

Table 2: Short Descriptions of Proposals for RMP Special Studies in 2021

Workgroup	Study Name	Budget	Summary	Deliverables
Emerging Contaminants	CECs in Stormwater (Year 3)	\$148,000	This study is designed to fill critical stormwater data needs for five contaminant classes: 1) a new, targeted list of CECs specific to stormwater; 2) per- and polyfluoroalkyl substances (PFAS); 3) organophosphate ester (OPE) plastic additives/flame retardants; 4) bisphenol plastic additives; and 5) ethoxylated surfactants. There is funding left in the Year 2 budget, which will be directed towards initial monitoring and laboratory analysis in Year 3. As scoped in the present proposal, Year 3 would be the final year of funding, and would support activities including further site selection, sample collection, and analysis for a greater number of samples for this Bay Area-wide screening study, as well as laboratory analysis, data management, and preparation of scientific manuscripts and a summary of results to inform water quality managers. There is an option to extend the study for a fourth year, in order to provide a more robust dataset for this pioneering examination of CECs in urban stormwater.	Site selection and reconnaissance; sample collection and analysis; manuscripts and management summary
Emerging Contaminants	Toxicology Strategy (followup)	\$60,000	The RMP uses a risk-based framework for prioritizing monitoring of contaminants of emerging concern (CECs). Environmental toxicity threshold values are variable in availability and quality, and inappropriate thresholds may easily be used by researchers without toxicology knowledge. Past identification of toxicity thresholds for the Bay RMP has been on a study-by-study basis. This study proposes synthesizing and assessing the quality of the available thresholds for CECs detected in the Bay in the past ten years, calculating or estimating thresholds for data-poor contaminants using EU guidance and predictive toxicology methods, and risk screening for the Bay using a risk characterization ratio approach. This project will result in a "living document" of CEC ecotoxicity thresholds and their quality, and will inform design of future monitoring. The estimation and compilation of toxicity thresholds may support recategorization of some contaminants currently classified as Possible Concern due to insufficient toxicity data.	Synthesize and assess available CEC thresholds; identify knowledge gaps; calculate new thresholds; technical report; "living document" synthesis of thresholds
Emerging Contaminants	PFAS in Bay water	\$50,000	The ECWG classified PFOS, PFOA, and other long-chain perfluoroalkyl carboxylates as Moderate Concern in the RMP tiered risk-based framework due to concentrations in Bay biota linked to potential risks. However, the most recent Bay water monitoring occurred in 2009, and included just 13 PFAS. Since that time, several new members of the PFAS class have been identified in environmental matrices elsewhere, and standardized analytical methods have been expanded to include a broader suite of analytes. We propose a study to assess the concentrations of 33 PFAS in Bay water to characterize newly identified PFAS and begin to assess trends in those previously observed PFAS.	Sample collection; sample analysis; data QA/QC; technical report
Emerging Contaminants	Seasonal Influence of Bisphenols and OPEs	\$85,500	Widely used as plastic and polymer additives, organophosphate esters (OPEs) and bisphenols are compounds detected ubiquitously in many environmental matrices. Within each class, well-studied compounds have been identified as toxic, including potential for carcinogenic (OPEs) and reproductive (bisphenols) effects. The RMP classified OPEs and bisphenols as Moderate Concern in the RMP tiered risk-based framework due primarily to concentrations in Bay water in the range of or above current toxicity thresholds. As Moderate Concern contaminants, both classes could be proposed as analytes that merit routine monitoring via the RMP Status and Trends water cruise; however, their expected presence in both stormwater and wastewater pathways suggests that the current sampling design of the Status and Trends water cruise, which occurs in the summer and therefore minimizes the influence of stormwater flows, may not adequately characterize contaminant concentrations in the Bay. We propose a study to assess the concentrations of 13 OPEs and 6 bisphenols in South and Lower South Bay waters during wet and dry seasons.	Sample collection; sample analysis; data QA/QC; technical report
