

Priority Margin Unit Conceptual Model Development

Oversight group: PCB Workgroup
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Funding Options

- 1) Funding recommended by TRC for 2016: **\$40,000**
- 2) Another viable funding option: \$60,000
- 3) Funding originally proposed by Workgroup for 2016: \$80,000

Proposed Deliverables And Timeline

| Deliverable | Due Date (Option 1) | Due Date (Options 2 and 3) |
|---|---------------------|----------------------------|
| Updated multi-year plan for RMP PCB studies | June 2016 | June 2016 |
| Draft report | Apr 2017 | Dec 2016 |
| Final report | Jul 2017 | Mar 2017 |

Summary

The goal of RMP PCB Strategy work over the next few years is to inform the review and possible revision of the PCB TMDL and the reissuance of the Municipal Regional Permit for Stormwater (MRP), both of which are tentatively scheduled to occur in 2020. Conceptual model development for a set of representative priority margin units will provide a foundation for establishing an effective and efficient monitoring plan to track responses to load reductions and also help guide planning of management actions.

Introduction and Background

The RMP PCB Strategy Team formulated a PCB Strategy in 2009. The Team recognized that a wealth of new information had been generated since the PCBs TMDL Staff Report (SFBRWQCB 2008) was prepared. The Strategy articulated management questions to guide a long-term program of studies to support reduction of PCB impairment in the Bay. The PCB Team recommended two studies to begin addressing these questions. The first recommended study was to take advantage of an opportunity to piggyback on the final year of the three-year small fish mercury sampling in 2010 to collect data on PCBs in small fish also. The second study that was recommended was a synthesis and conceptual model update based on the information that had been generated since the writing of the TMDL Staff Report.

The small fish monitoring revealed extremely high concentrations of food web PCBs in several areas on the Bay margins (Greenfield and Allen 2013), and highlighted a need to develop a more detailed conceptual model than the one-box model used as a basis for the TMDL. A model that would support the implementation of actions to reduce loads from small tributaries, a primary focus of the TMDL, would be of particular value. A revised conceptual model was developed that shifted focus from the open Bay to the contaminated areas on the margins where

impairment is greatest, where load reductions are being pursued, and where reductions in impairment in response to load reductions would be most apparent (Davis et al. 2014).

The margins appear to be a collection of distinct local food webs that share some general similarities but are largely functionally discrete from each other. Monitoring, forecasting, and management should therefore treat these margin locations as discrete local-scale units. Local-scale actions within a margin unit, or in upstream watersheds, will likely be needed to reduce exposure within that unit. Better characterization of impairment on the margins through more thorough sampling of sediment and biota would help focus attention on the margin units where the need for action is greatest (“priority margin units” or PMUs), and will also provide an important performance measure for load reduction actions taken in local watersheds. Davis et al. (2014) recommended a focus on assessing the effectiveness of small tributary load reduction actions in priority margin units, and provided an initial foundation for these activities.

The 2014 update of the PCB Strategy called for a multi-year effort to implement the recommendations of the PCB Synthesis Report (Davis et al. 2014) pertaining to:

1. identifying margin units that are high priorities for management and monitoring,
2. development of conceptual models and mass budgets for margin units downstream of watersheds where management actions will occur, and
3. monitoring in these units as a performance measure.

A thorough and thoughtful planning effort is warranted given the large expenditures of funding and effort that will be needed to implement management actions to reduce PCB loads from urban stormwater.

The work being conducted in 2015 has initiated the multi-year PMU effort. The first phase of the 2015 work consisted of a preliminary assessment of margin units downstream of six pilot watersheds that have been prioritized for management actions. In the second phase of the 2015 workplan, to be conducted in the second half of the year, a detailed assessment of one of the six PMUs will be developed.

PCB Strategy Team discussions in 2015 have helped refine the multi-year plan (Table 1). The goal of RMP PCB special studies over the next few years is to inform the review and possible revision of the PCB TMDL and the reissuance of the Municipal Regional Permit for Stormwater (MRP), both of which are tentatively scheduled to occur in 2020. Conceptual model development for the set of PMUs is the element of the PCB workplan that will have the greatest value in informing the consideration of a revised TMDL and MRP. A conceptual understanding of the anticipated response of these PMUs to load reductions, in addition to providing a foundation for establishing an effective and efficient monitoring plan, will also help guide planning of management actions. As conceptual models are developed for these PMUs, consideration will be given to whether a general model or family of models can be developed that could apply to margin units more broadly. The monitoring plans that are produced will be designed to maximize sensitivity to detecting reduced impairment in the margin units.

Study Objective and Applicable RMP Management Questions

The objectives of this study are:

1. to develop a conceptual understanding of the anticipated response of four PMUs to load reductions, and
2. to develop sensitive monitoring strategies to detect the effectiveness of watershed management actions in reducing PCB impairment in PMUs.

PCB Strategy Questions Addressed

1. What are the rates of recovery of the Bay, its segments, and in-Bay contaminated sites from PCB contamination?
4. Which small tributaries and contaminated margin sites are the highest priorities for cleanup?
5. What management actions have the greatest potential for accelerating recovery or reducing exposure?
6. What are the near-term effects of management actions on the potential for adverse impacts on humans and aquatic life due to Bay contamination?

RMP Management Questions Addressed

4. Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?
 - B. What are the effects of management actions on the potential for adverse impacts on humans and aquatic life due to Bay contamination?

