Special Study Proposal:
Emerging Contaminants Strategy

Summary: Increasing interest in 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. The amount of effort needed to manage the RMP Emerging Contaminants Strategy has increased significantly in recent years. Core deliverables include tracking new information regarding contaminant occurrence and toxicity and updating the RMP's Tiered Risk and Management Action Framework; responding to requests for information and assisting the Water Board with emerging contaminants action plans; and coordination of *pro bono* analyses by partners. The Emerging Contaminants Workgroup (ECWG) recommended $10,000 additional funding above the baseline request of $65,000 to support further development of a toxicology strategy and development and improvement of conceptual models for CECs. To accomplish all of these tasks, $75,000 is requested.

Estimated Cost: $75,000
Oversight Group: ECWG
Proposed by: Rebecca Sutton (SFEI)
Time Sensitive: Yes; essential annual strategy funding

PROPOSED DELIVERABLES AND TIMELINE

Deliverable	Due Date
Task 1. Information gathering from a variety of sources throughout the year, including presentations at scientific conferences, to inform Task 4	Year-round
Task 2. Assist Water Board and other RMP stakeholders with science summaries relating to policy including emerging contaminants action plans and comment letters regarding proposed actions of other agencies	Year-round
Task 3. Coordinate *pro bono* studies conducted in collaboration with RMP Status and Trends monitoring activities	Year-round
Task 4. Update the RMP CEC Strategy document with toxicology strategy, conceptual models, revised tiered framework tables (integrating new data and external information) and multi-year plan, discussion of new RMP data and information gathered (Task 1); present at spring ECWG meeting	Spring 2021
Task 5. Present an update of RMP CEC Strategy, ongoing or completed special and *pro bono* studies, and new studies to the Steering Committee	Summer 2021

Background

The science and management of contaminants of emerging concern (CECs) is an area of dynamic recent development. The RMP, a global leader on CECs, stays ahead of the curve by identifying problem pollutants *before* they can harm aquatic life.

In 2017, the RMP completed the first major revision of its CEC Strategy document, which outlines a comprehensive, forward-looking approach to addressing CECs in San Francisco Bay (Sutton et al. 2017). 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 bioanalytical tool development and use. In 2018, a strategy for monitoring CECs in pathways was introduced via a CEC Strategy Update (Lin et al. 2018).

For the RMP CEC Strategy to remain relevant and timely, it needs to be updated annually 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. Coordination of *pro bono* analyses is another rapidly expanding component of the strategy fund.

Funds are also required to synthesize available ecotoxicity data, an essential component of classifying CECs within the Tiered Risk and Management Action Framework. This includes developing expertise in gleaning insights provided by new tools in the field of predictive toxicology. Likewise, it is important for RMP scientists to provide relevant, objective science to inform the growing number of policy actions concerning emerging contaminants, an increasing demand on staff time.

Beginning in 2017, the RMP directed significantly increased resources for monitoring and special studies relating to emerging contaminants, the result of an optional reduced monitoring schedule for municipal wastewater discharges to the Bay in exchange for increased payments to the RMP. By necessity, the level of funding directed towards the emerging contaminants strategy also increased to a baseline level of $65,000.

For 2020, the ECWG recommended increased resources to accommodate further development and refinement of: 1) a toxicology strategy designed to inform prioritization of monitoring and science relating to data-poor (Possible Concern) contaminants; and 2) conceptual models relating to CECs under current scrutiny. Additional funding of $10,000 was suggested, for a total request of $75,000.

Study Objectives and Applicable RMP Management Questions

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

Management Question	Study Objective	Example Information Application
1) Which CECs have the potential to adversely impact beneficial uses in San Francisco Bay?	Compare existing occurrence data with new toxicity information reported in the scientific literature. Evaluate future monitoring needs and toxicity data gaps. Develop and apply a toxicology strategy to inform risk evaluation of data-poor (Possible Concern) chemicals and prioritization of followup work.	Does the latest science suggest a reprioritization of chemicals as we learn more about them? Which newly identified contaminants merit further monitoring? Which Possible Concern contaminants could be the subject of RMP-funded ecotoxicity studies?
2) What are the sources, pathways and loadings leading to the presence of individual CECs or groups of CECs in the Bay?	Evaluate new knowledge regarding sources, pathways, and loadings for CECs in the context of CEC-specific and comprehensive conceptual models to allow prioritization of data gaps the RMP can fill.	What are the key sources or pathways that impact concentrations and potential risk of emerging contaminants?
3) What are the physical, chemical, and biological processes that may affect the transport and fate of individual CECs or groups of CECs in the Bay?	Compare levels of parent CECs to degradates in light of processes expected to be active and influential in the Bay. Compare model predictions to monitoring results; assess potential reasons for differences between predicted and measured values. Does new research in other regions provide insight as to key processes that affect the fate of emerging contaminants?	Are relative levels of contaminants and degradates in different matrices or subembayments consistent with our expectations for various contaminant processes?
4) Have the concentrations of individual CECs or groups of CECs increased or decreased in the Bay?	Compare Bay CECs levels measured over time. Do trend data from other regions suggest likely trends in the Bay?	Have specific CECs declined over time? Have functional replacements for these CECs increased?

