

EXHIBIT A SCOPE OF WORK

I. PURPOSE OF PROJECT

A. Background Information

Present concentrations of mercury in aquatic food webs in the Bay-Delta watershed are high enough to warrant concern for the health of humans and wildlife. Although fishing for food is a significant activity in the Bay-Delta watershed, there is low awareness among anglers about fish contamination issues and how to protect their health. Wildlife exposure is another facet of the mercury contamination problem. Recent studies indicate that mercury concentrations in eggs of several bird species are high enough to reduce hatching success (Schwarzbach and Adelsbach 2003).

Mercury science is a rapidly developing field, and the Bay-Delta watershed represents a unique and challenging setting for mercury investigations. Our present understanding of mercury is not sufficient to predict which restoration or remediation projects will affect mercury accumulation in food webs on a local or regional scale. CBDA restoration and water management activities may potentially lead to local and possibly regional increases in concentrations of mercury in aquatic food webs. On the other hand, remediation efforts by CBDA and other organizations will aim to reduce mercury accumulation in food webs.

Project Objectives

To address mercury contamination of fish in the watershed, San Francisco Estuary Institute (SFEI), University of California at Davis (UC Davis), Moss Landing Marine Laboratory (MLML), and the Environmental Health Investigations Branch of the California Department of Health Services (EHIB) propose a collaborative pilot program with three main objectives: monitoring of mercury in fish, stakeholder involvement, and risk communication. This approach follows the recommendations of the Mercury Strategy (Wiener et al. 2003) and builds on past and ongoing activities in the Bay-Delta watershed to address this issue.

- *Monitoring* of mercury in fish is the most relevant measure of mercury exposure in aquatic ecosystems. Monitoring will be an essential component of adaptive management of the mercury problem, allowing managers to identify and advance actions that reduce mercury exposure rather than increase it.
- *Stakeholder involvement* will ensure that the monitoring results will be relevant to local affected communities.
- *Risk communication* is the most effective way to reduce human exposure to mercury in the short-term, particularly given the recalcitrance of mercury contamination in the watershed. Guided by results of the monitoring activities, and risk assessment of fish contamination, risk communication activities will identify specific ways affected populations can reduce their exposure to mercury through selection of fishing locations or species that are less contaminated, or simply through reducing fish consumption.

In summary, the objective of this program is to establish a foundation for state-of-the-science regional monitoring of mercury in the watershed coupled with stakeholder involvement and risk communication.

1. **Primary Project Goals**

- i. Protect human health by assessing and reducing exposure to methylmercury-contaminated fish through risk communication

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- ii. Provide “performance measures” to gauge methylmercury contamination of the watershed during restoration and remediation
- iii. Establish an organizational and technical foundation for cost-effective, scientifically defensible monitoring of mercury in the watershed that meets the identified needs of end users and is coordinated with related science and management efforts

2. Study Objectives

- i. Monitor spatiotemporal patterns of methylmercury in fishery resources in the watershed
- ii. Examine the relation of these patterns to ecosystem restoration, remediation, and landscape manipulations
- iii. Assess health risks of consuming contaminated fish and communicate these risks to appropriate target audiences
- iv. Establish a Steering Committee and stakeholder advisory groups to facilitate
 - a) stakeholder input to the monitoring and risk communication activities and
 - b) coordination with other science and management efforts

3. Current Working Hypotheses and Investigative Approaches

- i. *Management actions will lead to localized and regional changes in long term trends in fish mercury.* Establish a network of long term sampling sites to begin characterizing inter-annual variability and provide a solid basis for evaluation of long term trends.
- ii. *Fish mercury concentrations in the watershed will vary spatially, ranging from safe to hazardous.* Conduct sport fish sampling broadly in the watershed, tracing contamination upstream from areas with demonstrated contamination, and including areas not influenced by historic mining or known mercury sources except for atmospheric deposition.
- iii. *Elevated mercury in fish will be found downstream of historic mercury and gold mining activity.* Sample reservoirs, streams, and rivers downstream of historic mining regions.
- iv. *Elevated mercury in fish will be found downstream of drainages with high percentages of wetland or floodplain acreage.* Sample drainages in the watershed with varying degrees of wetland and floodplain acreage.

II. PROJECT FUNDING SOURCE(S) – PROPOSITION 50

The funding required to complete this scope of work is \$4,513,819.00, all of which will be contributed through the Proposition 50 grant that is the subject of this Agreement.

III. WORK TO BE PERFORMED

A. Scope of Work

This project has been broken down into 12 tasks with subtasks and lists of deliverables per task and sub-task.

Task 1 Project Management and Administration

The Contractor shall provide all technical and administrative services associated with performing and completing the work for this project.

The Contractor shall be responsible for the performance of the work as set forth in this agreement as well as for the preparation of products and a final report as specified in this Exhibit A. The Contractor Representative shall promptly notify the GCAP Contract

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Management Entity, herein after referred to as GCAP Contract Manager of events or proposed changes that could affect the scope, budget, or schedule of work performed under this agreement.

The Contractor shall provide all quarterly progress reports, invoices, and scheduled deliverables as indicated in **Section III.B. – Schedule of Completion Dates.**

This task includes all aspects of administrative and scientific coordination, monitoring design, quality assurance oversight, and information management aspects of the project, including integration with separately funded, yet related activities under an anticipated contract with the State Water Resources Control Board (SWAMP), linkages to the emerging California Environmental Data Exchange Network (CEDEN) funded through CalEPA and DWR, the San Francisco Estuary Regional Monitoring Program, and related CBDA efforts.

Subtask 1.1 Project Management

Technical and administrative tasks shall include: project management, budgeting, scheduling, coordination, crew supervision, report preparation, contract management, invoicing, equipment maintenance and data collection, storage and analysis, subcontract management, and all other tasks that may be necessary to complete the scope of work specified in this agreement.

The work performed in this subtask also includes the preparation and submission of Quarterly Progress Reports (using Ecosystem Restoration Program (ERP) Report Format) to GCAP Contract Manager; the planning and conducting of quarterly status meetings with all project investigators to review progress and issues from the previous quarter; the preparation and submission of the project Final Report; and the preparation and submission of deliverable products as specified.

Work efforts in this subtask will be dedicated to tracking milestones, coordinating all team members, providing invoices, and maintaining communication with the CBDA project officer and CBDA contract administrators. In addition, contractor will participate in the CBDA Mercury Annual Review to highlight progress and highlight preliminary results, as appropriate. This should require approximately one meeting per year.

Subtask 1.2 Quarterly Progress Reports

Prepare and submit quarterly progress reports to GCAP Contract Manager in electronic form using ERP's progress report format shown as Exhibit A – Attachment # 1. Each progress report shall detail work accomplished, discuss any problems encountered, and recommend potential solutions to those problems; detail costs incurred during the subject quarter, and document delivery of any intermediate work products. A brief outline of upcoming work scheduled for the subsequent quarter should also be provided. Progress reports must be submitted by the 10th day of the month following each calendar quarter (April, July, October, January) throughout the duration of the project.

The description of activities and accomplishments of each task during the quarter shall be in sufficient detail to provide a basis for payment of invoices and shall be translated into percent of task completed for the purposes of calculating invoice amounts.

