Biosentinel sampling at 47 sites is nearly completed.

Project Milestones Achieved

- Steering Committee formed
- Role statement and member roster for Steering Committee
- Assembled peer review panel
- Project web site established: <http://www.sfei.org/cmr/fishmercury/>
- Peer-reviewed goals and objectives established
- Peer reviewed sampling plan developed
- QAPP materials developed
- Annual report for Mercury Workshop prepared

PROJECT HIGHLIGHTS AND RESULTS

Steering Committee Formed – The SC has 28 members representing a range of organizations including CBDA, resource agencies, health agencies, environmental organizations, fishing advocates, community-based organizations, and health professionals. Stakeholder participation on the SC was broadened through a nomination process to seek participation from local agencies, and community-based, environmental, angler, and tribal groups. The SC has met three times and discussed issues relating to the Project's goals and objectives, sampling design for fish monitoring, environmental justice, and other topics.

Peer Review Panel convened – The PRP is chaired by Barbara Knuth of Cornell, and also includes: Jim Wiener, University of Wisconsin LaCrosse; Drew Bodaly, Fisheries and Oceans Canada; Tom Grieb, Tetra Tech; and Patricia McCann, Minnesota Department of Health. The Review Panel met at a two-day workshop in April.

Goals and objectives refined – The first task for the SC and PRP was to review and refine the Project goals and objectives. This task was completed in April.

Website Established – A website was established that provides access to Project documents, meeting materials, and links to other websites with relevant information.

PRP Comments on the Sampling Plan – At the end of the two-day meeting in April, the PRP provided the investigators a PowerPoint summary of recommendations for the Project (available on the FMP website). These recommendations were incorporated into the first written draft of the sampling plan.

Fishing Activity Assessments - In 2005 EHIB conducted several activities to identify fishing locations and species in the south Delta and San Joaquin River for guiding the development of the 2005 sampling plan. The following activities were conducted:

1. EHIB reviewed the California Department of Fish and Game (DFG) river creel data for 1999 and 2000, and provided a summary of fishing activity (number of anglers present) by river mile.
2. Phone discussions with fishing contacts from DFG and other groups on fishing areas and species in the south Delta and San Joaquin River.
3. Site visits to fishing locations in the south Delta and San Joaquin River to verify site locations and observe fishing activity.
4. Interviews with 32 anglers at 6 locations in the south Delta and San Joaquin River. Anglers were asked about species they catch and eat, and other fishing locations.
5. Focus groups with African American, Cambodian, Lao, and Hmong anglers to learn about the areas where they fish and species they catch and eat in the Delta. The focus groups were conducted mainly to confirm that the fishing locations and species caught and consumed by local stakeholders were adequately reflected in the sampling plan for the Delta.

Year 1 Sampling Plan for Sport Fish and Biosentinels - A sampling plan (Davis et al. 2005) was developed with Steering Committee and Review Panel input. The Steering Committee provided input on sampling sites and species of interest. At the April meeting, the Review Panel provided detailed input on many aspects of the fish sampling. The Steering Committee and Review Panel provided additional input upon review of the written draft version of the plan distributed in July. The final version completed in October documents the final plan and the sampling that was actually performed in the summer of 2005.

The sampling design for 2005 includes four different types of sampling sites (index sites, intensive sites, restoration sites, and advisory development sites), in addition to sampling of three salmonid species (chinook salmon, steelhead, and rainbow trout). Table 2 provides a thumbnail summary of the different types of sites.

A great deal of background work went into identifying sites. Site selection is documented in detail in the sampling plan (Davis et al. 2005). Sites were ranked relative to a suite of selection criteria (Table 3) and matrices were developed to document rankings and overall scores for each site. Evaluating sites against some of the criteria (especially fishing activity – including amount of activity at a location and species preferences) required an extensive information gathering effort. Restoration/remediation sites were selected with input from CBDA restoration leads in different regions. The sampling plan developed for 2005 to support developing advisories focused on the south

Delta, the San Joaquin River, the Cosumnes and Mokelumne rivers and associated reservoirs, and the Feather River. Sampling for advisories in 2006 will focus on the north Delta, the Sacramento River, Lake Shasta, and other tributaries, creeks, and reservoirs in this area. Sampling for advisories in 2007 will focus on tributaries, creeks, and reservoirs along the San Joaquin River. The 2005 sampling plan will support risk assessments to develop advisories based on methylmercury, but includes provisions that would enable future analyses and assessments of organic contaminants. Sampling plans were also developed for anadromous species and trout that are popular with anglers in northern California. The plan for 2005 focused on trout, salmon and steelhead. Hatchery raised trout will be collected at multiple state hatcheries throughout the CBDA ERP management units. Lists of target species (including by-catch) and sample sizes were developed for each sport fish sampling site and entered into a spreadsheet used by the DFG sampling crew. This provided detailed instructions for the crew and was also used to report catch on a weekly basis. These reports were reviewed and used to coordinate and add instructions for additional collections by the sampling crew.