Microplastic	Ecotoxicological Workshop	\$18,000 (\$56K matching funds from SCCWRP)	SFEI and SCCWRP will work together to convene world experts on microplastic environmental and human health toxicology for a three-day workshop aimed at summarizing the current state of scientific knowledge on the potential risks of microplastics to aquatic life and humans. Through this project, we will identify environmentally relevant exposure information for different particle types, and develop a roadmap describing what additional research should be prioritized to give managers the relevant insights they need to develop a comprehensive risk management plan. This project would fund SFEI staff time to facilitate the workshop and write follow-up documents, and leverages significant contributions from SCCWRP in planning and hosting the workshop.	Facilitate workshop; summary report
Microplastic	Microplastic in Sport Fish	\$51,000	In summer 2019, as part of RMP Status and Trends monitoring, sport fish were collected and analyzed for a suite of contaminants. The digestive tracts of some of these fish were archived specifically for future microplastic analysis. This project proposes to make use of archived fish digestive tracts from three species to assess the level of exposure in the Bay food web to microplastics and associated pollutants. The cost of the study is \$92,775, but this could be reduced by analyzing fewer samples.	Analyze samples; manuscript
Microplastic	Stormwater Conceptual Model (Year 2)	\$30,000	The recently completed study of microplastics in San Francisco Bay identified stormwater to be a major pathway. Given this finding, the Microplastics Workgroup has prioritized the development of a stormwater conceptual model for microplastics. A first year of work focused on black rubbery fragments that were the most abundant type of microplastic in stormwater. This proposal is for a second year of funds to further develop the conceptual model by focusing on other prioritized microplastics, such as fibers, which were the second most abundant type of microplastic in stormwater. Development of the conceptual model for microplastics in stormwater will help inform available management actions to address microplastic pollution and identify data gaps and monitoring data needs to address Workgroup management questions, and to inform the Ocean Protection Council's state-wide microplastic strategy.	Literature review and discussion with experts; conceptual model report
Microplastic	Microplastic in South Bay Sediment Cores	\$50,500	Following findings of abundant levels of microplastics in San Francisco Bay, the RMP has elevated microplastics to the Moderate Concern category within the RMP's emerging contaminants tiered risk-based framework. The RMP's recommended strategy for Moderate Concern contaminants includes determining whether Bay concentrations are increasing or decreasing in the Bay. We propose to evaluate sediment as a suitable matrix for monitoring microplastic concentration trends by measuring microplastics in sediment cores. In the summer of 2020, there are two RMP studies collecting and analyzing sediment cores, providing the opportunity to collect samples with minimal additional costs. Additionally, microplastic concentration trends in the sediment core from one of the sites will be compared to trends in PCB sediment concentrations.	Sample collection; sample analysis; technical report
Nutrients	Suspended sediment light attenuation in San Francisco Bay	\$125,000-\$150,000		Model output of near-surface suspended sediment concentrations; technical memo

Nutrients	Moored sensor high-frequency observation network	\$180,000	Bay-wide cruises have been critical to our understanding of the system. The Bay is spatially and temporally heterogeneous, however, and monthly measurements miss changes in water quality that are driven by short time scale processes, including tidal forcing, wind, and biological cycles. The eight sensors in the moored, high-frequency observation network in South Bay collect water quality data every 15 minutes and contribute to our understanding of Bay processes that affect nutrient and chlorophyll dynamics.	Sensor maintenance; data management
PCBs	Strategy for In-Bay Modeling of PCBs and Other Contaminants	\$45,050	This study would develop a strategy and multi-year workplan for modeling PCBs and other contaminants in the Bay. Modeling is needed to address several management questions that are a priority for PCBs, and a platform developed for PCBs could also be applied to answering management questions for other contaminants.	Strategy technical report
