

RMP Special Study Proposal: Small Tributaries Loading POC Watershed Reconnaissance Monitoring

Summary: To support a weight-of-evidence approach for the identification and management of PCB and mercury (Hg) sources, stormwater samples will be collected to assess concentrations and particle ratios in stormwater in the areas that have a disproportionately larger area of older urban and industrial land use. Manual sampling will also provide opportunities for CEC piggybacking. The proposal is primarily a field study. The level of effort will be tailored to the amount of budget available. There is no phasing proposed.

Estimated Cost: \$110k

Oversight Group: STLS/SPLWG

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Time Sensitive: No, but this is a continuation of a multi-year study to identify PCB and Hg sources to inform management actions and also allows for CEC piggybacking.

Proposed Deliverables and Timeline

Deliverable	Due Date
Selected site list	09/2019
Wet season water samples collected and sent to the labs for analysis	04/2020
Laboratory analysis, QA & Data Management	09/2020
Interpretation & reporting for BASMAA	02/2021
Draft report	03/2021
Final report	05/2021

Background

The San Francisco Bay Hg and PCB TMDLs call for a 50% reduction in Hg loads by 2028 and a 90% reduction in PCB loads by 2030. In supporting these TMDLs, Municipal Regional Permit for Stormwater (MRP) (SFRWQCB 2009, SFRWQCB 2015) called for a range of actions, including gaining a better understanding of which Bay tributaries contribute the most loading to sensitive areas of biological interest on the Bay margin, better quantification of sediment and trace contaminant loads 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. In response to the MRP requirements and information needs, the Small Tributaries Loadings Strategy (STLS) outlined a set of evolving management questions (SFEI, 2009) that have been used as the guiding principles for the region’s stormwater-related activities (Table 1).

During water years (WYs) 2015-2019, the RMP funded a watershed characterization reconnaissance study to locate high leverage watersheds and subwatersheds, and develop a remote sampler method designed to decrease costs and increase ease of data collection. Over the five years of watershed characterization, in addition to a similar effort in WY 2011 (McKee et al., 2012), a total of 80 sites have now been characterized for PCB and Hg concentrations and particle ratios during at least one storm (McKee et al., 2016; Gilbreath et al., 2017; Gilbreath et al., 2018, Gilbreath et al., 2019)¹. In addition, a total of 16 sites have now been characterized using the remote sampler methods. Through these efforts, it was discovered that PCB concentrations at 23 sites are highly elevated (> 0.2 ug/g, or > 140x the TMDL target²), and six sites have highly elevated concentrations for Hg (> 1 ug/g, or > 5x the TMDL target)³. Initial results of the remote sampling pilot indicate a reasonable correlation between the particle concentrations observed in the remote samplers and particle ratios observed in the manual water samples. As such, the remote sampler method has been adopted as a screening method.

Study Objectives and Applicable RMP Management Questions

This study will provide information essential to understanding concentrations of PCBs and Hg in a broad number of sites around the Bay. The objectives of the project and how the information will be used are shown in Table 1 relative to the RMP’s high-level management questions.

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

Management Question	Study Objective	Example Information Application
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¹ Data were also collected by the Santa Clara and San Mateo Stormwater programs using the same watershed characterization reconnaissance study design.

² The TMDL did not have a concentration target but rather a total load target, and through back calculation we determined the average concentration required to meet that target.

³ Note: These data only reflect WYs 2011, 2015-2018; results have not yet been returned for sampling in WY 2019)

Q1: What are the loads or concentrations of Pollutants of Concern (POCs) from small tributaries to the Bay?	N/A	
Q2: Which are the “high-leverage” small tributaries that contribute or potentially contribute most to Bay impairment by POCs?	N/A	
Q3: How are loads or concentrations of POCs from small tributaries changing on a decadal scale?	N/A	
Q4: Which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff?	<p>Use remote samplers to collect samples at new locations as a screening method to determine if they are likely high-leverage. Use these results to rank these locations relative to each other and sources.</p> <p>Use manual water composite sampling methods to revisit previously sampled locations</p>	<p>Where are the highest leverage watersheds for potential management action?</p> <p>How variable are concentrations from storm to storm?</p>
Q5: What are the measured and projected impacts of management action(s) on loads or concentrations of POCs from small tributaries, and what management action(s) should be implemented in the region to have the greatest impact?	Provides a regional map of concentrations and loads for baseline comparison to the effects of BMP application.	Where should BMPs be located to have the greatest benefit for water quality?

