Special Study Proposal:
Emerging Contaminants Strategy

Summary: Increasing engagement on emerging contaminants issues by the San Francisco Bay Regional Water Board, RMP stakeholders, and the general public is reflected in headline news as well as policy actions at local, state, and federal levels. Work to advance the RMP's Emerging Contaminants Strategy has increased significantly in the last year, driven by increased demand for independent information on key contaminants. Critical new deliverables, such as assisting the Water Board as the agency prepares emerging contaminants action plans for the Bay, have been added to the primary deliverables of this strategy: Tracking new information regarding contaminant occurrence and toxicity and updating the RMP's tiered risk and management action framework for emerging contaminants in San Francisco Bay (see Sutton et al. 2013). Coordination of pro bono analyses is another rapidly expanding component of the strategy fund. For this reason, this proposal requests an additional $13,000 for strategic emerging contaminants tasks.

New developments like the recently disseminated pilot CEC study guidance (Dodder et al. 2015), along with the completion of critical RMP studies on non-targeted analysis, and frequent questions concerning process, indicate the need to formally revise the RMP CEC strategy document (Sutton et al. 2013). This proposal requests an additional $15,000 to create a fully updated strategy document as a key deliverable for the 2016 Emerging Contaminants Strategy Special Study.

Estimated Cost: $48,000
Oversight Group: ECWG
Proposed by: Rebecca Sutton (SFEI)

PROPOSED DELIVERABLES AND TIMELINE

Deliverable	***Due Date***
Task 1. Information gathering from a variety of sources throughout the year, including presentations at scientific conferences	2016
Task 2. Assist Water Board and other stakeholders with science summaries relating to policy including emerging contaminants action plans and comment letters regarding proposed actions of other agencies	12/31/2016
Task 3. Present an update of emerging contaminants strategy, ongoing or completed special and pro bono studies, and new studies to the Steering Committee	12/31/2016
Task 4. Review tiered monitoring and management risk framework, present findings to the Water Board	9/30/2016
Task 5. Complete update of RMP CEC strategy document, including discussion of pilot CEC study guidance, conclusions of non-targeted studies (broad scan, bioanalytical tools), revised tiered framework tables, outline of process	3/31/2017

Background

The science and management of contaminants of emerging concern (CECs) is an area of dynamic recent development. Competing Senate bills introduced this year to reform the federal Toxic Substances Control Act are a clear sign of the growing concern surrounding the widespread introduction of thousands of chemicals into commerce without significant testing to establish safety for humans or wildlife. The general public has become increasingly engaged on issues of chemical safety and potential ecological harm, informed by headlines in major newspapers across the country. The RMP's recent study documenting declines in flame retardant contamination in San Francisco Bay (Sutton et al. 2015) made the front page of the San Francisco Chronicle, and and was broadcast widely via local print, radio, and television news, as well as in major publications like Scientific American.

The RMP, a global leader on contaminants of emerging concern (CECs), stays ahead of the curve by identifying problem pollutants *before* they can harm wildlife. The RMP has completed a strategy document outlining a comprehensive, forward-looking approach to addressing CECs in San Francisco Bay (Sutton et al. 2013). The RMP's CECs strategy consists of three major elements. First, for contaminants known to occur in the Bay, the RMP evaluates relative risk using a tiered risk and management action framework. This risk-based framework guides future monitoring proposals for each of these contaminants. The second element of the strategy involves review of scientific literature and other aquatic monitoring programs to identify new contaminants for which no Bay data yet exist. Finally, the third element of the strategy consists of non-targeted monitoring, including broadscan analyses and development of bioanalytical tools.

For the RMP's CECs strategy to remain relevant and timely, it needs regularly updates with new information on analytical methods and study findings from the RMP and others. Funds are needed to review new results, track research conducted elsewhere, and keep stakeholders apprised of findings. At the same time, it is important for the RMP to provide relevant, objective science to inform the growing number of policy actions concerning emerging contaminants, an increasing demand on staff time. In the last six months, RMP emerging contaminants experts have responded to a Water Board information request concerning the state of science surrounding perfluorochemicals as it relates to developing emerging contaminant action plans, and provided necessary scientific support for Water Board comment letters regarding two USEPA proposed significant new use rules concerning nonylphenol ethoxylates and perfluorochemicals.