PCBs	Monitoring the Impact of Remediation Actions on San Leandro Bay Recovery from PCB Contamination	\$77,830 - \$104,020 (\$60K in-kind from Stanford)	This study would establish baseline conditions to monitor changes in PCB loadings to the San Leandro Bay Priority Margin Unit expected from recent and pending upstream management actions in the watershed. Cleanup action at a former GE facility, an expected major source of PCBs to the watershed, has largely been completed. Cleanup activity at a second site (Union Pacific Railroad) is planned in the next few years. Passive samplers and sediment traps will be deployed downstream of completed and planned management activities to monitor PCB loadings to San Leandro Bay. A reference site in San Leandro Bay further away from direct watershed influences will also be sampled to evaluate spatial patterns. Since management activities either have been implemented or are planned in the next few years, there is urgency to establishing baseline conditions in order to document expected changes in PCB loadings.	Sample collection; sample analysis; technical report
Sediment	DMMO San Francisco Bay Floating Percentile Method Update	\$34,050	The Long-Term Management Strategy for dredged sediment in San Francisco Bay calls for 40% of dredged sediment to be used for beneficial reuse. While this objective is currently being met, the need for additional sediment volume to restore tidal marsh far surpasses the 40%. Concerns that the draft sediment screening guidelines for beneficial reuse were too restrictive resulted in a RMP-led Beneficial Reuse Workshop in September 2019. One of the recommendations from the expert panel was to compare sediment chemistry thresholds currently in use versus those generated using the Floating Percentile Method (FPM). The FPM was developed in 2002 by Avocet Consulting/SAIC, using paired sediment toxicity and chemical analysis data to develop sediment quality guidelines. This proposal seeks to use recent estuarine data reported to the Dredged Materials Management Office (DMMO) and data from the San Francisco Bay Regional Monitoring Program (RMP) to update a regional application of the FPM conducted previously in 2004 for the Sediment Screening Guidelines study and report (Germano & Associates, 2004). This method provides additional weight of evidence for the derivation of thresholds that can be used to determine whether dredged sediment can be used for beneficial reuse purposes. The outcomes of this analysis will be reviewed as an option for updating the draft sediment screening guidelines for beneficial reuse.	Data compilation and cleanup; technical report
Sediment	Temporal variability in sediment delivery to a South San Francisco Bay salt marsh	\$199,511	Salt marshes provide critical habitat as well as coastal protection. One of the key sediment management questions for San Francisco Bay is whether available sediment is sufficient for marshes to keep up with sea-level rise. We propose to investigate the influence of tides, waves, and water levels on sediment delivery to and deposition on a tidal marsh surface. We will measure suspended sediment concentration (SSC) and suspended sediment flux (SSF) in the shallows adjacent to a marsh, SSF into the marsh through a tidal creek, deposition and accretion on the marsh, and the variation in deposition with elevation and vegetation density and type. Data collection will be repeated in winter and summer, to determine seasonal effects. The study will be conducted in a marsh with a wave-exposed edge and large wind fetch. We anticipate a site on the eastern shore of South Bay, between the San Mateo and Dumbarton Bridges, but final site selection will depend on site accessibility and suitability for the study. Our overall objectives are to connect sediment dynamics in the shallows to rates of deposition and accretion across the marsh surface, and to assess seasonal variation in the effectiveness of sediment delivery. Results will be useful for prioritizing marsh restoration sites, assessing restoration actions, and understanding mechanisms of sediment delivery to and sea-level rise vulnerability of marshes.	Release time series, deposition, accretion, and vegetation characteristics data; technical report; presentation at Delta Science Symposium or State of the Estuary Conference
