

# **Regional Monitoring Program for Water Quality in San Francisco Bay**

## **2015 Detailed Workplan**

### **Overview**

In 2015 the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) is entering its 23<sup>rd</sup> year of collecting data and communicating information to support water quality management decisions. The 2015 RMP Budget was approved by the Steering Committee on November 13, 2014 (Table 1). This Detailed Workplan provides details of activities that will be completed with the budgeted funds. Most importantly, the workplan establishes the deliverables that will be produced for each line item of the budget. RMP staff will report on progress toward completing these deliverables throughout the year using a standardized “stoplight” report.

### **HIGHLIGHTS OF THE 2015 PROGRAM**

#### **Status and Trends Monitoring**

A continuing goal is to make optimal use of the funds that participants provide to the Program. High priority topics continue to emerge (e.g., nutrients and selenium), and information needs continue to grow. Status and trends monitoring of open Bay waters is a cornerstone of the Program, but after 20 years of repeated sampling the information yield has gradually diminished.

In 2014, the Steering Committee and Technical Review Committee continued a process of seeking efficiencies in status and trends monitoring. The committees reduced the frequency of sediment sampling from a two-year cycle to a four-year cycle. Water will continue to be sampled on a two-year cycle, but many of the more expensive parameters will be measured a greatly reduced frequency. As one example, PCBs in water will now be analyzed once every 10 years - commensurate with the value of additional water PCB data in promoting understanding and supporting decision-making. Other matrices that are more crucial for PCBs, such as sport fish, bird eggs, and sediment, will continue to be monitored at a higher frequency. This belt-tightening has freed up resources that can be applied to higher priority information needs, such as sampling of sediment on the shallow margins of the Bay, which have historically not been included in status and trends monitoring.

The revised schedule for status and trends monitoring is as follows:

- continuous monitoring of suspended sediment,
- monthly monitoring of basic water quality parameters (salinity, temperature and dissolved oxygen; suspended sediments; and phytoplankton biomass),
- biennial water and bivalve monitoring,
- triennial bird egg monitoring, and

- sediment monitoring on a four-year cycle, and
- sport fish monitoring on a five-year cycle.

In 2015, the schedule calls for sampling of water and bird eggs. Water analytes will include copper, cyanide, selenium, methylmercury, ancillary parameters, and aquatic toxicity. Eggs of double-crested cormorants and Forster's Terns will be collected. Cormorant eggs will be analyzed for PCBs, PBDEs, Hg, PFCs, and Se. Tern eggs will be analyzed for Hg, PBDEs, and Se.

Discussions are in progress regarding using the funds freed up by the reductions in water and open-Bay sediment monitoring to sample sediment on the Bay margins. Due to the type of sampling vessel used in open Bay monitoring, sediment sampling to date has not included areas on the margin of the Bay where the water is less than 1 ft deep at mean lower low water. In parts of the Bay, especially Lower South Bay, this encompasses an extensive area of important habitat.

### **Special Studies**

Special study funds in 2015 will primarily go to work on nutrients and small tributary loading. Smaller amounts will go to studies on emerging contaminants, PCBs, and selenium.

#### Nutrients

RMP funds will provide support for the Nutrient Science Strategy, augmenting major funding from BACWA, USGS, and other sources. RMP funds will primarily be used for moored sensor work. RMP moored sensor monitoring began in 2013 to better assess the Bay's condition, and to collect high frequency data to calibrate water quality models. The sensors gather data on chlorophyll, dissolved oxygen, turbidity, temperature, and other parameters were deployed at three stations in Lower South Bay and South Bay. RMP funds are also supporting development of models that will allow forecasting the response of the Bay to changes in nutrient loads and other factors that drive potential impairment related to nutrients.

#### Small Tributaries

RMP work on small tributary load monitoring is being conducted in close coordination with monitoring being performed by members of the Bay Area Stormwater Management Agencies Association. Work elements to be performed with funds from 2015 will include:

- a characterization study to support identification of additional watersheds for management consideration through analysis of contaminant concentrations on suspended sediment particles, with a design that includes sampling of fine sediments using settling chambers,
- ongoing regional-scale stormwater load estimation using the regional watershed spreadsheet model, and
- development of a trend monitoring strategy.

## Chemicals of Emerging Concern

Monitoring of chemicals of emerging concern continues to be a priority for the Program. Activities in 2015 will include:

- a study of perfluorochemicals (PFCs or Teflon chemicals) and the pesticide fipronil in treated wastewater discharged to the Bay, and
- analysis of microplastic pollution in Bay water and sediment.

## PCBs

A synthesis and conceptual model update published in 2014 shifted focus from the open Bay to the contaminated areas on the margins where impairment is greatest, where load reductions are being pursued, and where reductions in impairment, in response to load reductions, will be most apparent. The Synthesis was the foundation for a 2014 update of the PCB Strategy that calls for a multi-year effort to identify margin areas that are high priorities for management and monitoring, develop site-specific conceptual models and sediment mass balances for margin areas downstream of watersheds where management actions will occur, and perform monitoring in these areas as a performance measure. Work in 2015 will include selection of priority margin areas for evaluation and development of conceptual models and mass balances for one or two of these areas.

## Selenium

In April 2014 the RMP formed a Selenium Strategy Team to evaluate low-cost, near-term information needs that can be addressed by the Program in the next several years. The Team recommended exploring an opportunity to obtain a larger number of sturgeon muscle samples, non-lethally and inexpensively, through collection of small plugs of sturgeon muscle in a collaboration with a California Department of Fish and Wildlife annual tagging program. A pilot effort using this technique was conducted in 2014, and the approach will be applied again in 2015. Another small study of selenium in sturgeon will be performed in collaboration with a fishing derby in the Delta. Tissues will be obtained from fish caught for the derby that will allow a comparison of muscle plugs, which are easy to obtain, with concentrations in eggs or ovaries, which is the exposure of interest toxicologically.

## Communications

*A Pulse of the Bay* will be produced in 2015, to be released at the Annual Meeting which will once again be held jointly with the State of the Estuary Conference in September. This edition of the *Pulse* will be a companion to the *State of the Estuary Report*, which will also be released in September. The 2015 *Pulse* will provide profiles of the contaminants of concern in the Bay, similar to the profiles provided for CECs in the 2013 *Pulse*.