Failure to submit any two (2) consecutive quarterly progress reports may result in forfeiture of the contract funds awarded for this project.

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Subtask 1.3 Subcontractor Selection

The parties listed below were instrumental co-investigators involved in the development of the submitted proposal and are included as subcontractors for the purposes of contract administration. The subcontractors for the project and their tasks are as follows:

- Moss Landing Marine Laboratory
Dr. Mark Stephenson will direct a group that will complete the sport fish sampling and laboratory analysis.
- University of California, Davis
Dr. Darell Slotton will direct the biosentinel sampling and laboratory analysis.
- Department of Health Services
Alyce Ujihara will lead the stakeholder involvement and risk communication.
- Office of Environmental Health Hazard Assessment
Dr. Robert Brodberg will lead the risk assessment and advisory development.
- Dr. Robert Smith and Dr. Don Stevens will assist in the design of statistically robust sampling regimes.

Award subcontracts, as necessary, to qualified consultants or other agencies. The subcontractors shall be selected by a process that complies with applicable State and Federal regulations. Prepare a legally enforceable agreement between the contractor and the selected subcontractors. The agreement shall describe the scope of work and the products expected from each subcontractor. Submit final draft contract documents for all subcontracts to GCAP's Contract Manager for review and approval prior to execution. Document steps taken in soliciting and awarding the subcontract and submit to GCAP Contract Manager for review. In the quarterly progress report, document all subcontractor activities, deliverables completed, progress, issues and proposed resolutions.

Subtask 1.4 Data Management

Prepare and submit all data generated by the project for input into ERP's data system. Data format and report guidance for ERP's data system shall be provided by GCAP Contract Manager. Data shall be submitted to the GCAP Contract Manager on computer diskettes or on forms provided by the GCAP Contract Manager. The Contractor shall be responsible for verifying the quality of the data.

Tissue contamination, especially by mercury, stands as a primary factor influencing the effectiveness and risks associated with CBDA-sponsored ecosystem restoration actions. Associated water contamination data establish part of the context for understanding processes controlling tissue contamination. This subtask will take advantage of the present opportunity to further the convergence of state environmental data storage and access by working collaboratively with SWAMP and BDAT participants to adopt consistent storage for tissue and water contamination data as a step towards full-scale implementation of a California Environmental Data Exchange Network (CEDEN). A standard tissue data format will thus be shared between CBDA, SWRCB, DWR (BDAT) and SFEI, strengthening the format as a standard for future data collection efforts in the state.

The San Francisco Estuary Institute is the data steward of one of the largest tissue contamination databases in the state and is poised to become the Bay Area "node" within the planned databases network. As part of this work effort, SFEI will do the following:

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1. Working with BDAT staff, adopt the draft tissue contaminant database schema (BDAT v2.2 family) developed by BDAT staff, in collaboration with SWAMP and other tissue monitoring participants, into SFEI's database management system, thus further promoting it as the California tissue data storage standard. Implement the "Export Module" or equivalent included with the database. As part of this task, SFEI will review and provide comments on the schema to Karl Jacobs.
2. Data entry and/or conversion to bring the following datasets into the tissue database:
 - The data generated under the other tasks of this proposal;
 - All other SFEI tissue data (1993-present); and
 - Selected historical tissue data.
3. Development and maintenance of an intuitive, easy to use, public web-based interface for assessing tissue data holdings and downloading selected datasets from those entered in subtask 2.
4. Working with BDAT staff, adopt a subset of the database schema (BDAT v2.2 family) into SFEI's database management system, and perform conversions to house the RMP's water quality data.

Subtask 1.5 Coordination and Development of an Organizational Framework for Stakeholder Guidance of the Program

Establish a multidisciplinary, multi-institutional Steering Committee (SC) to help guide and facilitate the program development process. Establishing this institutional structure will provide an important element of a lasting framework for adaptive management of the mercury problem over the long-term. The membership of the SC will include representatives from the CBDA, water quality management agencies, health agencies, other major monitoring and research programs, environmental organizations, and representatives of other stakeholder groups.

The SC will provide a vital hub for coordinating fish mercury monitoring with other research, monitoring, and restoration activities in the watershed. Several elements of program coordination will be covered, including:

- Sampling design and quality assurance (to avoid duplication and promote generation of directly comparable data for the watershed);
- Sharing of results and information, including recent, unpublished findings; and
- Reporting of available data from the various programs.

With regard to reporting, a variety of informational products are proposed, including:

- An annual report that synthesizes data from this project and other projects and presents them in a concise, accessible format (similar to the "Pulse of the Estuary" – the annual report of the RMP); and
- Fact sheets targeted toward audiences (e.g., water quality managers, at-risk populations, restoration project managers) identified by the SC.

The SC will also provide a forum for local input and include representation from county health agencies and CBOs, among others, from throughout the CBDA solution area (described further under Task 6 below). A stakeholder advisory group will be represented on the SC to ensure stakeholder input. SC subcommittees will be formed as needed to address specific issues.

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As described in the Strategy, a first step in implementing this proposal will be for the SC to refine the goals and objectives developed in the Strategy and incorporated into this proposal. Committee members will be carefully selected and guided to provide input to support the Program objectives. For example, the SC members will provide information on appropriate species and locations to monitor. The role of SC members will not be to bring unrelated objectives and priorities to the table. After the SC adopts refined goals and objectives, they will be peer reviewed, as recommended by the Mercury Strategy, and revised as appropriate.

Additionally, the contractor shall participate in the CBDA Mercury Annual Review which should require approximately two reports and two meetings. Reports are expected to be at least 20 pages and in sufficient detail to undergo technical peer review.

Subtask 1.6 Monitoring Program Design

Once the final goals and objectives are established, the next step will be to design a program to meet them. For developing this proposal, we had to devise preliminary plans. Preliminary plans for monitoring (and the other program components) will be presented to the SC for refinement. All of the preliminary designs described in this Scope of Work may be modified upon review by the Steering Committee and peer reviewers.

The sampling design for fish monitoring will be developed in consultation with experts in the statistical design of monitoring programs and experts in fish monitoring. Two statisticians are on the team of investigators for this proposal. Dr. Robert Smith collaborated with Dr. Davis on implementing the polynomial regression ANCOVA technique employed for the sport fish data in the CALFED Mercury Project (Davis et al. 2003), and will work on applying this technique for evaluating spatiotemporal patterns in the data generated in this study and other comparable studies (especially Davis et al. [2003] and Slotton et al. [2002a, 2004a]). Dr. Smith will also perform power analyses needed to inform decisions about sampling design. Dr. Don Stevens, another expert in statistical aspects of sampling design, will also be a co-investigator on this project. Dr. Stevens developed the spatially randomized and balanced, rotating panel design currently used by the RMP for sampling water and sediment in San Francisco Bay, and developed the statistical theory behind US EPA's EMAP sampling program. Dr. Stevens and Dr. Smith collaborated in a similar manner in developing the RMP sampling design. The expertise of the Office of Environmental Health Hazard Assessment will also be utilized in reviewing monitoring designs to incorporate lessons learned in the most recent sampling and advisory development efforts in the Delta, Sacramento, and San Joaquin River watersheds.