By the end of 2015, a number of new developments will necessitate a thorough revision of the RMP CEC strategy document to assure it evolves with the latest science. These new developments include: 1) a SCCWRP pilot CEC study guidance document concerning CEC monitoring in aquatic environments; 2) completion of an RMP special study consisting of non-targeted broad scan analysis of Bay tissue samples to identify CECs not yet monitored; and 3) completion of an RMP study to develop bioanalytical tools to identify estrogenicity due to contaminants. The potential impact of these larger scale developments on the RMP's CEC strategy requires full revision of the strategy document, as opposed to the revision of specific tables considered emerging contaminants strategy deliverables for 2015.

In addition, as the RMP CEC strategy has expanded and evolved in recent years, a number of process-related questions have come up surrounding the annual procedure for updating the tiered risk and management action framework, as well as the process for making recommendations regarding analyses appropriate for inclusion in RMP Status and Trends monitoring. An updated CEC strategy document will also include clear descriptions of all processes relating to the RMP CEC strategy.

Study Objectives and Applicable RMP Management Questions

Through this Special Study, the RMP has traditionally funded updates to the tiered risk and management framework (element one of the RMP CEC strategy), review of the state of the science concerning CECs and interaction with other monitoring groups (element two), and interpretation of the findings of non-targeted analysis (element three) to determine new monitoring priorities.

Additional demands now placed on the RMP's emerging contaminants team include: a) scientific assistance to the Water Board as agency staff prepare action plans for priority CECs; b) increased engagement with stakeholders (e.g., briefings for the Water Board and the RMP Steering Committee); c) scientific advisory support for the Water Board and other stakeholders concerning relevant policy proposals and actions at the local, state, and federal levels (e.g., USEPA proposed significant new use rules); and d) increasing coordination of pro bono analyses that leverage RMP funds. To assure that the RMP is able to provide cost-effective expertise to address these demands, this proposal requests a higher level of funding for 2016 to assure that the policies that are developed are based on sound science.

As described above, key developments with the potential to impact the core RMP CEC strategy make revision of the strategy document in 2016 a high priority. Periodic revision was anticipated as necessary to maintain the relevance of this document in the face of an evolving science and policy landscape.

Table 1: Study objectives and questions relevant to RMP management questions

Management Question	Study Objective	Example Information Application
1) Are chemical concentrations in the Estuary at levels of potential concern and are associated impacts likely?	Compare existing occurrence data with new toxicity information reported in the scientific literature. Evaluate future monitoring needs and toxicity data gaps.	Does the latest science suggest a reprioritization of chemicals as we learn more about them? Which newly identified contaminants merit further monitoring?
2) What are the concentrations and masses of contaminants in the Estuary and its segments? 2.1 Are there particular regions of concern?	Does new knowledge including recently published toxicity data and/or source/pathway information suggest different relative risks for any of the five subembayments?	What are the key regional influences on different subembayments that impact concentrations, masses, and potential risk of emerging contaminants?
3) What are the sources, pathways, loadings, and processes leading to contaminant-related impacts in the Estuary? 3.1. Which sources, pathways, etc. contribute most to impacts?	Does new research in other regions provide insight as to key sources, pathways, loadings, and processes that affect impacts of emerging contaminants?	Are relative levels of contaminants in different matrices or subembayments consistent with our expectations for various contaminant processes?
4) Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased? 4.1. What are the effects of management actions on concentrations and mass?	Does trend data from other regions suggest likely trends in the Bay? Which new management actions are likely to impact contaminant levels?	Are additional or different actions needed to reduce levels below aquatic toxicity thresholds?
5) What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?	Do data on production, use, and source trends in the scientific and trade literature provide a means of prioritizing relative risk of Bay contaminants?	Do production, use, and source trends suggest likely changes in the relative risk of specific emerging contaminants?

Emerging contaminants strategy work most directly addresses questions 1, 3, and 5, by assuring that all manner of relevant new information is brought to bear in evaluating the relative risk of emerging contaminants to Bay wildlife. For example, a new study identifying a lower toxicity threshold for a particular contaminant might suggest that the relative risk tier in which that contaminant had been placed should be revised.

In addition, the study will address the emerging contaminants priority question: What emerging contaminants have the potential to adversely impact beneficial uses of the Bay?

By providing funding for the emerging contaminants strategy, the RMP can be assured it is getting "the most bang for its buck," targeting the highest priority contaminants among the many thousands in commerce and potentially discharged to the Bay. The RMP is a global leader in CEC monitoring, yet it must be efficient and pragmatic in the face of finite

resources. An increase in funding for this task will allow for strategic thinking using the latest science, so that the RMP can continue to generate the information water managers need to effectively address emerging contaminants in the Bay.