Approach

A wet weather field monitoring program is proposed to continue during the winter months of WY 2020 at sampling watersheds, subwatersheds, or finer scales to assess management priority. The sampling program will largely mimic the program implemented during WYs 2011, and 2015-2018 (McKee et al., 2012; Gilbreath et al., in final revisions);

the improved decision tree for site and storm characteristics developed by the advanced data analysis in WY 2019 will also be used to augment the program.

- Monitoring Design
 - At each site, collect a minimum of:
 - One composite stormwater sample during a rainfall event that is forecast to exceed 0.5 inches of rainfall in a 6-hour period using a manual sampling techniques and/or
 - One remote sampler (settled suspended sediment) sample during a rainfall event that is forecast to exceed 0.5 inches of rainfall in a 6-hour period using one or both remote sampling techniques (Hamlin or Walling tube).

- Site Selection
 - Objective 1: Finding new high-leverage watersheds or sub-watershed areas (watershed locations near the Bay margin or further downstream than the source tracking approach). Remote samplers will be used in these watersheds. Approximately half of the field labor and analysis budget will be allocated to this effort.
 - Objective 2: Re-sampling locations where additional information is necessary to inform ranking. In these watersheds, manual water composite sampling methods will be used for direct comparison to the prior data. Approximately half of the field labor and analysis budget will be allocated to this effort.
 - Other selection criteria:
 - Larger watersheds with an existing USGS gauge
 - Re-sampling potential false negatives
 - Contingency for resampling Guadalupe River for trends
 - PCB Strategy priority margin unit watersheds
 - Nested sampling design to track sources upstream in known polluted areas to help better define source areas and management options

- Number of sites: Dependent on site logistics, proximal site associations, analytes, budget, and other factors; currently budgeted at 10 sites.
- The 2019 analytes list will be continued (PCBs, Hg, SSC) in WY 2020

Budget

The following budget represents estimated costs for this proposed special study (Table 2). Efforts and costs can be scaled back by reducing the number of sampling sites.

Table 2. Proposed budget.

Expense	Estimated hours	Estimated Cost
<i>Labor</i>		

Project Staff	500	\$37,000
Project Management		\$12,000
Data Management		\$20,000
Reporting		\$20,000
Subcontracts		
SGS AXYS Analytical and Moss Landing Marine Labs		\$17,500
Direct Costs		
Equipment		\$1,000
Travel		\$500
Shipping		\$3,000
Grand Total	500	\$110,000

Budget Justification

Field Costs: This special study proposal has a budget of \$110,000, which includes up to \$37,000 devoted to stormwater sample collection (site selection and reconnaissance, permit applications, development of sample collection protocols, and field work for 10 sites).

Every effort will be made to minimize field costs through monitoring multiple sites per team per storm, and leveraging existing stormwater monitoring activities of the RMPs.

Laboratory Costs: Up to 14 independent samples will be analyzed, including field duplicates and a field blank. Analyses will be conducted for PCBs, mercury, and suspended sediment concentration.

Data Management Costs: Data services will include quality assurance and upload to CEDEN.

Reporting Costs: Preparation of a draft and final report on the results will be completed.

Reporting

The outcome of the study will be a concise technical report. The main objective of this report will be to report and rank concentrations and particle ratios observed at each location and compare these to existing data. The methods developed in the Advanced Data Analysis project may be applied.

References

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