Sediment	DMMO database enhancements	\$40,000	In 2018, SFEI began hosting and managing the DMMO database and website (https://www.dmmosfbay.org/). A DMMO Project Team with representatives from the partner agencies USEPA, USACE, SFBWQCB, and BCDC convene regularly to set priorities and guide the transition from Exa Data to SFEI. Initially, the highest priorities were to assemble the various components of the DMMO information system onto SFEI's servers, maintain the domain registration, make minor updates to the website, upload new data templates into the database, and maintain the technical documentation and procedures. Now that those priorities have been addressed, the DMMO database user community seeks more database functionality and an improved user interface. This proposed project focuses on improving the DMMO database to make it more accessible by the user community. Enhancements to the database would (1) improve efficiencies and streamline the process of making data available in a timely manner for querying; (2) enable the integration of DMMO data into SFEI's other data visualization tools, such as the Contaminant Data Display and Download tool (cd3.sfei.org), which is the primary data access and visualization tool for the Regional Monitoring Program's long-term dataset; and (3) support DMMO data mining and synthesis efforts.	Enhance database functionality and access to DMMO data
Sediment	Continuous suspended sediment monitoring on the eastern shoal of South San Francisco Bay	\$29,040 - \$50,320	The proposed project aims to expand continuous suspended sediment (SSC) monitoring, and optionally adds wave characteristic monitoring, in South San Francisco Bay (SB). Continuous SSC data are essential to both empirical and model-based sediment studies but are currently only available at two channel stations in SB. The SB shoals play an important but understudied role in SB sediment dynamics, and these dynamics are strongly influenced by wind waves. This project would efficiently fill SB data gaps by leveraging monitoring at existing and proposed stations managed by the San Francisco Bay Nutrient Management Strategy (NMS). Specifically, this project would add SSC sampling and wave sensors at NMS stations and would make the associated data publicly available.	Sample collection; deploy wave sensors; curated SSC dataset; technical report
Selenium	Selenium in North Bay Clams and Water	\$71,600	The proposed monitoring would extend and leverage a long-term time series for selenium in clam tissue and associated water sampling. The RMP approved funding in 2017 that enabled monitoring to extend a USGS time series through September 2017, and then re-initiated clam and water monitoring in 2019. This proposal would support a third year of monitoring following a monitoring design optimized for cost-effective early detection of changes in selenium trends in clams and water. Clam and water samples would be collected monthly at two locations in two three-month blocks (Jun-Aug and Dec-Feb).	Sample collection; sample analysis; data QA/QC; technical report

Selenium	Selenium in White Sturgeon Muscle Plugs	\$21,825	In March 2016, the USEPA approved a Selenium TMDL for North San Francisco Bay, which established a white sturgeon muscle tissue target of 11.3 ug/g dry weight as a basis for evaluating impairment. From 2014-2017, the RMP conducted annual monitoring of selenium in sturgeon muscle plug tissue, through a collaboration with the California Department of Fish and Wildlife (CDFW) and other partners. Preliminary power analyses suggest that long term monitoring of 60 samples per year at a minimum biennial frequency is needed to detect potential long-term trends driven by changes in environmental selenium sources. This study proposes to continue the biennial sampling started in 2019 as part of the long-term North Bay monitoring work, that aims to track North Bay condition relative to the TMDL target and evaluate long-term trends.	Sample collection; sample analysis; data QA/QC; technical report
Sources, Pathways, and Loadings	STLS Program Management	\$25,000	The goal of the Small Tributary Loading Strategy (STLS) over the next few years is to continue to provide information to RMP stakeholders and the public that directly supports the identification and management of PCBs, Hg, and other pollutant sources, concentrations, and loads in stormwater, and the determination of trends in relation to management efforts in San Francisco Bay. This proposal is to provide STLS program management to help achieve this goal. The outcome of this task is to maintain communication with the BASMAA program and Water Board representatives via in-person and phone meetings, and to participate in RMP inter-workgroup meetings aimed at maximizing efficient collaboration. Specific activities include coordinating regular meetings, planning and developing agendas and materials, preparing meeting summaries, and attendance at key external meetings.	Hold 6 STLS meetings; attend key external meetings