Approach

Base funding ($20,000) for this effort has supported the review of key information sources throughout the year. These sources include:

- Abstracts of newly published articles in key peer-reviewed journals (e.g., Environmental Science and Technology, Environmental Toxicology and Chemistry, Environment International)
- Documents produced by other programs (e.g., USEPA, Environment Canada, European Chemicals Agency, Great Lakes CEC Program)
- Abstracts and proceedings from relevant conferences (e.g., Society of Environmental Toxicology and Chemistry, International Symposium on Brominated Flame Retardants)

Additional funding ($13,000) would support staff to provide additional services, such as:

- Additional presentations, briefings, and stakeholder interactions
- Scientific assistance to the Water Board as the agency prepares emerging contaminant action plans
- Scientific assistance to stakeholders engaged in emerging contaminants policy
- Coordination of pro bono analyses including study of pharmaceuticals in WWTP effluent

Finally, a major emerging contaminants deliverable proposed for 2016 is full revision of the RMP CEC Strategy document (Sutton et al. 2013). The estimated cost for this task is $15,000. A number of critical developments have occurred since its original publication in 2013, as detailed previously, and the RMP's overall strategy should evolve to encompass new science and policy. Updates to the tiered risk-management action framework for San Francisco Bay would be included within this larger deliverable, as well as an outline of the general process for future updates and other related activities, such as CEC-related recommendations for expanded Status and Trends analyses.

Budget

The following budget represents estimated costs for 2016 Emerging Contaminants Strategy, including additional deliverables not included in the proposals from previous years.

Table 2. 2016 Emerging Contaminants Strategy budget

Deliverables	**Funds**
Tasks 1-4: Information gathering from a variety of sources throughout the year, including presentations at scientific conferences; Assist Water Board and other stakeholders with science summaries relating to policy including emerging contaminants action plans and comment letters regarding proposed actions of other agencies; Present an update of emerging contaminants strategy, ongoing or completed special and pro bono studies, and new studies to the Steering Committee; Review tiered monitoring and management risk framework, brief the Water Board	$33,000
Task 5: Update RMP CEC Strategy document	$15,000
Total	$48,000

Budget Justification

Essential Emerging Contaminants Strategy Deliverables

In past years, a strategy fund of $20,000 has covered a number of essential tasks to assure that the RMP's monitoring of CECs remains relevant and timely, as described previously. New demands placed on CEC staff indicate a need for a discrete increase in these funds to $33,000. For example, developing a single memo for the Water Board describing the state of science and policy for a particular contaminant for which an action plan is being developed may require 20 hours of senior staff time @ $150/hr, resulting in an expenditure of $3,000.

RMP CEC Strategy document update

To produce a revised CEC strategy document, we estimate 80 hours of senior staff time @ $150/hr ($12,000), 20 hours of junior staff time @ $70/hr ($1,400), and 15 hours of design staff time @ $115/hr ($1,725).

Reporting

Emerging contaminants strategy work would be captured in the updated RMP CEC Strategy document proposed as a major deliverable. A number of RMP CEC Strategy presentations (Emerging Contaminants Workgroup, Steering Committee, and Annual Meeting) and briefings (Water Board, others as needed) provide further opportunities to report on this work.

References

Dodder NG, Mehinto AC, Maruya KM. 2015. Monitoring of Constituents of Emerging Concern (CECs) in Aquatic Ecosystems – Pilot Study Guidance and QA/QC Guidance. SCCWRP Technical Report 854. Southern California Coastal Water Research Project, Costa Mesa, CA. http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/854_CaliforniaCEC_PilotStudy_040315.pdf

Sutton R, Sedlak M, Davis J. 2013. Contaminants of Emerging Concern in San Francisco Bay: A Strategy for Future Investigations. SFEI Contribution 700. San Francisco Estuary Institute, Richmond, CA. http://www.sfei.org/documents/contaminants-emerging-concern-san-francisco-bay-strategy-future-investigations

Sutton R, Sedlak MD, Yee D, Davis JA, Crane D, Grace R, Arsem N. 2015. Declines in polybrominated diphenyl ether contamination of San Francisco Bay following production phase-outs and bans. Environmental Science and Technology. 49:777-784.