Figures 1 and 2 show the sites selected for sport fish and biosentinel sampling in 2005. Sport fish were sampled at 43 sites for the FMP, with approximately 1600 fish collected. Sport fish were also collected at seven hatcheries. Sport fish were also collected at an additional 23 sites in the watershed by two other programs (one led by Chris Foe covering 20 sites and the other was the Sacramento River Watershed Program [SRW]P covering three sites) (Figure 1). Sampling among the FMP, the Foe Study, and the SRWP was closely coordinated to avoid duplication of effort and maximize information gained.

Biosentinel sampling will be completed for 47 sites for the FMP, including 11 index sites, 3 intensive sites, and 33 restoration/remediation sites (Figure 2). Precise locations, species, size ranges, and sample numbers were also carefully selected for the biosentinel sampling.

POTENTIAL MANAGEMENT IMPLICATIONS OF FINDINGS TO DATE

Fishing Activity – New information generated by this project to date concerns fishing activity information in the Delta. The information was used in selecting sampling locations and target species, and will also be useful in risk communication.

Fish Mercury Data - Sampling of sport fish and biosentinels just began in late summer, so the data will not be available until early 2006.

Figure 1. Sport fish sampling sites for the FMP (index, intensive, restoration, and advisory development sites), Chris Foe's study, and the Sacramento River Watershed Program.

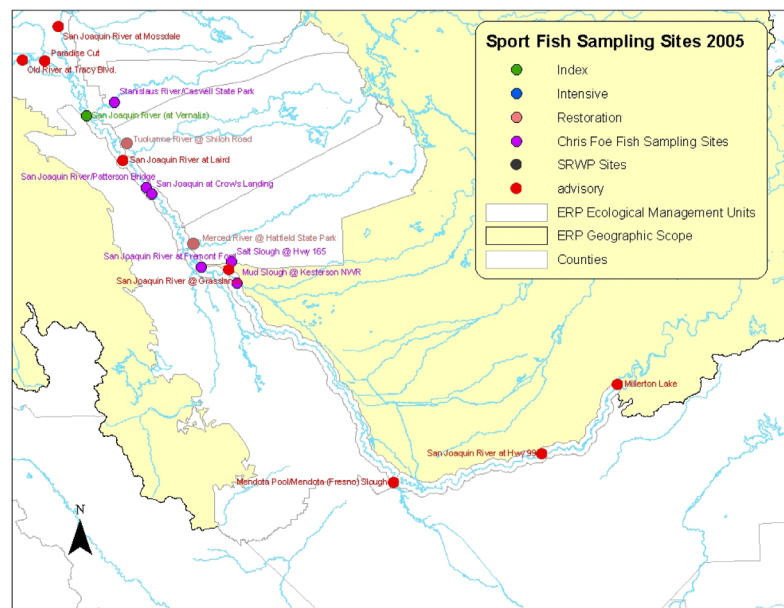
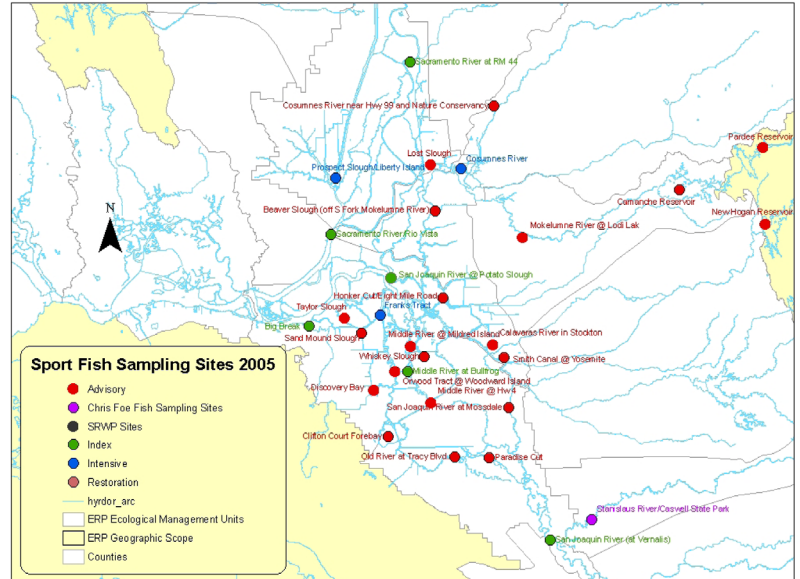