## TASK DESCRIPTIONS

### 1. Program Management

The administration and management of the RMP requires a substantial effort from SFEI staff. Program management tasks include:

- program planning
- contract and financial management
- technical oversight
- internal coordination
- external coordination
- safety training
- administration

Approximately half of the cost for this category is fiduciary oversight, project-specific safety training, and office administrative costs. Deliverables associated with this line item include documents describing the budget, the Multi-Year Plan, the Detailed Workplan, and the Program Plan. The funds for technical oversight allow for internal review by senior staff of the many reports, presentations, posters, workplans, memos, and other communications coming out of the RMP. The funds for external coordination cover participation in meetings with external partners to coordinate programs and leverage RMP funds (e.g., coordinating work on the Pulse Report with the State of the Estuary Report, coordination with SCCWRP, and serving as liaison to the Delta RMP and other RMPs).

The total cost for these tasks in 2015 will be \$432k. SFEI labor will be \$402k. The labor tasks and deliverables are summarized below.

Subtask	Description	Deliverables	Budget
A. Program Planning	Preparing annual workplans and budgets (Program Plan, Detailed Workplan, Multi-Year Plan). Preparing presentation of RMP activities for the coming year for Planning Workshop and outreach meetings. Updating the MOU between SFEI-ASC and the Water Board biennially	2016 Budget Memo (October), 2016 Multi-Year Plan (draft in October, final in January '15), 2016 Program Plan (October). 2016 Detailed Workplan (Draft to TRC in December, final to SC in January '15)	\$50,000
B. Contract and Financial Management	Tracking expenditures versus budget, accounting, working with auditors, providing financial updates to RMP SC, developing contracts, overseeing contracts, invoicing stakeholders.	Updates on 2015 Budget (quarterly at SC meetings)	\$170,000 (labor) \$187,100 (total)

C. Technical Oversight	Review of work products by Lead Scientist, Program Manager, and Senior Scientists to ensure the quality of RMP deliverables. These funds will also be used to provide advice to junior staff on technical problems. When possible, technical reviews will be completed using funds in the labor budget for the project. However, some projects are underbudgeted for internal review; some projects would benefit from a broader set of internal reviewers than originally planned; and review is often needed on small deliverables such as slides.	Improved quality work products	\$50,000
D. Internal Coordination	Workflow planning, tracking deliverables, and holding staff meetings.	RMP Deliverables Tracking System and Stoplight Reports (quarterly at SC meetings)	\$90,000
E. External Coordination	Participation in meetings with external partners to coordinate programs (e.g., coordinating work on the Pulse Report with the State of the Estuary Report, linking RMP monitoring with SWAMP, meeting with SCCWRP, serving as liaison to the Delta RMP and other RMPs)	20 external meetings for SOTER planning, SWAMP, Delta RMP, SCCWRP coordination, etc.	\$30,000
F. Safety Training	Field and lab safety training associated with RMP monitoring activities	Field and Lab Training (June)	\$5,000
G. Administration	Office management assistance (e.g., ordering supplies, arranging travel) and supplies	NA	\$7,000 (labor) \$19,700 (total)

## 2. Governance

Governance tasks include convening, coordinating, and facilitating Steering Committee, Technical Review Committee, and Workgroup meetings. Tasks include preparing agendas, agenda packages, participating in meetings, writing meeting summaries, action item follow-up, reviewing minutes from past meetings, coordination with committee chairs, and honoraria and travel for external advisors.

The total budget for governance is \$280k. SFEI labor will be \$225k. The labor tasks and deliverables are summarized below. In addition to the line items shown on the table, \$50k has been budgeted for honoraria and travel for external science advisors.

Subtask	Description	Deliverables	Budget
A. SC meetings	Preparing agendas, agenda packages, participating in meetings, writing meeting summaries, action item follow-up, reviewing minutes from past meetings. Pre-meeting with Chair and Co-Chair.	4 SC meetings	\$65,000 (labor) \$66,500 (total)
B. TRC meetings	Preparing agendas, agenda packages, participating in meetings, writing meeting summaries, action item follow-up, reviewing minutes from past meetings.	4 TRC meetings	\$80,000 (labor) \$81,500 (total)
C. WG meetings	Preparing agendas, agenda packages, participating in meetings, writing meeting summaries, action item follow-up, reviewing past meeting minutes.	4 Workgroup meetings - ECWG (April), SPLWG (May), EEWG (TBD), Sport Fish WG (fall)	\$80,000 (labor) \$81,500 (total)

### 3. Data Management

Data management tasks include processing of new data, maintaining the RMP database, providing online data access, and providing quality assurance review. Results from the large number of samples collected in 2014 will be processed and quality assured in 2015.

In addition to processing new data, the program needs to maintain the approximately 1.1 million records generated since the Program began in 1993. Database maintenance includes incorporating updates and corrections to data as needed, including re-analyzed results and updates implemented by CEDEN/SWAMP. RMP staff also maintain and enhance web-based data access and visualization tools such as CD3.

Quality assurance is a critical foundation for the scientific investigations of the RMP. The major quality assurance tasks for 2014 are keeping the Quality Assurance Project Plan up to date, preparing QA summaries for datasets, and conducting interlaboratory comparison tests.

The total cost for these tasks in 2015 will be \$355k. SFEI labor will be \$345k. The labor tasks and deliverables are summarized below.

Subtask	Description	Deliverables	Budget
A. Data Processing, Quality Assurance, and Upload to CEDEN	Formatting, performing QA/QC review, and uploading RMP field and analytical results from laboratories to SFEI's RDC database and replicating these results to CEDEN. Maintaining the database of archived RMP samples and coordinating with archive facilities. Coordinating team, collection agencies, and laboratories. Tracking data deliverables and pending issues.	Processing, QA summary preparation, and upload of 2014 sediment data, 2014 bivalve data, and 2014 sport fish data (September).  Preparations for 2015 water data and 2015 bird egg data (December).	\$160,000
B. Database Maintenance and Online Data Access	Incorporating updates and corrections to data as needed, including re-analyzed results and updates implemented by CEDEN/SWAMP. Adding enhancements and updates to web-based data access tools such as CD3.	Present CD3 Phase 2 enhancements and updates to TRC/SC (December). Present archive database redesign and online web tool to TRC/SC (December). Upload historic datasets to RDC database (e.g., 2012 RMP EEPS bird and EEPS small fish data) (September). Present summary of data updates and database maintenance to TRC/SC (December).	\$140,000
C. Quality Assurance System	Updating the Quality Assurance Project Plan, writing QA summaries for datasets, conducting interlaboratory comparison tests, and researching analytical methods. Maintaining laboratory SOP file system.	Revisions to QAPP (December). Report on laboratory methods comparison study for Selenium in water (December). Present summary of maintenance activities for the lab SOP directory to TRC/SC (December).	\$15,000 (labor) \$25,000 (total)
D. Updates to SOPs and Templates	Developing and enhancing software tools and processes such as EDD templates, and developing and maintaining internal SOPs to increase efficiency of data management tasks.	Replace existing RMP data templates and online data checker with the new CEDEN templates and data checker (June). Replace existing RMP QA review queries with ones that use new CEDEN templates (June).	\$30,000

#### 4. Annual Reporting

A *Pulse of the Bay* will be produced in 2015, to be released at the Annual Meeting which will once again be held jointly with the State of the Estuary Conference in September. This edition of the *Pulse* will be a companion to the *State of the Estuary Report*, which will also be released in September. The 2015 *Pulse* will provide profiles of the contaminants of concern in the Bay.