Study Approach

The multi-year plan for studying PCBs in the margins has three components: conceptual model development, field studies to support/confirm the models, and trend monitoring. The funding requested for 2016 would support continued conceptual model development through synthesis and simple modeling based on existing information, potentially supplemented by a small budget for field sampling to address critical information needs related to the conceptual models.

- The revised multi-year plan calls for the development of conceptual models for four PMUs (Emeryville Crescent, Richmond Harbor, Steinberger Slough, and San Leandro Bay) from 2015-2018. Work on this component will begin for Emeryville Crescent in 2015 and is proposed to continue with San Leandro Bay in 2016.

- To support conceptual model development, a budget for field studies (\$20K per year) is also included in the multi-year plan. This component would only be included under funding option 3. These studies could include, for example, analysis of spatial patterns in surface sediments or of sampling to determine the presence of indicator species and their PCB concentrations.
- Per the multi-year plan, as the conceptual models are completed, trend monitoring can be phased in. A preliminary estimate of the cost of this monitoring is \$30K per unit per year. Monitoring is tentatively planned for one unit in 2017, two in 2018, and all four in 2019.

Given the long-term plan discussed above, the work proposed for 2016 is to develop a conceptual site model for a second PMU (San Leandro Bay). Under funding option 1, development of the conceptual site model for San Leandro Bay would begin in 2016 and would be completed in the first half of 2017. Under funding options 2 and 3, the conceptual site model for San Leandro Bay would be completed in 2016.

The field study budget for 2016 (included for option 3 only) can be used either to address information gaps for the first (Emeryville Crescent) or second (San Leandro Bay) PMUs.

Tasks for 2016

Task 1: Develop a conceptual site model and first order mass budget for the second PMU (\$40K: \$30K for SFEI labor to synthesize information and conduct modeling). Funding option 2 adds \$20K for model development. Funding option 3 adds \$20K for field studies.

The second PMU (San Leandro Bay) will be evaluated in detail in 2016. A relatively large Conceptual Site Model Workgroup (CSMW) will be assembled that includes members of the PCB Strategy Team, along with experts on potential biotic indicators, sediment movement from watersheds to margins to the open Bay, and local conditions, and local stakeholders. This CSMW will meet two to three times to develop and document conceptual understanding and a monitoring plan for the PMU. While ideally the site model evaluations will conclude that it is possible to detect reduced concentrations in the Bay, it is also possible that the CSMW will conclude that this is not feasible with a realistic effort given the relative magnitude of the reduced loading, the reservoir of PCBs already in the PMU, and environmental variation. Schedules for CSMW activities will be established with input from workgroup members and interested parties.

The labor required to conduct task 1 is difficult to estimate because this is a pilot effort and the data gathering and analysis to be done will be determined through Strategy Team and CSMW discussions. If funds remain from task 1 after the task is completed, they will be applied to development of the CSM for the third PMU. More detailed budgets will be developed and subject to Strategy Team, TRC, and Steering Committee approval as planning proceeds.

Timing and Deliverables: A draft technical report documenting a conceptual site model and monitoring plans for the second PMU by April 2017. Final report in July 2017. Dates for funding options 2 and 3 would be December 2016 and March 2017.

Task 2: Convene PCB Strategy Team and update multi-year plan in support of the TMDL (\$10K)

Funds for this task would enable SFEI to continue to convene the PCB Strategy Team to allow discussions of plans for the next iteration of the TMDL and RMP activities that can inform the TMDL, and for any small-scale synthesis of information that is needed to support these discussions. The plan will include a multi-year plan schedule of budgets and deliverables aimed at providing a technical foundation for the next iteration of the TMDL. Depending on the outcomes of the site model evaluations, this RMP expenditure for continued Strategy Team discussions may need to be augmented or complemented by other forums for discussing TMDL revision.

Timing and Deliverables: An updated PCB multi-year plan in June 2016. The plan will include a multi-year plan schedule of budgets and deliverables.

References

Davis, J.A., L.J. McKee, T. Jabusch, D. Yee, and J.R.M. Ross. 2014. PCBs in San Francisco Bay: Assessment of the Current State of Knowledge and Priority Information Gaps. RMP Contribution No. 727. San Francisco Estuary Institute, Richmond, California.

Table 1. PCB studies and monitoring in the RMP from 2010 to 2019 - \$40K funding scenario in 2016. Numbers indicate budget allocations in \$1000s.

| Element | PCB Questions Addressed | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|--------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Food Web Uptake (Small Fish) | 1, 4 | 50 | | | | | | | | | |
| PCB Conceptual Model Update | 1,2,3,4,5,6 | | 53 | | | | | | | | |
| Development and updating of multi-year workplan and continued support of PCB Strategy Team meetings | | | | | | | 10 | 10 | 10 | 10 | 10 |
| Prioritize Margin Units | 1, 4, 5, 6 | | | | | | 30 | | | | |
| Develop Conceptual Site Models and Mass Balances for PMUs (4 PMUs) | 1, 4, 5, 6 | | | | | | 45 | 30 | 70 | 50 | |
| PMU Field Studies to Support Development of Conceptual Site Models and Monitoring Plans | 1, 4, 5, 6 | | | | | | | | 30 | 20 | |
| PMU Trend Monitoring (5 PMUs) | 1, 4, 5, 6 | | | | | | | | | 60 | 120 |
| TOTAL | | 50 | 53 | | | | 85 | 40 | 110 | 140 | 130 |