Statistical analysis of recent reliable fish mercury data will be used as much as possible in crafting an efficient sampling design. Unfortunately, the sport fish element of the CALFED Mercury Project only collected one year of the data in the manner that should be followed in long term monitoring: based on a sampling of enough fish across a broad size range to support regression analysis (this design was developed in the second year of the Project) at each siteXtime combination. Furthermore, most sites were switched in year two of the Project. These false starts will be avoided in this proposed monitoring because of the groundwork established in the CALFED Mercury Project and the thorough process of design and review that will occur before sampling is conducted. Design of the biosentinel monitoring will utilize databases generated to date in related projects, primarily by the UC Davis team. These data will be examined, with the aid of the project statisticians, to better clarify issues regarding sampling design and power to detect spatial and temporal trends.

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National experts in fish monitoring and risk communication will also be brought in to work with SC members on developing potential modifications to sampling designs and risk communication strategies. With statistical consultation, guidance from monitoring and risk communication experts, and SC input, robust strategies will be developed to meet the defined objectives.

An important consideration in site selection will be linking to process-oriented studies of mercury dynamics in water, sediment, and other portions of the food web. Other criteria to be considered in site selection are described for each Program element below.

The next step, following Strategy recommendations, will be documentation of procedures for program tasks, including: fish sampling, handling and analysis of samples, quality assurance, archiving, data management, statistical analysis, synthesis and reporting, risk communication, outreach and education, and peer review. This documentation will facilitate the next step in the process, external peer review of the design of the program. A budget for peer review is included in this proposal. Peer review of this Pilot Program will be coordinated with any broader peer review of Strategy implementation. For review of the Pilot Program, a panel comprised of experts in fish mercury, monitoring, statistical sampling design, and risk communication will be assembled, with the guidance of the Steering Committee. This panel will provide initial review of the Pilot Program prior to sampling in 2005, and will meet annually or as needed to provide guidance on Program design and review of products emanating from the Program.

Subtask 1.7 Quality Assurance Oversight

This task covers work efforts related to developing a Quality Assurance Project Plan (QAPP), and insuring comparability of analytical results from the two laboratories involved in the sampling and fish tissue analysis efforts, verification of analytical results by an independent third laboratory, as well as participation in CBDA-sponsored intercomparison exercises. The UC Davis team will be involved in sampling and analyzing small fish and invertebrates (biosentinels), while SJSUF will be in charge of collecting, storing, processing, and analyzing sport fish samples. The primary data for each sample type will be generated within the same laboratory throughout the course of the project. An additional program of inter-laboratory cross calibrations will be enacted to facilitate the comparison of sport fish data with biosentinel data. Calibration exercises will utilize homogeneous splits of project samples and certified reference materials. If funds allow, a bulk amount of project-specific reference material will be developed for the project. Another aspect of QA oversight will be to seize opportunities collecting alternate, overlapping sport fish species when readily available to provide general conversion capability between species and sizes. The UC Davis protocols call for the collection of one or more prevalent alternate species as available. Efforts will be made to accomplish overlaps of key species at a range of mercury exposure conditions. It would, however, be cost prohibitive to collect all species at all samplings, so these opportunities for particular overlaps will be chosen carefully.

Task Deliverable(s): Quarterly progress reports, quarterly invoices, subcontract documentation, annual project summary reports, role statement and member roster for Steering Committee, fact sheets, peer-reviewed sampling design plans, documentation of procedures, Quality Assurance and Control Project Plan, web-based interface for tissue data; electronic copies of presentation material for CBDA Annual Mercury Review Meetings.

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Task 2 Temporal Trend Monitoring

The preliminary design of the monitoring program includes five different types of sampling sites: index sites, intensive sites, striped bass sites, restoration sites, and spatial characterization sites (Tables 1 and 2). Tables 1 and 2 indicate which sites will be sampled in the different years of the project and how fish sampling will differ among sites.

Temporal trend monitoring will consist of three major elements: monitoring of index sites, intensive sites, and monitoring of striped bass. Striped bass monitoring is separated because this species is highly migratory and cannot reliably be collected at the same locations that are desirable for long term trend monitoring of other species.

Subtask 2.1 Index Site Monitoring

General Index Site Sampling Design. Index site monitoring will be conducted to provide information on health risks associated with fish consumption, long term regional trends, spatial variation, mechanisms of mercury uptake in indicator species, and factors influencing mercury accumulation in food webs. The index sites will be selected with input by the Steering Committee. The following draft selection criteria will be presented to the Committee:

- Popularity with local anglers;
- Integrative representation of subwatersheds;
- Spatial coverage of study area, especially regions where restoration and remediation are occurring;
- Existence of historic data at the location; and
- Linkage with other process and monitoring studies.

A list of candidate sites will be given to the Committee.

Approximately three sites will be sampled more intensely (“intensive sites”) in 2005, 2006, and 2007. At the intensive sites, a concerted effort will be made to sample the entire spectrum of sport fish and lower trophic level fish species. This will provide valuable information on mercury concentrations in less common species and on how concentrations in the primary indicator species can generally be extrapolated to other species. Some information on inter-annual variation in sport fish mercury will be obtained through annual sampling at these sites to provide variance estimates needed for power analysis.

Biosentinel Sampling at Index Sites and Intensive Sites. Biosentinel sampling will be conducted with the objective of evaluating spatial and inter-annual trends in methylmercury exposure and bioaccumulation. Young-of-year small fish will be the primary monitoring tool, providing a responsive, integrative measure of bioaccumulation that can in turn be linked to mercury in large fish and wildlife and underlying measures of net methylmercury production and presence. At some tributary sites and sites directly within flooded tracts, small fish may be supplemented with benthic invertebrate sampling.

Establishment of a network of long-term biosentinel index sites will provide integrative measures of spatial and inter-annual variability, against which restoration monitoring, remediation monitoring, and mercury process studies can be calibrated. Index site monitoring will also provide a degree of regional and local performance measure monitoring.

Target biosentinel species: The primary biosentinel organism will be a small fish with the greatest convergence of key attributes, including:

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- a) wide and abundant presence throughout the CBDA region,
- b) importance or dominance as a prey item of co-occurring piscivorous sport fish and wildlife,
- c) relatively consistent and predictable diet and trophic level across the target sizes,
- d) significant accumulation of methylmercury, allowing the differentiation of temporal and spatial variability, and
- e) acceptable levels of individual variability in mercury bioaccumulation within same site-samplings.

A single sentinel species would be ideal to assess spatial and temporal variability across the entire CBDA study area. However, this area spans large gradients of habitat, water quality and, hence, species assemblages. Different characteristic species assemblages will require the use of alternate sentinel species in some of the regions. At each index site, biosentinel sampling will consist of collections of the appropriate, regionally dominant small fish, together with several additional small fish species as present. If appropriate small fish are not available at some of the locations, clams, crayfish, and/or select aquatic insects may be taken. A summary of the proposed sampling scheme is presented in Table 2.