Tasks related to production of the *Pulse* include preparation of technical content (text, analyses, graphics), graphic design, and web presence. Subcontractors assist with editing and preparing content.

Tasks related to the Annual Meeting include developing the meeting agenda, managing logistics, advertising about the meeting, managing attendee registration, preparing presentations, and staffing the meeting.

In 2015 the report formerly titled “Annual Monitoring Results” will be scaled back and renamed the “Annual Monitoring Report.” The report will now only provide summary information on data collection.

The total cost for these tasks in 2015 will be \$254k. SFEI labor will be \$175k. The labor tasks and deliverables are summarized below.

Subtask	Description	Deliverables	Budget
A. Pulse or Pulse Lite Report	SFEI staff time for technical content (text, analyses, graphics), design, and web presence. Direct costs for printing and mailing report. Subcontractors for editorial content.	2015 Pulse Report (September)	\$110,000 (labor) \$165,000 (total)
B. Annual Meeting	Developing the meeting agenda, managing logistics, advertising about the meeting, managing attendee registration, preparing presentations, staffing the meeting. Direct costs for Save the Date mailings, venue, and catering. Travel funds for outside speakers.	2015 Annual Meeting as part of the State of the Estuaries Conference (September)	\$50,000 (labor) \$73,900 (total)
C. Annual Monitoring Report	Preparing summary information for a streamlined report to document the activities taken during the field season. The report will be part of the QA System, along with the QAPP, cruise reports, QA memos for datasets.	2015 Annual Monitoring Report (December)	\$10,000



D. Updates to Copper SSO and Dredged Material Thresholds	Updating the rolling average of dissolved copper concentrations in water in each segment of the Bay and making comparison to SSO. Updating ambient sediment concentrations for the Dredged Material Management Office for determining when bioaccumulation testing will be required for dredged material. Due to the alternating schedule of water and sediment sampling, these calculations will be done in alternate years.	Updated webpage for Copper SSO (December)	\$5,000
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## 5. Communications

Communications tasks will implement the plans included in the RMP Communications Strategy, approved by the Steering Committee in July 2014. Tasks will include the distribution of RMP information to stakeholders, natural resource managers, and the public through multiple media channels (e.g., website, publications, email newsletters, fact sheets, social media, etc.).

Stakeholder engagement is critically important to addressing the information needs of RMP participants. Tasks include preparing for and attending RMP stakeholder meetings (e.g., BACWA, BASMAA, BPC, LTMS, WSPA) as well as communicating directly with stakeholder representatives.

Other communications tasks include responding to inquiries for RMP data and reports, including press calls, producing summary information on important topics in convenient formats, and planning and reviewing content for *Estuary News*. Participation in workshops and conferences for SWAMP, SETAC, ACS, and other professional organizations allows sharing of RMP information, gathering of information from other investigators on the latest advances in monitoring and understanding, and identification of opportunities for collaboration with other organizations. Presentations at local meetings and to local audiences are also important for collaboration and information dissemination to scientific partners. Keeping the website up to date is another important component of communication.

The total cost for these tasks in 2015 will be \$166k. SFEI labor will be \$145k. The labor tasks and deliverables are summarized below.

Subtask	Description	Deliverables	Budget
A. Communications Plan Implementation	Coordinate the distribution of RMP information to RMP stakeholders, natural resource managers, and the public through multiple media channels (e.g., website, publications, email newsletters, fact sheets, social media, etc.). Develop a calendar of RMP communications products, identify appropriate media channels, and implement calendarized events.	List of events and communications products for RMP in 2015 (February)	\$22,000
B. Stakeholder Engagement	Preparing for and attending RMP stakeholder meetings (e.g., BACWA, BASMAA, LTMS, WSPA) as well as communicating directly with stakeholder representatives.	RMP presentations at BACWA, BASMAA, LTMS, BPC, and WSPA Board Meetings.	\$42,000
C. Responses to Information Requests	Responding to inquiries for RMP data and reports, including press calls.	TBD	\$10,000
D. Fact Sheets and Outreach Products	Producing summary information on important topics in a convenient format (includes miscellaneous design products). Production costs for hard-copy fact sheets and other outreach materials.	Microplastics fact sheet and manuscript for journal publication (Draft in September, Final by March '16). Review by ECWG.	\$10,000 (labor) \$10,500 (total)
E. Support for "Estuary News"	Coordinating and reviewing content for the newsletter. Cash support to SFEP for Estuary News. Subcontracts for editorial content and graphic design.	4 issues of Estuary News with RMP content (quarterly)	\$6,500 (labor) \$18,500 (total)
F. Presentations at Conferences and Meetings	Participation in workshops and conferences for SWAMP, NorCal SETAC, ACS, and other professional organizations; as well as presentations at local meetings. Direct costs for travel and conference registration.	Presentation of RMP data at 3 conferences (December). 10 presentations at local meetings (quarterly).	\$40,000 (labor) \$48,000 (total)
G. RMP Website Maintenance	Updating the RMP website with new reports. Funds for online data access tools (e.g., CD3) are in the Data Management budget. Funds for website redesign are a separate line item.	Review of RMP website to determine out-of-date material (February). Updates to website (quarterly).	\$15,000

## 6. Status and Trends Monitoring

A continuing goal is to make optimal use of the funds that participants provide to the Program. High priority topics continue to emerge (e.g., nutrients and selenium), and information needs continue to grow. Status and trends monitoring of open Bay waters is a cornerstone of the Program but, due to competing demands for funds, must be done efficiently.