5) Are the concentrations of individual CECs or groups of CECs predicted to increase or decrease in the future?	Evaluate data on production, use, and source trends in the scientific and trade literature as a means of prioritizing potential risk of Bay contaminants in the future, and corresponding monitoring recommendations. Evaluate the expected impacts of changes to population, climate, affluence, and other factors.	Do production, use, and source trends suggest likely changes in the relative risk of specific emerging contaminants? What are the possible effects of changes to population, climate, and affluence on concentrations of CECs and associated risk?
6) What are the effects of management actions?	Evaluate the likely impacts of new management actions on contaminant levels. Which actions may have unintended consequences?	Are additional or different actions needed to reduce levels below aquatic toxicity thresholds?

Emerging contaminants strategy work most directly addresses questions 1, 2, 3, 5, and 6, by assuring 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 risk tier in which that contaminant had been placed should be revised.

Approach

The emerging contaminants strategy funding supports the review of key information sources throughout the year. These sources include:

- Abstracts and 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 and Climate Change 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)

In addition, strategy funding allows staff to provide additional services, such as:

- Numerous 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

Starting in 2019, we will develop an approach for using predictive toxicology to review Possible Concern contaminants and prioritize special studies for those that have the highest potential to pose risks based on available data. New insights may highlight the need for the RMP to fund targeted toxicological studies to develop ecotoxicity thresholds that might allow for a more definitive classification in the High, Moderate, or Low Concern tiers. The ECWG recommended additional funding to support development and application of this toxicology strategy, as well as refinement of conceptual models relating to CECs of current interest.

The proposed deliverables table on the first page of this proposal lists the specific tasks to be completed and their due dates.

Budget

Table 2. 2020 Emerging Contaminants Strategy budget

Deliverables	Budget
Tasks 1-5: Information gathering from a variety of sources throughout the year, including presentations at scientific conferences, to inform Task 4; Assist Water Board and other RMP stakeholders with science summaries relating to policy including emerging contaminants action plans and comment letters regarding proposed actions of other agencies; Coordinate *pro bono* studies conducted in collaboration with RMP Status and Trends monitoring activities; Update the RMP CEC Strategy document with toxicology strategy, conceptual models, revised tiered framework tables (integrating new data and external information) and multi-year plan, discussion of new RMP data and information gathered (Task 1), present at spring ECWG meeting; Present an update of RMP CEC Strategy, ongoing or completed special and *pro bono* studies, and new studies to the Steering Committee.	$75,000

Budget Justification

Significant increases in RMP resources dedicated to CEC special studies, beginning in 2017 and expected to continue in 2020, require greater levels of engagement, outreach, coordination, and integration to assure strategic use of available funds. 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. Additional funding is recommended to support the development of a toxicology strategy and conceptual models.

Reporting

RMP CEC Strategy presentations (Emerging Contaminants Workgroup meeting and follow-up teleconference [as needed], Steering Committee, and Annual Meeting) provide opportunities to report on this work. A brief update to the RMP CEC Strategy, including

revised tiered framework tables and multi-year plan, represents another key reporting mechanism.

References

Lin D, Sutton R, Shimabuku I, Sedlak M, Wu J, Holleman R. 2018. Contaminants of Emerging Concern in San Francisco Bay: A Strategy for Future Investigations. 2018 Update. SFEI Contribution 873. San Francisco Estuary Institute, Richmond, CA. https://www.sfei.org/documents/contaminants-emerging-concern-san-francisco-bay-strategy-future-investigations-2018-update

Sutton R, Sedlak M, Sun J, Lin D. 2017. Contaminants of Emerging Concern in San Francisco Bay: A Strategy for Future Investigations. 2017 Revision. SFEI Contribution 815. San Francisco Estuary Institute, Richmond, CA. https://www.sfei.org/documents/contaminants-emerging-concern-san-francisco-bay-strategy-future-investigations-2017