Figure 2. Biosentinel sampling sites for the FMP (index, intensive, and restoration sites)

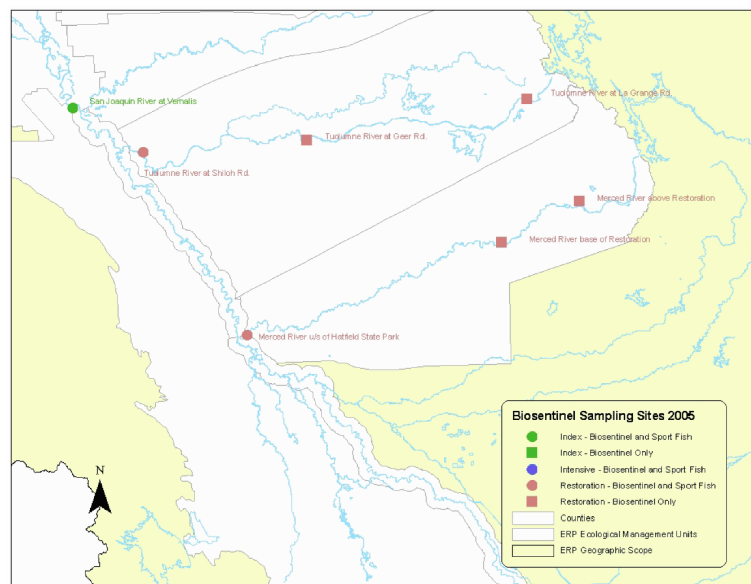
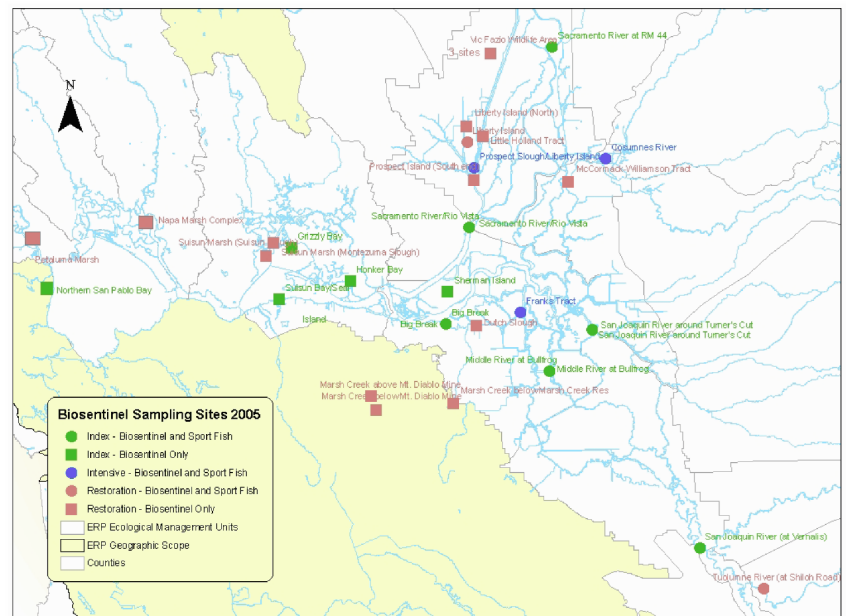
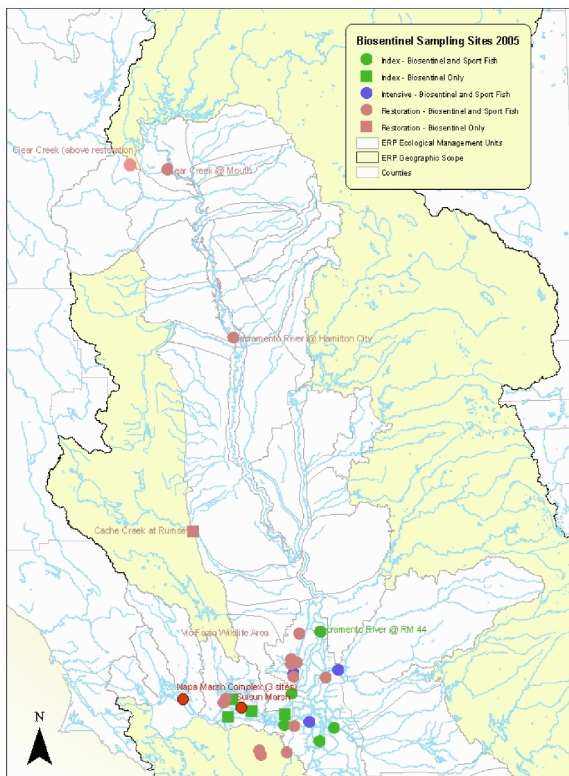