In 2014, the Steering Committee and Technical Review Committee continued a process of seeking efficiencies in status and trends monitoring. The committees reduced the frequency of sediment sampling from a two-year cycle to a four-year cycle. Water will continue to be sampled on a two-year cycle, but many of the more expensive parameters will be measured a greatly reduced frequency. As one example, PCBs in water will now be analyzed once every 10 years - commensurate with the value of additional water PCB data in promoting understanding and supporting decision-making. Other matrices that are more crucial for PCBs, such as sport fish, bird eggs, and sediment, will continue to be monitored at a higher frequency. This belt-tightening has freed up resources that can be applied to higher priority information needs, such as sampling of sediment on the shallow margins of the Bay, which have historically not been included in status and trends monitoring.

The revised schedule for status and trends monitoring is as follows:

- continuous monitoring of suspended sediment,
- monthly monitoring of basic water quality parameters (salinity, temperature and dissolved oxygen; suspended sediments; and phytoplankton biomass),
- biennial water and bivalve monitoring,
- triennial bird egg monitoring, and
- sediment monitoring on a four-year cycle, and
- sport fish monitoring on a five-year cycle.

In 2015, the schedule calls for sampling of water and bird eggs. Water analytes will include copper, cyanide, selenium, methylmercury, ancillary parameters, and aquatic toxicity. Eggs of double-crested cormorants and Forster's Terns will be collected. Cormorant eggs will be analyzed for PCBs, PBDEs, Hg, PFCs, and Se. Tern eggs will be analyzed for Hg, PBDEs, and Se.

Discussions are in progress regarding using the funds freed up by the reductions in water and open-Bay sediment monitoring to sample sediment on the Bay margins. Due to the type of sampling vessel used in open Bay monitoring, sediment sampling to date has not included areas on the margin of the Bay where the water is less than 1 ft deep at mean lower low water. In parts of the Bay, especially Lower South Bay, this encompasses an extensive area of important habitat.

Brief summaries of each of the Status and Trends elements for 2015 are provided below.

### **Continuous Monitoring of Suspended Sediment (\$250k)**

Tides and wind waves are constantly moving water and altering the water quality of San

Francisco Bay. The USGS California Water Science Center provides the RMP water quality measurements at the tidal time scale through continuous monitoring of suspended-sediment concentration and dissolved oxygen at multiple locations in the Bay. At each station, turbidity and dissolved oxygen sensors are deployed in the water column and automatically collect measurements every 15 minutes. Approximately every 3 weeks technicians visit the stations to clean the sensors, check their calibrations, and download data. Data are processed and edited to remove values that are corrupted by biofouling. Data are available at <http://waterdata.usgs.gov/ca/nwis/sw/>. Data are analyzed and the resulting reports are available at <http://ca.water.usgs.gov/projects/baydelta/publications.html>.

This monitoring has been conducted since the Program began in 1993, and revealed that suspended sediment concentrations in the Bay declined sharply beginning in 1999. This work is led by Dr. David Schoellhamer of the USGS in Sacramento.

USGS maintains five suspended sediment stations in the Estuary (i.e., Mallard Island, Benicia, Richmond Bridge, Alcatraz, and Dumbarton Bridge) and funding for a temporary site. The USGS used the temporary site funding for 2013 for better understanding the sediment flux at the Golden Gate. In 2014, the temporary site funding was used to install a suspended sediment station at the Exploratorium (Pier 15). Discussions are underway to determine how to maintain the existing monitoring scheme in light of increasing costs and the available budget, which has been fixed at \$250k since 1993.

### **Hydrography and Phytoplankton (\$173k)**

This work is led by Dr. Jim Cloern of the USGS in Menlo Park. The study performs monthly water sampling to map the spatial distributions and temporal trends of basic water quality parameters along the entire Bay-Delta system. Measurements include salinity, temperature, dissolved oxygen, suspended sediments, and phytoplankton biomass. This basic information is required to follow the seasonal changes in water quality and estuarine habitat as they influence biological communities and the distribution and reactivity of trace contaminants. This monitoring has played a crucial role in documenting changes in the Bay that have raised concern for the possible impacts of nutrients and provided an impetus for the Nutrient Science Strategy.

USGS also provides funding for this monitoring. This funding decreased in 2014, and the contribution from the RMP increased from the \$110k that had been in place for many years to \$173k.

### **Water Chemistry (\$45k)**

Monitoring for trace elements and water quality parameters will occur at 22 sites in 2015. Water analytes will include copper, cyanide, selenium, methylmercury, ancillary parameters, and aquatic toxicity. As in prior years, SFEI staff will assist in the collection of water samples. Subcontractors conducting the water chemistry analyses will likely include EBMUD for ancillary, ALS Laboratory Group for nutrients, Brooks Rand for inorganics, CCCSD for cyanide,

and City of San Jose for splits of copper and nickel, pending review of previous data and pricing. We may also work with a specialty lab to be determined for lower selenium detection limits. Applied Marine Sciences has will continue to serve as our logistics coordinator.

### **Bird Eggs (\$150k)**

Avian egg monitoring is a tool that was piloted in the Exposure and Effects Pilot Study and retained as an element of RMP Status and Trends monitoring (Davis et al., 2006). Avian egg monitoring in other aquatic ecosystems has proven to be a highly effective tool for assessment of long-term trends in persistent, bioaccumulative contaminants. Egg monitoring is now conducted in the RMP once every three years. The RMP will contract with USGS to collect the eggs. The contract laboratories are expected to the same as in past years (AXYS, USGS, MLML, and California DFW).

Double-crested Cormorants (*Phalacrocorax auritus*) are now routinely monitored by the RMP as a sentinel species for the open waters of the Bay. Cormorant eggs are sampled Bay-wide every three years and analyzed for mercury, selenium, PBDEs, PCBs, legacy pesticides, and, starting in 2009, perfluorinated compounds (PFCs). Sampling locations include Wheeler Island in Suisun Bay, the Richmond Bridge, and Don Edwards Wildlife Refuge in the Lower South Bay.

Forster's Tern eggs were selected as another avian indicator because this species feeds primarily on small fish in shallow water habitats on the Bay margins, including managed ponds. The spatial and habitat coverage of this species (Bay margins and managed ponds) therefore complements that of Double-crested Cormorants (open waters and large sloughs). Studies by the U.S. Geological Survey (USGS) have resulted in the establishment of Forster's Tern eggs as a primary biosentinel tool for monitoring of mercury risk to Bay wildlife. Tern eggs are also sampled every three years and analyzed for mercury, PBDEs, and selenium. Forster's Tern nesting locations vary from year to year. Past sampling locations have included Knight Island and Napa Marsh near the Napa River (San Pablo Bay segment); salt ponds near Hayward (South Bay segment); and salt ponds in Lower South Bay.