Replication: Biosentinel sampling will emphasize the generation of consistent, tight statistical confidence intervals for each mean biotic mercury concentration, thereby facilitating the statistical differentiation of spatial and temporal variation. The biosentinel protocol will include, as available, up to 30 replicate whole individual small fish within a consistent size range for each sample, to be analyzed individually for total mercury. The methyl:total mercury ratio will be established as necessary for each species using composite samples. Detailed sampling and analysis approaches will be subjected to external scientific review prior to implementation. Because of the very large number of biosentinel samples to be generated by the overall project, three sampling approaches will be used. The primary index species will be sampled with extensive replication of individuals ($n =$ up to 30, above). A second prevalent species will be sampled in replicate composites, each consisting of multiple individuals. This technique will provide a level of statistical confidence while generating a reduced analytical load. Additional species, as available, will be characterized with single multi-individual composites. Statistical confidence of samples analyzed as single multi-individual composites will be estimated with new investigations testing replication statistics as a function of individual analyses. These statistical power analyses will be conducted in consultation with Dr. Robert Smith of the project team.

Sampling locations: Index site sampling will occur at the 15 sites selected based on input from the Steering Committee, with three of these designated as intensive sites, as described above for the sport fish monitoring program. Annual biosentinel sampling will occur in 2005, 2006 and 2007. Index site sampling will focus on the primary biosentinel fish species, another prevalent species, and additional small fish species as available. At approximately three intensive sites, non-primary but numerically significant small fish and macro-invertebrate species will be sampled and analyzed with more extensive replication, also in conjunction with the collection of all primary large fish species. Sampling at the intensive sites will additionally be conducted multiple times throughout each year (below).

Timing: Index site biosentinel sampling will generally be performed once each year. For the suite of sites located within the Estuary and the Sacramento and San Joaquin inflows, optimal sampling has been indicated to be in late summer or fall when the target organisms, representative young-of-year fish, have attained sufficient size to be important prey items and have integrated methylmercury bioaccumulation across the bulk of the warm season. The timing of biosentinel sampling will be coordinated with sport fish sampling and chemical sampling of aqueous and sediment parameters at overlap sites with MLML, as discussed

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below. Special care will be taken to minimize overall annual sampling time, to reduce the chance of temporal concentration shifts affecting the interpretation of spatial data. Once a time period has been chosen for annual index sampling, it will be kept consistent throughout the three years of the project. To help place these annual measures into a potentially varying seasonal context, the intensive sites will be sampled on approximately 4 additional dates throughout the year, primarily between spring and fall. Seasonal sampling is proposed for May, July, September, November, and February.

Methods: Sample handling and analysis will follow procedures developed in prior work (Slotton et al 2002a, 2004a). All samples will be analyzed for total mercury, and selected samples for methylmercury. The UCD analytical laboratory will participate in the QA program being established by the Bay-Delta Authority. As part of this program, splits of approximately 5% of samples may be analyzed by an independent lab. Sufficient tissue mass from each sample will be archived to allow for reanalysis.

Sport Fish Sampling at Index Sites and Intensive Sites. Sport fish sampling at index sites will be performed with the objective of evaluating long term trends in regional mercury contamination. Index sites will be sampled in only one year (2005) in late summer. It is anticipated that future monitoring of sport fish will revisit the sites established in this project with a return frequency to be established based on statistical analysis and management needs.

The primary target sport fish species at a given index site will depend on the fish assemblages present in that region. At Valley floor locations, the primary target species will include largemouth bass and white catfish. In clearer, cooler streams and rivers, primary targets will include Sacramento pikeminnow and Sacramento sucker. Different primary targets may be needed in other areas. For primary target species we will attempt to catch a minimum of 9 fish at each site, spanning a broad range of sizes, with the goal of establishing a regression between mercury and length at each location. Muscle tissue from primary target species will be analyzed individually for mercury. Secondary target species will also be collected at each index site. These secondary target species will include abundant species that are low in mercury (e.g., redear sunfish and bluegill). Secondary target species will also include other species that are of health concern due to factors such as high consumption or local concern. For secondary target species, composite samples comprised of 5 fish in a target size range will be analyzed following USEPA (2000) guidance. Other popular species that turn up in adequate numbers as bycatch will also be retained and analyzed.

At intensive sites, a focused effort will be made to collect the entire spectrum of sport fish species. This will provide information on the relative degree of contamination of different species, including high mercury species (analyzed as individuals) and medium and low mercury species (analyzed as composites). This type of sampling would be expensive and logistically infeasible to perform at all sites, but data from a few representative sites will allow observation of general relationships. We will seek to co-locate these intensive sites with sites being employed for process-oriented studies to create a comprehensive evaluation of mercury movement from water and sediment through the food web. These sites will be sampled in 2005, 2006, and 2007.

Gut contents of all largemouth bass and white catfish collected from index sites will be analyzed by CDFG staff. This detailed diet information will be of great value in modeling mercury accumulation in largemouth bass and white catfish in the Delta.

Sport fish samples will be collected and analyzed by MLML using protocols established for the CALFED Mercury Project, RMP, and SRWP. Total mercury concentrations in sport fish

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muscle will be analyzed. The MLML and UCD analytical labs will participate in the QA program being established by the Bay-Delta Authority. Sufficient tissue mass from each sample will be archived to allow for reanalysis.

Data from sport fish monitoring at index and intensive sites will be analyzed in several ways. For sites with data from previous years, inter-annual variation and trends will be evaluated using the improved ANCOVA method described in Davis et al. (2003). The Mercury Strategy recommends that mercury studies in the Estuary should move from a predictive phase into a mechanistic phase. Data on mercury concentrations in the food web and diet will be used to develop a mechanistic model of mercury uptake by largemouth bass and perhaps other key indicator species. The model will combine bioenergetics and a mercury mass balance approach (Trudel et al. 2000). This modeling will help define the pathway of mercury transfer through the food web to largemouth bass, and the seasonal dynamics of uptake. Finally, correlations between sport fish mercury and other parameters will be examined using index and intensive site data, in an effort to identify factors controlling spatial variation in food web mercury.

Subtask 2.2 Striped Bass Monitoring

Striped bass are among the most important vectors of mercury contamination in the region from a human health perspective. Recent sampling efforts, including the CALFED Mercury Project and the RMP, have not effectively sampled this species and yielded relatively small sample sizes. In this study, we will conduct targeted sampling of striped bass to obtain an adequate sample size. This study will conduct focused striped bass sampling in one year only (2006), establishing a solid benchmark for future reference. This sampling will coincide with the triennial fish sampling conducted in the Bay under the RMP, which includes striped bass. These two efforts will yield the most thorough assessment of striped bass mercury in 30 years.

The timing and location of striped bass sampling will be aligned with fishing activity for this species. Multiple locations will be sampled, as previous sampling has suggested some spatial variation, possibly due to the presence of some nonmigratory subpopulations. Striped bass will be sampled using gill nets or electroshock techniques. Sampling will be in collaboration with the DFG Bay Delta Striped Bass Group. A broad range of sizes, including sub-legal (<45 cm) fish, will be collected at each location to provide suitable data for regression analysis. Striped bass will be analyzed as individuals using the same chemical methods described above for the other sport fish species.