Sources, Pathways, and Loadings	Regional Model Development to Support Watershed Loads and Trends	\$150,000	The 2018 Small Tributary Loading Strategy (STLS) prioritized further assessment of the spatial and regional estimates and temporal trends in Pollutants of Concern (POC) loads, and developed a 5-year plan for model development out to 2022. Although initially conceived as a tool for evaluating trends, advice provided at the 2019 SPLWG meeting placed the emphasis on developing a model to support better estimates of PCB and other POC loads, sediment, and emerging contaminants. The focus in 2020 is on developing and calibrating the hydrology model. Following the modeling implementation plan (MIP), this proposal is for funding in 2021 to complete the sediment model and continue working on the conceptual design of the POC model. The hydrology and sediment model, once established, will be used as a basis for POC modeling in subsequent years. Although there is a more general objective to support multiple pollutants, initially the model will be developed for PCBs and Hg. After PCB calibration and validation, the model will be used to evaluate PCB loadings at watershed and regional scales. Trends associated with control measures, land-use changes, or other scenarios could then be explored.	Complete sediment model setup and calibration; collate PCB and Hg model data; begin planning on general POC modeling
Sources, Pathways, and Loadings	Integrated Monitoring and Modeling Strategy - CEC Conceptual Model	\$50,000	The RMP modeling of concentrations and loads delivered to the Bay from the small tributaries in the nine county Bay Area, along with monitoring to support the modeling, has largely been funded and led by the SPLWG and focused on PCBs and Hg. Other workgroups with modeling or monitoring needs have largely just retrofitted the models or piggybacked on the monitoring programs. As the focus of modeling moves towards supporting a broader suite of contaminants including sediment, nutrients and CECs beyond just PCBs and Hg, the information and the monitoring required to model contaminant groups with similar characteristics (chemical and physical properties, sources, pathways, etc.) needs to be systematically identified, and the model structure needed to support these priorities needs to be considered from inception. This proposal aims to address these issues by building an integrated watershed modeling and monitoring implementation strategy to lay out the information needs and associated monitoring and modeling processes to address management questions for any contaminant of interest when the need arises.	Integrated watershed modeling and monitoring implementation strategy report
Sources, Pathways, and Loadings	Small Tributaries Loading POC Watershed Reconnaissance Monitoring	\$65,000	Over the past six years, the RMP has funded reconnaissance monitoring to identify high leverage watersheds and subwatersheds for PCBs and Hg sources and to develop a remote sampler method to decrease costs and increase ease of data collection. We propose to continue reconnaissance monitoring during winter storms in WY 2021. The study will help gain further knowledge and understanding of PCB and Hg concentrations, particle ratios, congener patterns, and yields in areas that have a disproportionately larger area of older urban and industrial land use. In addition, this sampling program is being coordinated with the needs of the ECWVG (for specific emerging contaminants), the microplastics WG, and the PCBWG, all who pay a share of the field cost, their own analytical and data management costs. It is primarily a field study and the level of effort will be tailored to the amount of budget available and collaboration with the other groups. There is no phasing proposed.	Select sampling sites; sample collection; sample analysis; data QA/QC; technical report
Sources, Pathways, and Loadings	POC Data Interpretation - Advanced Data Analysis	\$15,500 - \$50,000	Reconnaissance data collected during single storms have provided evidence to support enhanced management efforts in watersheds with high PCB concentrations in water and on sediment particles. However, sources have not been located in all watersheds exhibiting high concentrations and data have had limited value for prioritizing management efforts in watersheds exhibiting moderate or lower concentrations, yet these watersheds likely contain patches with elevated concentrations. This project proposes to complete the analysis on all remaining sites (WYs 2020, 2021) and those sampled by San Mateo and Santa Clara Programs for which there is congener data for both water and sediment/soils. The output will be a comprehensive and inclusive comparative ranking of all watersheds based on concentrations, particle ratios, loads, yields, and congener patterns. The outcome will be more informed decisions on watersheds to prioritize for enhanced management or further sampling.	Data compilation and analysis; technical report