### **Field Work and Logistics (\$175k)**

This task includes work by SFEI to assist with sampling and coordination (\$45k); a subcontractor (Applied Marine Sciences) to plan cruise logistics, collect samples, ship samples to laboratories, and manage the sample archive (\$95k); funds for renting the research vessel (the USGS R/V Turning Tide) (\$25k); and funds for other miscellaneous items.

### **Margin Sediment Sampling: Planning (\$20k) and Sampling (\$120k)**

As mentioned above, discussions are in progress regarding using the funds freed up by the reductions in water and open-Bay sediment monitoring to sample sediment on the Bay margins. In parts of the Bay, especially Lower South Bay, this encompasses an extensive area of important habitat. The 2014 workplan included \$20k for development of a draft probabilistic

sampling design. An additional \$20k is needed to support continued discussion and sampling design development. The reductions in the water and open-Bay sediment elements of RMP status and trends monitoring have made \$120k available for margin sediment sampling. Once a monitoring design is approved by the TRC and SC, then these funds will be used to pay for field sample collection and laboratory costs.

**Analysis of S&T Impacts, Changes, and Data (\$15k)**

The RMP has been invited to submit a paper for a special issue of the new journal *Regional Studies in Marine Science*. The special issue will focus on successful regional monitoring programs around the US. These funds will support an article documenting the evolution of and lessons learned from RMP monitoring, including data analysis. The funds will also support production of a document that clearly documents changes to the S&T design over time.

The total costs for these tasks in 2015 will be \$966k. SFEI labor will be \$145k. The labor tasks and deliverables are summarized below. Note: tasks without a SFEI labor component (i.e., 100% subcontractor) are not shown on this table.

Subtask	Description	Deliverables	Budget
A. Field Work and Logistics	Coordinating field sampling, preparing cruise plans, making maps of sampling locations, field sampling, and ensuring delivery of samples to laboratories. Subcontractors to assist with field data collection and research vessels. Direct costs for sampling equipment, supplies, and insurance.	Collection of water samples (August). Collection of bird egg samples (May).	\$45,000 (labor) \$175,000 (total)
H. Planning for Bay Margins Sediment Study	Preparing a final sampling design, which will involve working with statistics, analyzing available data, issuing RFPs for subcontractors, and holding meetings with stakeholders.	Monitoring Design for Bay Margins Sediment Sampling (March)	\$20,000
J. Analysis of S&T Impacts, Changes, and Data	Compiling information on how the S&T program has affected management decisions. Documenting changes to the S&T design. Analyzing RMP data to plan future monitoring or address management questions. Preparation of a manuscript for a special edition of the Journal of Regional Studies in Marine Science.	Manuscript summarizing S&T fipronil data (Draft in April, Final by December). Review by ECWG.  Manuscript on RMP design and influence (Draft in February, Final by December). Review by TRC and SC.  White paper on RMP website that summarizes S&T design changes (March).	\$15,000

## 7. Special Studies

The following studies were reviewed by the TRC and SC and approved for incorporation into the 2014 Program Plan. The total costs for special studies in 2015 will be \$1,172k. SFEI labor will be \$993k. The labor tasks and deliverables are summarized below.

### Nutrients (\$470k)

#### Overview

San Francisco Bay has long been recognized as a nutrient-enriched estuary, but one that has historically proven resilient to the harmful effects of nutrient enrichment, such as excessive phytoplankton blooms and hypoxia. Available information suggests that the accumulation of phytoplankton biomass in the Bay is strongly limited by tidal mixing, grazing pressure by invasive clams, light limitation from high turbidity, and potentially, altered nutrient forms and ratios in the North Bay. However, evidence is building that, since the late 1990s, the historic resilience of the Bay to the harmful effects of nutrient enrichment is weakening. In response to these apparent changes in the Bay's resilience to nutrient loading, a Nutrient Science Strategy has been developed.

Bay-wide Nutrient Permit funds (\$880k/yr for FY2015) are being directed toward nutrient science studies in the Bay. The intent is for these funds to be combined with funds from the RMP (\$470k in CY2015) and other entities, with the Nutrient Management Strategy (NMS) Steering Committee making decisions about how to allocate funds, based on recommendations in a Science Plan (under development). Plans for the use of the RMP portion of the funds are presented here, based on the projects approved by the NMS Steering Committee for FY2015. Since nutrient Permit funding follows a fiscal year and the RMP follows the calendar year, and all of the FY2015 funding decisions have not yet been made, the exact project(s) to which the remaining portion of the RMP CY2015 funds will be allocated remains to be determined.

### Moored Sensor Monitoring (\$190k)

While monitoring has occurred regularly in the Bay over the past 40 years, most of the data have been collected at weekly or monthly time intervals. Phytoplankton, nutrients, dissolved oxygen, and other parameters such as suspended sediment (which dictates the light available for phytoplankton growth) vary strongly over much shorter time scales (e.g., on an hourly basis) due to the daily cycle of photosynthesis and respiration in phytoplankton, mixing, biogeochemical processes, and tides. To better assess the Bay's condition on these time scales, and to collect high-frequency data to calibrate water quality models, the RMP is funding a moored sensor monitoring network. Beginning in summer 2013, sensors for chlorophyll, dissolved oxygen, turbidity, temperature, and other parameters were deployed at two stations in Lower South Bay (Alviso Slough, Dumbarton Bridge). A third site (San Mateo Bridge) was added in 2014. In 2015, funds will be directed toward on-going maintenance and data interpretation at the 3

existing sites and the additioning of one more permanent site in Lower South Bay, likely in Coyote Creek. Work in 2015 will also include deployment of a SUNA-NO<sub>3</sub> sensor at Dumbarton Bridge (purchased in 2013), potentially adding another SUNA-NO<sub>3</sub> sensor at the Coyote Creek site, and field experiments, calibration, and data interpretation related to the SUNA-NO<sub>3</sub> sensor. Telemetry will be added to new and existing sites. Experiments will also be conducted to improve our ability to accurately infer chlorophyll-a concentration from fluorescence measurements. In a related project (funded by Nutrient Permit funds) we will also be performing a number of shorter-term deployments at a network of margin sites, with a specific focus on characterizing dissolved oxygen in the system; results from those deployments will be highly complementary with the open Bay station data, and the overall focus in Lower South Bay will lead to efficiencies in terms of field work costs .