Task Deliverable(s): data in raw and web-based format from index and intensive sites, technical memorandum describing mercury accumulation model for largemouth bass, striped bass data formatted and made accessible according to data management procedures outlined in Task 1.4

Task 3 **Spatial Characterization of the Watershed**

The primary objective of this Task will be to obtain directly comparable data on food web mercury throughout the watershed, identifying areas with high concentrations that pose health risks and areas with low concentrations that suggest alternative fishing locations. Largemouth bass have been selected as the primary indicator species for this purpose because of their mercury accumulation, site fidelity, abundance, and broad distribution in rivers and reservoirs in the study area. Other species (e.g., Sacramento pikeminnow and trout) will be used in regions where largemouth bass are not present. This Task would provide a preliminary screening of regions that have not yet been covered by past sampling

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efforts. The Office of Environmental Health Hazard Assessment will be involved in identifying data gaps on mercury contamination in fish that should be filled in order to support developing and communicating advisories for the Sacramento River, the Delta, and area reservoirs. The emphasis will be on spatial coverage of the watershed, rather than multi-species comparisons. However, other species, depending on availability, will be retained and analyzed in order to provide guidance to the public.

The first step in designing this element will be to thoroughly review existing data on mercury in sport fish in the watershed (e.g., Rasmussen and Blethrow 1990, May et al. 2000). In a separate project funded by the Surface Water Ambient Monitoring Program (SWAMP), SFEI is performing a review of all historical Toxic Substances Monitoring Program data in the state. This project will begin in early 2005.

The second step will be to identify sampling sites. This will be done with input from the Steering Committee. Criteria to be considered in sampling site selection will include:

- input from local agencies, community groups, anglers, and others;
- amount of fishing activity;
- the presence of largemouth bass and other target species;
- location downstream or upstream of historic mining activity or contaminated sites;
- location in areas suspected to have low mercury concentrations;
- lack of coverage under past or present sampling programs; and
- location downstream of landscape features expected to affect mercury bioaccumulation.

Approximately 33 sites will be sampled each year in 2005, 2006, and 2007. The budget developed for this work assumes that ten of these sites each year will be in areas where trout are the dominant species. The overall goal is to obtain a thorough spatial characterization of the watershed, so the primary emphasis each year will be on sampling areas that have not yet been sampled. With 100 total samples it will be possible to achieve a reasonably thorough spatial coverage of the watershed.

Much of the sampling effort will be focused on largemouth bass. A minimum of 9 largemouth spanning a wide size range will be collected from each site, following the same approach employed at the index sites. An additional species (e.g., white catfish or Sacramento pikeminnow) will also be collected to facilitate spatial comparisons with sites where largemouth are not present. The primary target species will be analyzed individually for total mercury. The secondary target species will include low mercury species and other popular species that may be of health concern, and will be analyzed as composites. Sample collection and chemical analytical procedures will be as described above for sport fish at the index sites.

Within each site, the size:mercury relationship for each primary target species will be evaluated by regression to allow among-site comparisons of standard sized fish. Using GIS, data from this project will be compiled along with comparable data from other studies in the watershed to create map-based graphics of mercury distribution throughout the watershed. The data analysis component of this project will include a quantitative comparison of fish mercury concentrations from this study and other studies to landscape features of the surrounding region (e.g., wetland acreage, prevalence of mines).

In order to develop a predictive model of the effect of such factors as pH and DOC on methylmercury uptake, several ancillary measurements will be made on water samples from reservoirs that are sampled, such as pH, DOC, dissolved oxygen, temperature, salinity, sulfate, methylmercury and total mercury. In addition, we will measure methyl and total

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mercury in sediments. It may be possible to predict Hg bioaccumulation from these ancillary measurements if strong correlations exist.

Task Deliverable(s): Technical memorandum highlighting results of data review of mercury in fish; technical memo describing site selection procedures and geo-referenced final sampling site locations; data from spatial sites, formatted and made accessible according to data management procedures outlined in Task 1.4.

Task 4 CBDA Project Monitoring

This task will include two components. One will be the refinement of biosentinel methodologies, particularly in relation to wetlands restoration monitoring (“Protocol Development”). The second will consist of the monitoring of select representative manipulated CBDA sites, together with linkage monitoring at sites of major CBDA mercury process studies (“Site Monitoring”).

Subtask 4.1 Protocol Development

This task will refine methodologies and address areas of uncertainty for the biosentinel approach to monitoring restoration and remediation projects. One important sub-task will include the determination of appropriate potential biosentinel organisms for use directly within a variety of wetland tracts. At several candidate sites, a variety of sampling techniques will be tested. Once collected, candidate organisms will be assessed for potential use as biosentinels (high enough absolute mercury concentration, low enough individual variability, consistent trophic level within useful size ranges, relevance as local diet item for predaceous fish, and relatively widespread for comparability). An estimated 12 additional samplings of up to 30 individual fish and approximately 72 invertebrate composites will be associated with this subtask in each project year. A summary of the proposed sampling scheme can be found in Table 2.

In addition to the testing of potentially new biosentinel taxa (above), some of the index species characterized with composite sampling will be further investigated on an individual basis. Individual analyses will be conducted across a range of relevant small sizes. Size ranges will be determined, if present, for which Hg bioaccumulation is relatively consistent, guiding future collections. Within consistent size ranges, power analyses will be conducted to determine relative variance in composites of increasing numbers of individuals. An estimated 10 additional samplings of up to 30 individual fish will be associated with this subtask in each project year.

In a third subtask, correlations between biosentinel data and underlying measures of methylmercury production and presence will be examined. This will be done through close coordination with MLML. In separately funded work, MLML will investigate aqueous on/off tract methylmercury loading, sediment methyl and total mercury, and a variety of ancillary parameters that have been found to be relevant to net methylmercury production in wetlands, including organic percentage, sulfur chemistry, and suspended solids (e.g., Brumbaugh et al. 2001). Biosentinel bioaccumulation will be compared to these underlying parameters at approximately 6 sites across a range of conditions, supporting the modeling of potential linkages.

The methods we develop and refine in a range of wetland habitats will provide a basis for future monitoring of many or all of the restoration projects as they commence.

Subtask 4.2 CBDA Site Monitoring

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In this task, monitoring with biosentinels will be performed at a select group of CBDA restoration, remediation, and process study sites. As described above for Task 4a, methods will center on UC Davis biosentinel monitoring, supplemented at a subset of sites with aqueous loading and sediment work in collaboration with MLML, and sport fish monitoring. The biosentinel monitoring is designed to track potential changes in net methylmercury exposure at these sites and provide a linkage to the wider mercury monitoring program. While it will be beyond the scope of this program to intensively monitor every restoration, remediation, or process study site, the program will provide annual biosentinel monitoring at approximately 12 sites associated with the most important and representative projects as they commence and before. We realize that many of the more significant planned restoration and remediation projects may not begin construction for a number of years. However, it will be important to obtain pre-construction baseline data from the general project area. Annual biosentinel monitoring will provide a relatively cost effective performance measure that can be placed into the wider context of the index monitoring network. A subset of the sites will be chosen in conjunction with the additional CBDA-funded MLML project. As discussed above in relation to Protocol Development, several of the sites will include MLML monitoring of on/off tract aqueous loading, sediment methyl and total mercury, and key ancillary parameters linked to mercury methylation. CBDA site monitoring locations, like the index sites, will be chosen with the input of the Steering Committee. Candidates for restoration site monitoring include the Suisun or Napa Marsh complexes, Dutch Slough, and the North Delta Wetlands. Candidates for remediation site monitoring include Cache and Marsh Creeks. Candidates for overlap with process studies include the Cosumnes River and Franks Tract. The proposed sampling scheme is presented in Table 2.

