

Special Study Proposal: STLS Regional model development to support trends strategy

Summary: The draft STLS Trends Strategy outlines a process to answer the key management question of how loads of pollutants of concern (e.g., PCBs) are changing over time. Progress has been made in trend analysis for individual watersheds with the RMP study of PCB loads in the Guadalupe River as well as BASMAA’s interim accounting tool for tracking management efforts. However, questions remain as how the loads at the regional scale have and will change as a result of decadal long management actions and in relation to TMDL goals. The draft STLS Trends Strategy identified this question as a priority and developed a plan to obtain initial answers by 2021. This proposal is for funding in 2019 to implement the first year of this plan. The tasks to be completed are: (1) to develop a detailed Modeling Implementation Plan and then (2) to develop a regional model for hydrology. The hydrology model, once established, will be used as basis for sediment and then Pollutants of Concern (POC) modeling in the subsequent years.

Estimated Cost: \$110,000

Oversight Group: STLS/SPLWG

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Proposed Deliverables and Timeline

Task	Deliverable	Due Date																
		2019												2020				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
A	Modeling Implementation Plan	!		!		!!												
B	Regional Model Development						!		!		!		!		!		!!	

! = STLS check in for review and course corrections

!! = SPLWG oversight and review

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 the implementation of control measures to reduce PCB and Hg loads from smaller urbanized tributaries, and also provided a set of management questions (MQs) that has been used as the guiding principle for the region’s stormwater related activities.

MRP 2.0 Q1: Source Identification / Leverage: Which sources or source areas provide greatest opportunity for load reductions?

MRP 2.0 Q2: Impairment: Which source areas contribute most to impairment of Bay?

MRP 2.0 Q3: Management effectiveness: Provide support for planning future management actions or evaluate existing actions.

MRP 2.0 Q4: Loads: Assess POC loads, concentrations, or presence/absence.

MRP 2.0 Q5: Trends: What are the temporal trends in loads or concentrations?

Over the past decade, considerable effort, including both field monitoring and empirical data collection and modeling, has been taken by both RMP and BASMAA to address these management questions. These effort has mostly focused on addressing MQ 1, 2, and 4.

In recognizing the need to answer MQ5 regarding how POC loads or concentrations from small tributaries has changed over time, a STLS Trends Strategy was developed in 2016 and subsequently updated in 2018 to outline a process to answer the key management question of how loads of pollutants of concern (e.g., PCBs) are changing over time. Progress has been made in trend analysis for individual watersheds with the RMP study of PCB loads in the Guadalupe River as well as BASMAA's interim accounting tool for tracking management efforts. However, questions remain as to how the loads at the regional scale have and will change as a result of decadal long management actions and in relation to TMDL goals. The draft STLS Trends Strategy identified this question as a priority and developed a plan to obtain initial answers by 2021. This proposal is for funding in 2019 to implement the first year of this plan.

Study Objectives and Applicable RMP Management Questions

The objectives of this study are to 1) develop a modeling implementation plan that will be used to guide regional model development; and 2) embark on the first phase of model development for hydrology to provide a basis for POC modeling and set the stage for trends evaluation.

This study addresses management question 5 primarily but also directly supports MQ 1, 2, and 4 by providing concentration and load information for all watersheds in the region. The regional model also provides a mechanism for evaluating management actions that is call upon in MQ 3.

Approach

Task A. Develop a Modeling Implementation Plan to guide a regional modeling effort

At a STLS meeting in April 2018, it was decided that the initial effort will be focused on understanding the trends in loads at small tributary locations at the regional scale. A regional watershed model is needed to accomplish this goal. Therefore, this task will develop a detailed Modeling Implementation Plan with the following information:

- Recommended modeling platform
- Model assumptions, processes represented, and calculation procedures
- Model input data and their data sources or other assumptions
- Calibration and verification processes and acceptance criteria
- Geographic scale for modeled watersheds
- Temporal scales for the model (e.g., period of model simulation and time step)
- Procedures for reporting model outputs
- Monitoring Design for hydrology, suspended sediment, PCBs, and other parameters needed to sufficiently calibrate and verify the model
- Monitoring Data Gap Analysis based on a comparison of current monitoring programs to the recommended monitoring design.

The Modeling Implementation Plan will be developed with input and oversight by STLS and the SPLWG before actual modeling work begins.

Task B. Develop a regional watershed model for POC trends evaluation

After approval of the Modeling Implementation Plan, a phased approach will be employed to develop the regional model, starting with hydrology, followed by suspended sediment, and then POCs. This task represents the first phase of the model development and will cover hydrology only. Below is a standard model application process that will likely be followed pending approval of the Model Implementation Plan:

- Collect and process model input data and monitoring data (for calibration).
- Calibrate the model to observed data
- Process and interpret model outputs for load estimates and trends evaluation at watershed and regional scales

Budget

Task	Budget
A. Develop a modeling implementation plan to guide regional modeling effort	\$60,000
B. Develop a regional watershed model for POC trends evaluation	\$50,000
Total	\$110,000

Budget Justification

Labor Costs

Task A: 300 hours (~8 weeks) of modeler time to prepare the Modeling Implementation Plan. This time includes preparing draft plan, working with stakeholders to review and revise the draft plan, and responding to comments.

Task B: 65 hours of technician time to gather and format input data. 260 hours of modeler time to set up the model, perform calibrations/verifications, and prepare the Model Development Report.

Reporting

Task A: The Modeling Implementation Plan will be presented as a technical report. The plan will be completed as a draft for SPLWG review in May 2019, and finalized in July 2019 after the review and approval from STLS.

Task B: Regional model development will begin after the Modeling Implementation Plan is approved. A Model Development Report will be prepared as a draft for SPLWG by May 2020 and finalized by June 2020.

Linkage to other STLS Proposed Tasks

The data collected from wet weather monitoring will be used to support the initial development of the

regional model. The monitoring design outlined in the Modeling Implementation Plan can be used to guide future monitoring efforts.

Linkages to other RMP Workgroups

Sediment has emerged as a pollutant targeted for research and management actions. The Sediment WG has identified estimating sediment loads from Bay area watersheds as one of research needs. The regional model could be used as a platform to estimate sediment loads. The Emerging Contaminants Workgroup (ECWG) has developed a Contaminants of Emerging Concern (CECs) strategy that identifies stormwater as a significant pathway for many CECs and calls for a combined modeling and monitoring approach to estimate their loads. Similar to sediment, the regional model can be utilized to estimate stormwater CECs loads from small tributaries to the Bay.

References

- SFRWQCB, 2009. California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit, Order R2-2009-0074, NPDES Permit No. CAS612008. Adopted October 14, 2009. 279pp.
http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/index.shtml
- SFRWQCB, 2015. California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit, Order No. R2-2015-0049, NPDES Permit No. CAS612008. November 19, 2015. 350pp.
http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/R2-2015-0049.pdf