Year 2 of moored sensor data collection will conclude in June 2015. Carryover funds from the 2014 RMP budget and the 2015 RMP funds will be used to complete the year 2 progress report, which will summarize lessons learned in the second year of instrument deployment (June 2014-May 2015) and make recommendations for year 3 of the program. The 2014 and 2015 RMP funds need to be combined for this deliverable because the moored sensor program runs on a fiscal year schedule, which spans the two calendar years of RMP funding.

#### Modeling (\$165k)

RMP funds are also supporting development of models that will allow forecasting the response of the Bay to changes in nutrient loads and other factors that drive potential impairment related to nutrients. Among its recommendations, the Nutrient Strategy calls for developing models to quantitatively characterize the Bay's response to nutrient loads; explore ecosystem response under future environmental conditions; and test the effectiveness of load reduction scenarios and other scenarios that mitigate or prevent impairment. A draft modeling workplan for 2015-2021 is currently in review.

The draft workplan calls for a phased approach, quality assurance protocols, and an open-source modeling platform to promote efficiency, produce quality results, and maximize the value of the modeling investment. In Phase 1 of model development, models will be simplified-domain (several boxes, with "real" hydrodynamics through grid aggregation of an existing hydrodynamic model), and focused on South Bay/Lower South Bay and Suisun Bay. The simplified domain models will allow effort to be directed toward parameter sensitivity analysis, subembayment scale calibration, exploration of underlying causes of observed changes in ecosystem response, and identification of key data needs to prioritize among other research and monitoring activities in subsequent years. Phase 1 will begin in 2015 and conclude in 2017.

For Phase 2, beginning in 2017, work will gradually move toward higher degrees of spatial resolution, building toward a whole bay model and will provide preliminary answers to key management questions about the role of nutrients in the Bay. Phase 3 modeling, planned to begin in 2021, will involve more complicated and/or multi-year scenarios to answer management questions with a higher degree of certainty.



The total cost for modeling work during 2015 is \$490k (see attached proposal), but because of carryover funds from previous RMP years, only \$165k was requested from RMP in 2015.

To Be Determined (\$115k)

In July 2014, the Nutrient Steering Committee approved moving forward with a subset of FY2015 projects totaling to \$945,000, tabling decisions on allocating the remaining \$390,000 until a later date. RMP representatives have requested that RMP funds be distributed across as few projects as possible to facilitate the tracking of those funds and deliverables. For that reason, although all of the RMP’s funds could have been distributed across the approved projects, \$115,000 of the RMP funds have been reserved as “to be determined” (as well as \$285k in BACWA funding). It is expected that in Q1 2015, the Nutrient Steering Committee will revisit the original set of proposals and allocate the remaining funding. Potential projects include: additional monitoring efforts (new locations/parameters); monitoring program development (using monitoring data and modeling output); and, mechanistic special studies to further define the role of nutrients in determining phytoplankton abundance/composition.

Subtask	Description	Deliverables	Budget
Nutrient Moored Sensor Program Development	Special study approved by SC on 7/15/14. See description above.	Nutrient Moored Sensor Program Year 2 Final Report (Draft in August , Final in September). Review by the NTW*.	\$190,000
Nutrient Modeling Program Development	Special study approved by SC on 7/15/14. See description above.	Data Quality Objectives Project Plan for Phase I modeling (Draft in March, Final in June). Review by the MAT*. Progress report on Phase I modeling (June '16).	\$140,000 (labor) \$165,000 (total)
Nutrient Research TBD	Exact project not yet determined. Allocation decision expected in Q1 or Q2 of 2015.	Nutrient Research Report, (Draft in TBD, Final in TBD. Date depends on project funded). Review by NTW.	\$115,000

\*MAT = Modeling Advisory Team, NTW = Nutrient Technical Workgroup.

**Small Tributary Loadings**

The San Francisco Bay Hg and PCB TMDLs call for a reduction in loads by 50 and 90% respectively. In response, the Municipal Regional Permit for Stormwater (MRP) calls for a range of actions including gaining a better understanding of which Bay tributaries contribute most loading to sensitive areas of biological interest on the Bay margin, better quantification of loads of sediments and trace contaminants on a watershed basis and regionally, a better understanding of how and where trends might best be measured, and an improved understanding of which management measures may be most effective in reducing impairment. These same needs are

reflected in the small tributary loading strategy (STLS) priority questions. Much has been learned over the past 15 years and during the first MRP term from 2009 to 2014 but the focus of RMP funding was largely devoted to better understanding loadings. However, during the next permit term (MRP 2.0), the Water Board and BASMAA are asking for an increased focus on identifying watersheds and areas within watersheds that are producing disproportional loads in relation to impairment in Bay margin areas while maintaining some effort on the loadings question, and developing and implementing a plan to determine trends (demonstrating that management efforts are effective at reducing impairment). Consistent with this new focus, the following tasks and deliverables will be completed:

#### Wet Weather Characterization (\$374k)

Most of the budget for small tributary load monitoring in 2015 will support a characterization study in the winter of 2014-15 to identify additional watersheds with high-concentration sources areas for potential actions to reduce loads of PCBs and mercury. The basic design of this effort will be to collect one composite in the downstream reaches of up to 20 selected tributaries. Concentrations of PCBs, mercury, and other metals will be analyzed in water samples at all locations. In addition, a pilot study will be conducted at a subset of 12 locations to collect fine sediments using special settling chambers. If this approach works, it will provide a highly cost-effective means of characterizing watersheds and subwatersheds for particulate bound pollutant concentrations during future monitoring years.

#### Regional Watershed Spreadsheet Model (\$35k)

To accurately assess total contaminant loads entering San Francisco Bay, it is necessary to estimate loads from local watersheds. "Spreadsheet models" of stormwater quality provide a useful and relatively cheap tool for estimating regional scale watershed loads. Spreadsheet models have advantages over mechanistic models because the data for many of the input parameters required by those models do not currently exist, and also require large calibration datasets which take money and time to collect. Development of a spreadsheet model for the Bay has been underway since 2010 and to-date models and software development has been completed for water and copper, and draft models have been completed for suspended sediments, PCBs, and Hg. During 2014, work was planned to improve these models based on improved GIS layers being developed by BASMAA, an improved iterative calibration technique, and an improved method of modeling that includes generation of ranges in loads estimates as a component of the modeling process. The 2014 work remains on hold pending GIS layer delivery. Tasks for 2015 depend upon the outcomes of the work for 2014. Possible uses of the 2015 funds include improving the basis of the model by shifting the model to a water-based starting point or completing further structural improvements to the sediment-based model, or incorporation of additional calibration watersheds and BASMAA studies. Decisions will be made in consultation with the STLS and after discussions at the SPLWG meeting slated for May, 2015.