Task Deliverable(s): protocol for monitoring restoration and remediation projects, data from monitoring of CBDA sites, formatted and made accessible according to data management procedures outlined in Task 1.4.

Task 5 Data Interpretation and Reporting

Subtasks under this SFEI task include:

1. literature review in support of sampling design and data interpretation, data compilation, statistical analysis, and interpretation;
2. modeling mercury uptake by largemouth bass;
3. analysis of association between spatial patterns in the watershed with landscape attributes; and
4. reporting of results in publications (annual reports, newsletters, fact sheets, journal articles) and presentations.

These tasks are described in other sections of this proposal and are not repeated here.

Task Deliverable(s): Annual project summary reports, a minimum of one newsletter per year, fact sheets, as appropriate, to inform local and regional stakeholders, such as tribal groups, anglers, public health officials, etc., manuscripts submitted to peer-reviewed journals), electronic copies of presentation materials.

Task 6 Stakeholder Involvement

Active participation from local stakeholders is an essential part of the program. Local involvement will ensure that monitoring and risk communication activities are responsive to local needs and concerns, coordinated with ongoing programs, and build local capacity to reduce exposure to mercury in affected populations. Stakeholder involvement activities will build on past and ongoing efforts in the Bay-Delta watershed to ensure input from and

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participation of affected populations and the local organizations that serve them. Activities will include:

Subtask 6.1 Evaluate Fishing Activities

An evaluation of fishing activities will be conducted to provide guidance to the SC and ensure that the selection of monitoring sites and species reflect actual fishing practices and local input. This evaluation will be coordinated with ongoing activities by EHIB to collect and analyze background data on fishing in the Delta watershed that supports the planning of a fish consumption survey of anglers. These ongoing activities, which are supported by CBDA and the Central Valley Regional Water Quality Control Board, are conducted with input from an interagency group - the Technical Advisory Group (TAG). Fishing evaluation activities under this project will build on the ongoing activities and will be conducted in collaboration with the TAG. Evaluation of fishing activities in the watershed will include:

- Review of existing creel data, and fish consumption, boating, and recreation survey data (e.g., CDPR 1997, CDFG 2001, Shilling 2004) to identify important fishing locations, species, and populations in the watershed;
- Implementation of a written survey about important fishing locations, species, populations, and specific local concerns regarding fish contamination problems. The survey will be conducted with key fishing contacts such as local agency staff, anglers, and others knowledgeable about local fishing activities;
- Site visits to important fishing locations and interviews of key fishing contacts to gather more in-depth information about fishing locations, species, populations, and local concerns.

The evaluation of fishing activities will be used to develop specific recommendations on monitoring sites and species for the SC. These recommendations will be developed for each year of monitoring, focusing on the selection of the index and spatial characterization sites. Information gathered under this subtask, along with input from the SC, will also be used to guide selection of the three priority counties discussed below.

Subtask 6.2 Conduct Needs Assessments

In-depth needs assessments will be conducted with local stakeholders in three counties in the watershed. These counties will be selected with SC input based on information gathered under Task 6.1, considering factors such as:

- (1) the presence of a fish advisory;
- (2) environmental justice concerns; and
- (3) areas where the need to reduce exposure to mercury is the greatest.

These needs assessments will be similar to the needs assessments already conducted by EHIB in five counties in the watershed (Sacramento, San Joaquin, Yolo, Placer, and Lake), and underway in Contra Costa and Solano Counties. Stakeholders may include local governmental agency staff, Native American tribal agency staff and members, health care providers, community-based organizations (CBOs), and environmental groups, among others to be identified.

Key informant interviews, focus groups, and surveys will be conducted to obtain the following types of information:

1. local awareness, concerns, and information needs regarding fish contamination and consumption guidance;

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2. important fishing locations, fishing populations, and species consumed;
3. appropriate risk communication methods;
4. training needs of local governmental agencies, CBOs, and other stakeholder groups;
5. opportunities for collaboration with local programs serving affected populations.

Needs assessment findings will guide subsequent risk communication activities in the watershed.

Subtask 6.3 Convene Stakeholder Advisory Groups

The formation of a Stakeholder Advisory Group is essential for ensuring participation from local stakeholders and engaging them in activities aimed at increasing public awareness about local fish contamination problems. A Delta Stakeholder Advisory Group (Delta SAG) was formed in November 2003, and includes representatives of agencies and organizations serving affected populations in Sacramento, San Joaquin, and Yolo Counties. With support from this project, the Delta SAG will continue and its membership may be expanded to include stakeholders from other counties in the watershed or additional SAGs may be formed, as appropriate. The SAGs will enable local stakeholders to remain informed and provide input to the program, particularly in the area of risk communication with affected populations. Specifically, SAG members will participate in the development, translation, dissemination, and evaluation of outreach, education, and training materials and activities described in Task 7. In addition, SAG representatives will participate on the SC.

Task Deliverable(s): Technical memorandum containing an evaluation of fishing activities, needs assessments report.

Task 7 Risk Assessment and Advisory Development

The Office of Environmental Health Hazard Assessment (OEHHA) assesses the human health risks of consuming fish contaminated with methylmercury for the state. OEHHA has worked with SFEI and others to formulate sampling plans that would support developing human health assessments for various monitoring programs (e.g., the Sacramento River Watershed Program, and the San Francisco Bay Regional Monitoring Program). OEHHA uses monitoring data from various sources and develops state fish consumption advisories that are used by OEHHA and other agencies and groups for risk communication. OEHHA has previously worked with CDHS on risk communication projects.

Subtask 7.1 San Joaquin River Risk Assessment and Sport Fish Consumption Advisory Development

Existing data compiled for this project and an independently funded review of bioaccumulation data under a contract with the State Water Resources Control Board will be used in 2005 to assess the risks of consuming sport fish contaminated with methylmercury from the San Joaquin River and develop an advisory that can be communicated for this water body. A data assessment and advisory report will be presented to the public, the Delta Local Stakeholder Advisory Group, at scientific meetings, and to other interested parties, such as community leaders and health care providers.

Subtask 7.2 Sacramento River Risk Assessment and Consumption Advisory Development

Same as Subtask 7.1, but focused on Sacramento River. This subtask will most likely be completed in 2006 but may be switched in order with subtask 7.3 pending recommendations from the SC. In 2006 OEHHA will also begin assessing new monitoring data from water

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bodies (e.g., reservoirs) sampled as part of the pilot monitoring program (Task 2, sport fish sampling).