Table 1. Fish Mercury Project goals and objectives.

Project Goals

1. Protect human health in the short term by characterizing mercury concentrations in fish, developing safe consumption guidelines, and reducing exposure through risk communication based on environmental justice principles
2. Through food web monitoring, determine how habitat restoration and mercury clean-up actions affect methylmercury accumulation in the food web
3. Establish an organizational and technical foundation for cost-effective and scientifically defensible fish mercury monitoring that meets the identified needs of end users
4. Coordinate with the major ongoing science, management, and risk communication efforts to achieve efficiencies of scale and scope

Project Objectives

1. Characterize spatial and temporal trends in mercury in fishery resources
2. Demonstrate the use of biosentinel species to link ecosystem restoration, contaminant clean-up, and other landscape changes with spatial and temporal patterns in food web mercury
3. Assess health risks of consuming contaminated fish and communicate these risks to appropriate target audiences based on environmental justice principles
4. Establish a Steering Committee and stakeholder advisory groups to facilitate:
 - a. stakeholder input into the monitoring and risk communication activities based on environmental justice principles, and
 - b. coordination with other major science, management, and outreach and communication efforts

Table 2. Thumbnail guide to the different types of sampling sites and the goals and objectives addressed by each. X indicates primary goals and objectives met, x indicates secondary goals and objectives met. Goals and objectives are listed in Table 1.

Type of Site	Description	G1	G2	G3	G4	O1	O2	O3	O4
Index	Evaluating the potential regional impacts of habitat restoration in the Delta	x	X			X	X	x	
Intensive	Another type of index site where more detailed investigation of temporal variation and mercury movement through the food web will be conducted	x	X			X	X	x	
Restoration and Remediation	Evaluating the localized impacts of CBDA habitat restoration and remediation projects on food web mercury	x	X			x	X	x	
Advisory Development	Providing the data needed to support consumption advisory development for the CBDA ecological management units	X	x			x	x	X	

Table 3. Criteria employed in selection of sampling sites.

Index sites	Intensive sites	Restoration/Remediation sites	Advisory development sites
Linkage to potential regional impacts of restoration	Linkage to potential regional impacts of restoration	CBDA Priority	Data gaps in sample size or species
Availability of historic data: small fish and Availability of historic data: sport fish	Availability of historic data: small fish and Availability of historic data: sport fish	CBDA Urgency	Data gaps based on spatial coverage
Regional spatial coverage (highly weighted)	Regional spatial coverage (highly weighted)	Abundance of appropriate biosentinels	Fishing activity
Linkage to present or potential wildlife studies	Linkage to present or potential wildlife studies	Abundant sport fish	Presence of high mercury species
Abundance of appropriate biosentinels	Abundance of appropriate biosentinels	Availability of historic data: small fish	Presence of low mercury species
Abundant sport fish	Abundant sport fish	Availability of historic data: sport fish	Presence of species suitable for organics screening
Linkage to other studies	Linkage to other studies	Fishing activity	Location with in ERP management units
Fishing activity	Fishing activity	Linkage to other studies	Shore-based fishing access
Presently or potentially under an advisory	Presently or potentially under an advisory	Linkage to present or potential wildlife studies	
	Travel distance and general sampling logistics	Presently or potentially under an advisory	

APPENDIX: PRODUCTS TO DATE

Davis, J.A., et al. 2005. DRAFT WORKPLAN FOR YEAR 1 OF THE CALIFORNIA BAY-DELTA AUTHORITY FISH MERCURY PROJECT: FISH SAMPLING AND ANALYSIS. CBDA Project # ERP 02D-P67.

Davis, J.A., et al. 2005. FINAL WORKPLAN FOR YEAR 1 OF THE CALIFORNIA BAY-DELTA AUTHORITY FISH MERCURY PROJECT: FISH SAMPLING AND ANALYSIS. CBDA Project # ERP 02D-P67.