#### Trends Strategy (\$35k)

The Sources, Pathways, and Loadings Workgroup recommended an effort to define where and how trends may be most effectively measured in relation to management effort so that data collection methods deployed over the next several years support this future need. A trends strategy white paper will be developed in 2015 addressing where trends should be measured, appropriate media and metrics, numerical methods for assessing trends, and sampling design. The workplan for the trends strategy will be developed in consultation with the STLS during the first quarter 2015 and presented to the SPLWG for review in May.

Small Tributary Loading Strategy Coordination (\$26k)

The RMP Small Tributaries Loading Strategy Team provides the forum for planning and coordinating projects for the improvement of information on small tributary loads to the Bay. This task will include quarterly STLS meetings to coordinate monitoring, and provide updates and solicit input on spreadsheet model and trends strategy development. Monthly phone conferences calls will be convened to provide brief updates and information sharing.

Subtask	Description	Deliverables	Budget
STLS Wet Weather Characterization	Special study approved by SC on 7/15/14. See description above.	Collection of stormwater samples (October '14-April '15) at up to 20 sites. Report on Pollutants of Concern monitoring in WY 2015 (Draft in March '16, Final in June '16). Review by SPLWG and STLS*.	\$267,000 (labor) \$374,000 (total)
STLS Regional Watershed Model	Special study approved by SC on 7/15/14. See description above.	New version of the RWSM for PCB and Hg prepared for May 2015 SPLWG meeting. Proposed work plan for CY 2015 budget also prepared for SPLWG meeting. Report on model sensitivity analysis and documentation (Draft in December, Final in March '16). Review by SPLWG and STLS.	\$35,000
STLS Trends Strategy	Special study approved by SC on 7/15/14. See description above.	Work plan prepared and discussed at May SPLWG meeting. Stormwater Trends Strategy White Paper (Draft in August, Final in October). Review by SPLWG and STLS.	\$35,000
STLS Strategy Coordination	Special study approved by SC on 7/15/14. See description above.	5-8 STLS meetings (March-December)	\$26,000

\*SPLWG = Sources, Pathways and Loadings Workgroup. STLS = Small Tributary Loading Strategy Team.

## Chemicals of Emerging Concern (CECs)

More than 100,000 chemicals have been registered or approved for commercial use in the U.S. For many of these chemicals, major information gaps limit the ability of scientists to assess their potential risks, and environmental monitoring of these chemicals is not required. Some of these chemicals have been classified as contaminants of emerging concern (CECs), often due to their high volume use, potential for toxicity in non-target species, and the increasing number of studies that report their occurrence in the environment. CECs can be broadly defined as synthetic or naturally occurring chemicals that are not regulated or commonly monitored in the environment but have the potential to enter the environment and cause adverse ecological or human health impacts.

The RMP has been investigating CECs since 2001 and developed a formal workgroup to address the issue in 2006. In 2013, the RMP finalized a three-element strategy to guide future work on CECs. The first element of the strategy is a continuation of targeted monitoring of CECs in San Francisco Bay via Special Studies, an RMP effort that has generated one of the world's most comprehensive datasets for CECs in an estuarine ecosystem. The relative risk of detected CECs is evaluated using a tiered risk and management action framework.

The second element of the RMP CEC strategy involves review of the scientific literature and other CEC aquatic monitoring programs as a means of identifying new CECs for which no Bay occurrence data yet exist. The third element of the strategy consists of non-targeted monitoring, including a) broadscan analyses of Bay biota samples, and b) development of bioassays to identify estrogenic effects, are designed to identify previously unknown CECs present in the Bay. The RMP's CEC program provides data critical to efforts of regulators working to manage the ever-growing variety of chemicals in commerce to ensure that they do not adversely impact human and environmental health.

### CECs in Municipal Wastewater (\$55k)

The State Water Resources Control Board's Chemicals of Emerging Concern (CECs) Science Advisory Panel has recommended that programs include sampling wastewater treatment plant (WWTP) effluent and stormwater when screening for emerging contaminants. The follow-up state pilot study guidance, now under development, similarly emphasizes examination of these contamination pathways as an important means of providing managers with the data they need to make sound decisions regarding CECs. A study in 2015 will expand our knowledge of the role of WWTP effluent in contaminating the Bay environment by monitoring high priority and newly-identified CECs in this matrix. This study will expand on previously-approved plans to sample WWTP effluent monitoring for alternative flame retardants and estrogenic contaminants. The 2015 funds will be used to screen for perfluorinated compounds (including PFOS) and fipronil in effluent from eight WWTPs. Both PFOS and fipronil are Tier 3 (moderate concern) CECs according to the RMP prioritization scheme.

Microplastics in the Bay and Municipal Wastewater (\$9k)

Microplastic is a term used to describe fragments of plastic that are less than 5 mm. Microplastics can be pellets that are used as precursors for industrial products, microbeads used in consumer products (e.g. exfoliants), or fragments/fibers of plastics that are the breakdown products of larger plastic materials. Microplastics can enter the aquatic environment through wind, stormwater runoff, or illegal dumping of plastic materials. Additionally, both microbeads from cosmetic products and plastic fibers (e.g., polyester and acrylic) from clothing can be washed down the drain and enter wastewater treatment plants. Microplastics may not be captured by wastewater treatment plants because they are buoyant and do not flocculate; therefore, they can be released in wastewater.

Microplastics are found in surface waters, the water column, and sediment. They can also be found in the gut and circulatory system of aquatic organisms that ingest the particles. Ingestion of microplastics can block the digestive tract, reduce growth rates, block enzyme production, lower steroid hormone levels, affect reproduction, and cause the adsorption of contaminants.

Samples of ambient Bay water and sediment from 10 sites will be analyzed for microplastics in two size classes: >0.355-mm (the size fraction that is characteristic of personal care product microbeads) and 0.125-0.355-mm (the size fraction that is characteristic of clothing fibers). Effluent from eight WWTPs will also be analyzed.