Subtask 7.3 Delta Risk Assessment and Consumption Advisory Development

Same as Task 1, but focused on the Delta and completed in 2007 (or 2006 if switched in order with subtask 7.2). OEHHA will continue assessment of new monitoring data from water bodies sampled as part of the pilot monitoring program (Task 2, sport fish sampling). Interim advisories after assessment of new monitoring data might be developed as needed. New advisories developed by OEHHA would provide a consistent scientific basis for the risk communication efforts in Task 8, below.

Task Deliverable(s): San Joaquin River watershed risk assessment report; Sacramento River watershed risk assessment report; Delta risk assessment report; interim consumption advisories, as appropriate, for each region.

Task 8 Risk Communication

Risk communication with affected populations is the most effective way to reduce mercury exposure in the short-term and, therefore, will be a critical component of the project. Risk communication activities will build on past and ongoing efforts in the Bay-Delta watershed to inform affected populations about fish consumption advisories, the health risks of exposure to mercury in fish, and ways to reduce exposures.

Subtask 8.1 Communicate with Community Leaders

Community leaders (e.g., local elected officials, civic leaders, clergy) in the counties encompassing the priority areas of the watershed will be informed about the program via a letter and companion document describing the program and providing contact names for additional information. This communication will ensure that community leaders are aware of the program, its purpose, and activities in case they are contacted by their constituents or the media, and presents an opportunity for their input to the program.

Subtask 8.2 Enhance Existing Risk Communication Strategy

In July 2003, EHIB received a grant from CBDA to develop a risk communication strategy based on the findings of the needs assessments conducted in five counties in the watershed during 2002-2003. The strategy responds to the recommendations generated by the needs assessments. Currently, EHIB is implementing elements of the strategy, specifically community outreach and education, in Sacramento, San Joaquin, and Yolo Counties in collaboration with Delta SAG members. EHIB will modify the existing risk communication strategy, as necessary, to address the specific objectives of this project and to respond to the findings of needs assessments that will be conducted in three additional counties. The revised strategy will identify risk communication activities that may be implemented in all counties targeted by the program as well as activities that may be more appropriate for specific counties, communities, or populations.

Subtask 8.3 Develop Messages and Materials

Risk communication messages and materials will be developed in partnership with CBOs and local governmental agencies. This collaboration will be supported by 4-5 mini-grants that will be awarded via a competitive bidding process to CBOs and local agencies serving affected populations in the watershed. The provision of mini-grants will enable CBOs and local agencies to produce their own materials that are culturally and linguistically appropriate. The specific activities

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and materials will be guided by the needs assessment findings and determined by the SAG members. Methods and materials may include: ethnic and other media, materials that emphasize visual images (e.g., posters, calendars), a multilingual video, multilingual fact sheets; and postings on the EHIB and other web sites. The materials will focus on presenting a balanced message and include issues related to fish contamination and health risks associated with exposure to mercury in fish, as well as ways to reduce exposure, the health benefits of fish, and safe (low mercury) species and areas. Some risk communication activities will focus specifically on informing affected communities about the fish monitoring activities. For example, EHIB may develop a multilingual newsletter or fact sheet, which would supplement the Annual Report for the project to specifically inform affected communities about the monitoring activities. SAG member agencies/organizations among others will assist in disseminating the materials to their constituents.

Subtask 8.4 Conduct Trainings

Trainings will be conducted for SAG member agencies and organizations including county agencies, Native American tribal organizations, CBOs, and health care providers. The aim of the trainings will be to build capacity at the local level to address fish contamination-related issues, thereby fomenting a sustainable, local response to the problem. A major focus of the trainings will be on risk communication, emphasizing the development and dissemination of accurate and appropriate information to the public, especially highly exposed and sensitive populations. EHIB will use a train-the-trainer approach with county agency programs and CBOs, and will coordinate with Physicians for Social Responsibility or similar organizations to deliver a series of CME seminars to appropriate health care providers. Training modules and materials will be developed in English and other priority languages, and will emphasize interactive learning approaches. Each training will be evaluated using a pretest/posttest tool.

Subtask 8.5 Convene Forum

A forum will be convened in the first half of Year 3 involving members of the SC and SAGS, state, local, and tribal agencies, and CBOs serving affected populations in the Bay-Delta watershed, among others. The forum objectives include: (1) to share information on monitoring and risk communication activities completed or underway in the watershed; (2) to identify lessons learned; (3) to showcase effective risk communication methods and materials; and (4) to identify next steps. A forum proceedings will be produced.

Subtask 8.6 Evaluate Stakeholder Involvement and Risk Communication Activities

The usefulness and effectiveness of stakeholder involvement, and outreach, education, and training activities and materials will be evaluated on an ongoing basis to better ensure achievement of the program's objectives. An evaluation plan will be developed that includes appropriate process and impact measures to monitor the program's stakeholder involvement and risk communication activities, and make timely adjustments, as necessary, to ensure their effectiveness. Additional activities may be warranted based on evaluation findings. Peer review of this task will provide an additional mechanism for evaluation.

Task Deliverable(s): information packet for community leaders, modified risk communication strategy (if necessary), risk communication messages and materials, training module and materials, forum proceedings, evaluation plan.

Task 9 Public Participation

Public participation in this project is detailed in subtask 1.5 and tasks 6, 7 and 8.

**EXHIBIT A
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This project is research that will not significantly impact the ecosystem, so no elements of this project require CEQA/NEPA compliance.

Subtask 10.2 Other Required Permits and Approvals

California Department of Fish and Game collecting permits will be required to capture fish for sampling. These permits will be obtained by the relevant subcontractors.

Task Deliverable(s): DFG collecting permits

Task 11 Draft and Final ReportSubtask 11.1 Prepare Draft Final Report/Plan for Project

SFEI staff and subcontractors will prepare a draft final report. The draft final report shall include sections reporting on each of the technical tasks previously described here. The draft report will be submitted to the GCAP Contract Manager. This report will undergo technical peer review by CBDA mercury scientific review panel and the review panel assembled for this project.

Subtask 11.2 Revise, Complete, and Distribute Final Report

Incorporate all relevant comments into the final report. Forward the final report to the GCAP Contract Manager.

Task Deliverable(s): Draft final report and final report.

Task 12 Project Closure

Submit Project Closure Summary Report to summarize project accomplishments. The format is attached to the Recipient Agreement as Exhibit A - Attachment 3 - Project Close Out Summary Report

Submit Final Invoice for payment, with separate delineation of payout of 10 percent retention (if applicable).

Task Deliverable(s): Project Closure Summary Report, final invoicing and supporting documentation.

B. Schedule of Completion Dates:

The Contractor agrees to submit all scheduled project deliverables in accordance with the schedule set forth in this agreement. Failure to submit any scheduled project deliverable within 30 days after the specified deliverable due date may result in forfeiture and/or reduction of the grant funds awarded for this project. In the event the Contractor anticipates any delay in submitting project deliverables as scheduled, the Contractor shall inform the GCAP Contract Manager in writing prior to the scheduled due date of the subject deliverable. In the event the project cannot be completed within the period of the Recipient Agreement, the Contractor shall request in writing an amendment (in accordance with the guidelines in Exhibit A - Attachment 2) extending the term of the Recipient Agreement at least 6 months prior to its end date. A written request to extend the term of the Recipient Agreement shall

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set forth the reason for the request, and must include a revised Schedule of Completion Dates.