CEC Strategy Support (\$20k)

Information on CECs is rapidly evolving. The RMP CEC Strategy (<http://www.sfei.org/sites/default/files/SFEI%20CEC%20strategy%20FINAL.pdf>) calls for routine review of work done by others to identify new chemicals, new methods, and new collaborators. RMP staff actively read the latest literature, attend scientific conferences, and confer with leading CEC scientists to obtain feedback on existing RMP studies, to identify new CECs, and to forge new partnerships. This information feeds into annual study plans and refinement of the CEC Strategy, including annual updates of the levels of concern associated with different emerging contaminants using the tiered Risk and Management Action Framework for San Francisco Bay.

Subtask	Description	Deliverables	Budget
EC Microplastics Monitoring	Special study approved by SC on 7/15/14. See description above.	Presentation of microplastics data to ECWG (April)	\$6,200 (labor) \$9,000 (total)

EC Wastewater Monitoring	Special study approved by SC on 7/15/14. See description above.	Report on EC monitoring in wastewater in a format that can be submitted to a journal (Draft in December, Final in March '16). Review by ECWG.	\$25,378 (labor) \$55,000 (total)
EC Strategy Support	Special study approved by SC on 7/15/14. See description above.	Brief Water Board on findings; update the CEC Strategy document with the latest tiered placement of chemicals, information needs and proposed studies, and a 5-year plan for research (Summer).	\$20,000

\*ECWG = Emerging Contaminants Workgroup

### PCBs

A synthesis and conceptual model update published in 2014 shifted focus from the open Bay to the contaminated areas on the margins where impairment is greatest, where load reductions are being pursued, and where reductions in impairment, in response to load reductions, will be most apparent. The Synthesis was the foundation for a 2014 update of the PCB Strategy that calls for a multi-year effort to identify margin areas that are high priorities for management and monitoring, develop site-specific conceptual models and sediment mass balances for margin areas downstream of watersheds where management actions will occur, and perform monitoring in these areas as a performance measure.

Tasks in 2015 will include 1) selection of priority margin areas for evaluation and 2) development of conceptual models and mass balances for one or two of these areas.

Task 1 will be performed by the PCB Strategy Team with staff support from SFEI. An initial survey and prioritization of all the margin units will be conducted. Properties of the margin units to be evaluated will be determined through Team discussion. Data gathering and analysis will be needed to support the prioritization effort, including evaluation of data on contamination in the watersheds and in the Bay, mapping information to link watersheds with margin units, and mapping to delineate boundaries of margin units. All margin units will be considered in this prioritization phase, not just those for which data are already available.

For task 2, the one or two highest priority margin units (PMUs) will be evaluated in detail in 2015. The following approach will be applied to each PMU. A relatively large Conceptual Site Model Workgroup (CSMW) will be assembled that includes members of the PCB Strategy Team, along with experts on potential biotic indicators, sediment movement from watersheds to margins to the open Bay, and local conditions. This CSMW will meet two to three times to develop and document conceptual understanding and a monitoring plan for the PMU.

Subtask	Description	Deliverables	Budget
PCB: PMU Conceptual Model	Special study approved by SC on 7/15/14. See description above.	3 PCB Strategy Team meetings (September). Brief report on margin unit prioritization: draft in March, final in April. Review by PCB Strategy Team. Priority Margin Unit Conceptual Model Report: Draft in December, Final in February 2016. Review by PCB Strategy Team.	\$85,000

## Selenium

In April 2014 the RMP formed a Selenium Strategy Team to evaluate low-cost, near-term information needs that can be addressed by the Program in the next several years.

### Sturgeon Tissue Plug Monitoring (\$23k)

The Team recommended exploring an opportunity to obtain a larger number of sturgeon muscle samples, non-lethally and inexpensively, through collection of small plugs of sturgeon muscle in a collaboration with a California Department of Fish and Wildlife annual tagging program. A pilot effort using this technique was conducted in 2014, and the approach will be applied again in 2015. This task will be performed in collaboration with CDFW and USGS. SFEI staff would plan the study, train CDFW staff and perform sampling, manage the data, and write a brief technical report. USGS (Robin Stewart and her team) will perform analysis of selenium and stable isotopes of C, N, and S in the plugs. The stable isotopes provide information on diet and habitat use by the sturgeon. The sampling will occur during the course of the CDFW survey in August through October. Thirty white sturgeon plugs will be collected and analyzed. Another 30 will be collected and archived in case additional samples are needed.

### Sturgeon Derby Study (\$20k)

Another small study of selenium in sturgeon will be performed in collaboration with an annual sturgeon fishing derby in the Delta. Tissues will be obtained from fish caught for the derby that will allow a comparison of muscle plugs, which are easy to obtain, with concentrations in eggs or ovaries, which is the exposure of interest toxicologically. This study will be performed in collaboration with USFWS and USGS. SFEI staff will plan the study, perform sampling, manage the data, and write a brief technical report. USGS (Robin Stewart and her team) will analyze of selenium and stable isotopes of C, N, and S in the plugs, and of selenium on the eggs or ovaries. The stable isotopes provide information on diet and habitat use by the sturgeon. The sampling would occur on Super Bowl weekend in 2015.

Fifteen white sturgeon muscle plugs will be collected and analyzed. Fifteen splits of their egg or ovary samples will also be obtained from USFWS for analysis by USGS.

Selenium Information Synthesis (\$10k)

The Selenium Strategy Team recommended the allocation of \$10k per year to support compilation of data and information, review of literature, and continuing Strategy development.

Selenium Strategy Team (\$10k)

The Selenium Strategy Team provides the forum for planning and coordinating projects for the improvement of information on selenium in the Bay. This task will include one or two meetings in 2015 to coordinate monitoring, provide updates and solicit input on current projects, and plan projects for 2016 and beyond.

Subtask	Description	Deliverables	Budget
Selenium Sturgeon Tissue Plug Monitoring	Special study approved by SC on 7/15/14. See description above.	Draft and final reports on Selenium in Fish Tissue in Sturgeon Plugs Collected in 2015 (February 2016, March 2016). Review by Selenium Strategy Team.	\$13,900 (labor) \$23,000 (total)
Selenium Delta Fish Derby Monitoring	Special study approved by SC on 7/15/14. See description above.	Draft and final Reports on Selenium in Fish Tissue from the 2015 Sturgeon Derby (December 2015, February 2016). Review by Selenium Strategy Team.	\$14,100 (labor) \$20,000 (total)
Selenium Information Synthesis	Special study approved by SC on 7/15/14. See description above.	Update to Selenium Strategy (December)	\$10,000
Selenium Strategy Team Meeting	Strategy Team meeting to provide oversight to the three selenium-related special studies planned for 2015.	Selenium Strategy Team meeting (March).	\$10,000