All requests for amendments shall be presented at the Ecosystem Restoration Program (ERP) Amendment Workshop. GCAP will prepare and execute amendments as approved by the Resources Agency/CBDA during the ERP Contract Amendment Workshop.

ERP-02D-P67 - Schedule of Deliverables

San Francisco Estuary Institute

November 15, 2004 - November 14, 2007

Rev 1- Task 8 Revised Per Contractor Request- July 2005

Rev 2- GCAP & SFEI clarified & consolidated deliverables and SFEI requested delivery date changes approved in November 2005

Task	Task Title	Deliverable	Completion Dates
1	Project Mgmt & Adm	<ol style="list-style-type: none"> 1. Steering Committee formation 2. Role statement and member roster for Steering Committee 3. Peer-reviewed goals and objectives 4. Assemble peer review panel 5. Quarterly progress reports 6. Annual project summary report 7. Fact sheets 8. Peer reviewed sampling design plans <u>(Also includes site selection procedures and criteria and maps of all spatial sites sampled to fill data gaps)</u> 9. Procedural documentation 10. QAPP report 11. Web-based interface for tissue data 12. <u>Electronic copy of presentation materials for CBDA Annual Mercury Review Mtgs</u> 	<ol style="list-style-type: none"> 1. Feb 2005 2. Mar 2005 3. Mar 2005 4. Mar 2005 5. Quarterly 6. Mar - Year 2, 3 <u>Chg to: June 2006 and June 2007</u> 7. As needed <u>Chg to: when published</u> 8. Jun - Year 1, 2, 3 <u>Chg to: October 2005, July 2006 & July 2007</u> 9. As needed 10. Jun - Year 1, 2, 3 <u>Chg to: October 2005, June 2006 & June 2007</u> 11. Oct 2007 12. <u>within 30 days of the meeting</u>
2	Temporal Trend Monitoring	<ol style="list-style-type: none"> 1. Data in raw and web-based format from index and intensive sites 2. Technical memo for Mercury uptake model for largemouth bass 3. Striped bass data 	<ol style="list-style-type: none"> 1. Mar 2006, Mar 2007, Oct 2007 <u>Chg to: May 2006, May 2007, & Oct 2007</u> 2. Oct 2007 3. Dec 2006 <u>Chg to: May 2007</u>
3	Spatial Characterization of	<ol style="list-style-type: none"> 1. Technical memo highlighting results of data review of mercury in fish. 	<ol style="list-style-type: none"> 1. Dec 2005, Dec 2006, Oct 2007

	the Watershed	<p><u>(Note: This is a one time deliverable of review of historical data.</u></p> <p>2. Technical Memo with data from spatial sites</p> <p><u>Chg to : Data from spatial sites formatted</u></p> <p>3. Technical memo with data review and site selection</p> <p><u>(Note: Data review is Task 3 item #1 and site selection information is included in sampling plan under Task 1.)</u></p>	<p><u>Chg to: May 2006</u></p> <p>2. Dec 2005, Dec 2006, Oct 2007</p> <p><u>Chg to: May 2006, May 2007 and Oct 2007</u></p> <p>3. Dec 2005, Dec 2006, Oct 2007</p> <p>N/A-See note</p>
4	CBDA Project Monitoring	<ol style="list-style-type: none"> 1. Site monitoring protocol 2. Data from CBDA site monitoring 	<ol style="list-style-type: none"> 1. Oct 2007 2. Mar 2006, Mar 2007, Oct 2007 <p><u>Chg to: May 2006, May 2007 & October 2007</u></p>
5	Data Interpretation and Reporting	<ol style="list-style-type: none"> 1. Presentations (annual reports, newsletters, fact sheets, journal articles) 2. Journal manuscripts 	<ol style="list-style-type: none"> 1. At annual review and SAG meetings, other symposia 2. Oct 2007
6	Stakeholder Involvement	<ol style="list-style-type: none"> 1. Fishing activities reports 2. Needs assessments report 3. <u>SAG meeting minutes</u> 	<ol style="list-style-type: none"> 1. Mar 2006, Mar 2007 2. June 2006 3. <u>Within 30 days of the meeting</u> <p><u>Chg to May 2006 & May 2007</u></p>
7	Risk Assessment and Advisory Development	<ol style="list-style-type: none"> 1. Data assessment and advisory reports: <ol style="list-style-type: none"> a. San Joaquin b. Sacramento or the Delta c. The remaining region 	<ol style="list-style-type: none"> a. Mar 2006 b. Mar 2007 c. Oct 2007
8	Risk Communication	<ol style="list-style-type: none"> 1. Information packet 2. Modified risk communication strategy 3. Risk communication messages and materials 	<ol style="list-style-type: none"> 1. Feb 2006, Feb 2007 <u>Chg to November 2005 and as needed (at least once more) with Quarterly Progress Report in the quarter published</u> 2. As needed <u>Chg to November 2005 and May 2006</u> 3. As needed

		<p>4. Training module and materials</p> <p>5. Convene forum- (Note: Dates based on CBDA determination sent to SFEI in email from GCAP on Nov 9, 2005)</p> <p>6. Forum proceedings</p> <p>7. Evaluation plan</p>	<p>4. June 2005 <u>Chg to July 31, 2005</u></p> <p>5. Mar 2007 <u>Chg to Dec 2005 and</u> <u>TBD first half of 2007</u></p> <p>6. May 2007 <u>Chg to: 30 days after</u> <u>each forum</u></p> <p>7. Dec 2005</p>
9	Public Participation	Detailed above in Task 1, 6, 7, & 8 (No deliverable under Task 9)	N/A
10	Permitting	1. Document DFG permits <u>(Note: permit renewal in 2006 will be</u> <u>good thru Nov 2008).</u>	1. June 2005, June 2006, June 2007 <u>Chg to June 2005 and</u> <u>November 2006</u>
11	Draft and Final Report	1. Draft final report 2. Final report	1. July 2007 2. Oct 2007
12	Project Closure Requirements	1. Project Closure Summary Report 2. Final invoice and supporting documentation	1. Oct 2007 2. Oct 2007

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C. Reports:

1. The first quarterly report shall be submitted to GCAP's Contract Manager no later than 10 days following the end of the first quarter and quarterly thereafter, for the term of this agreement. The Contractor shall provide a written report to the GCAP's Contract Manager providing the following information on each quarterly report:
 - List of activities and tasks performed and/or completed;
 - List and record of milestones accomplished and/or completed;
 - List of problems encountered while performing the task(s) and proposed solutions;
 - List of proposed activities and tasks for the following quarter.

The Contractor shall submit quarterly reports within no more than 10 days after the end of each quarter. Each quarterly report shall include the information noted above.

2. The Contractor shall submit to GCAP's Contract Manager for approval any and all reports, plans, or other deliverables containing the results of the work performed in accordance with Section B - Schedule of this exhibit.
3. The project will not be considered complete until the CBDA Contract Manager approves and accepts the Project Closure Requirements as complete and final.