Final

REGIONAL MONITORING PROGRAM FOR WATER QUALITY IN SAN FRANCISCO BAY

sfei.org/rmp

RMP PCB Workgroup Meeting

June 3, 2022 (teleconference)

Meeting Summary

Advisors and Workgroup Members	
Frank Gobas (Simon Fraser University)	Earl Hayter (USACE)
Jon Konnan (EOA)	Bridgette DeShields (Integral Consulting)
Tom Mumley (SFBRWQCB)	Steve Armann (USEPA)
Craig Jones (Integral Consulting)	Luisa Valiela (USEPA)
Sean Goral (USEPA)	Sami Harper (SFBRWQCB)
Marco Sigala (San Jose State University)	Mark Johnson (SFBRWQCB)
Bryan Frueh (City of San Jose)	Richard Looker (SFBRWQCB)
Helen Hild (SFBRWQCB)	Heather Peterson (City and County of SF)
Setenay Frucht (SFBRWQCB)	

RMP Staff and Contractors:

- Jay Davis (SFEI)
- Melissa Foley (SFEI)
- Martin Trinh (SFEI)
- Lester McKee (SFEI)
- Diana Lin (SFEI)
- Don Yee (SFEI)
- Alicia Gilbreath (SFEI)
- Dave Senn (SFEI)
- Yeo-Myoung Cho (Stanford)

1. Introductions and Updates

Jay Davis began the meeting with a quick round of introductions followed by a review of Zoom etiquette and a land acknowledgement to the native tribes of the area. Jay proceeded to go over the goals for the day; summarizing this year's process for review and planning of RMP PCB studies, obtaining feedback on the draft modeling strategy document, and reviewing the results from the Steinberger Slough/Redwood Creek passive sampler study.

2. Information: Regulatory and Management Update on Steinberger Slough/Redwood Creek

Jay asked the group for any regulatory and management updates on Steinberger Slough/Redwood Creek. Tom Mumley announced the State Board has reissued regional stormwater permits that are focused on reducing loads at old industrial areas. He noted that this focus represents a strong nexus with the efforts that will be discussed in the meeting. The Water Board has appointed Setenay Frucht to lead its TMDL team and the time has come to lay out a plan to review and potentially revise the PCB TMDL by 2030. Jay clarified for the new members of the group that this municipal regional permit is updated once every five years. Jon Konnan stated that EOA would have new updates on the MRP by March 2023.

3. Discussion: Report on Steinberger Slough/Redwood Creek Passive Sampler Study

Yeo-Myoung Cho of Stanford University presented the results from the Steinberger Slough/Redwood Creek (SS/RC) passive sampler study. A report on this study (funded in 2020) is available for review with comments due later this month. Stanford had previously conducted a small pro bono pilot study in San Leandro Bay. The SS/RC effort assessed spatial patterns and long-term trends in loadings from tributaries to Steinberger Slough and Redwood Creek and piloted passive sampler measurements (C_{PSD} and C_{free}) as potential complements to sediment and fish tissue measurements. The study measured PCB concentration profiles along the shoreline, assessed historical PCB loadings, compared C_{PSD} and C_{free} (calculated from C_{PSD}) with C_{SED}, and will compare C_{PSD} and C_{free} with future fish tissue measurements. Eight sites were sampled in the summer of 2020, including monitoring inside and outside a detention pond adjacent to Steinberger Slough. Passive samplers were attached to metal rods and deployed for two months; sediment cores were taken manually. Grain size, total organic carbon, and suspended sediment concentration were all measured.

Yeo-Myoung reviewed the results from the sites. There were three key sites identified in this effort. The Detention Pond Outlet (Station 2) recorded the highest PCB availability of all stations, peaking at a depth of 10 cm. This pattern matched the pattern of sediment concentrations.

Pulgas Creek (Station 1) had elevated levels of PCBs at 40 cm depth, while inside the Detention Pond (Station 6) recorded the lowest surface PCB levels. Yeo-Myoung noted a weak association between sediment PCB and passive sampling device (PSD) concentrations. This could have been due to spatial heterogeneity (consideration of TOC) or site-specific hydrodynamic conditions affecting PSD measures (ex-situ PE uptake). However, in-situ PE uptake was found to correlate with ex-situ PE uptake.

The high concentration of PCBs found at Pulgas Creek was of high interest. A historically contaminated area, upstream of the Pulgas sampling site, has shown the highest PCB concentration in stormwater in the Bay Area. The samples from this area are dominated by low-chlorinated Aroclors. Given the depth of the peak concentration found at this site, group members inquired about the age/dating of the cores. No dating was done on the sediment cores, so it is not possible to accurately age the deposit.

Yeo-Myoung reviewed the homolog analysis. In situ PCB homolog patterns at the Detention Pond Outlet and at Seaport (Station 5) were found to be similarly dominated by penta-chlorinated biphenyls. The study observed an increased amount of heavier chlorinated biphenyls in ex-situ PE uptakes. The major takeaway from the homolog results was the dominance of lower chlorinated PCBs observed at historical hotspots, with mono, di, and tri-PCBs contributing more than 50% of the PCBs found at Pulgas Creek. Jon remarked on the correlation of the pattern at this site and the historical stormwater data, which suggests higher loadings at this site. Jay commented that this is a unique profile, as the low chlorinated congeners typically do not persist in the environment. Prey fish collections in 2022 will evaluate if these congeners will appear in the food web.

4. Information: Progress on Steinberger Slough/Redwood Creek Sediment and Prey Fish Study

Don Yee gave an update on the Steinberger Slough/Redwood Creek Sediment and Prey Fish Study. This is a two-year effort of which collection has already been funded for 2022. Don reviewed the objectives and design of the study, recalling a similar 2016 surface sediment study in San Leandro Bay. New sites have been added for a total of 16 sites, distributed through the complex. Composite samples can be taken from up to 25 meters from the target location, acting as a channel cross-section. Prey fish will be sampled at five sites (three composites at each), consisting of primarily topsmelt. Steinberger Slough sites can be abandoned as needed if fish cannot be found. Marco Sigala provided some insight into the capture process. All methods (trawling, net casting) will be attempted during the end of August and beginning of September. This timing is similar to the San Leandro Bay study. Sampling will be targeted to medium tide or higher.

5. Decision: Proposal for Year 2 of the Steinberger Slough/Redwood Creek Sediment and Prey Fish Study

Jay noted that year 2 of funding for the SS/RC sediment and prey fish study was the only proposal coming out of the Workgroup this year that required approval for funding. This request is to fund the laboratory analysis and technical report production for the already funded collection happening in 2022. Frank Gobas expressed support for the proposal, noting the need to continue finding more biota samples. Jon Konnan inquired about the concentration and abundance of PCBs and fish in the area, with Jay noting low abundance of fish in Steinberger Slough in past efforts. PCB concentrations in shiner surfperch and prey fish in Redwood Creek have been high. Luisa inquired about the marine mammal study proposed by the Emerging Contaminant Workgroup and suggested adding PCB analysis to the CEC suite being analyzed. Melissa explained that this would be possible but is subject to the type of tissue that will be captured.

6. Information: Regulatory and Management Update on San Leandro Bay

Jay asked the group about any regulatory and management updates for San Leandro Bay. Helen Hild noted the Water Board was working on an internal document that will soon be shared to management regarding the GE property. Helen described a 13267 letter that requires data collection in Arroyo Viejo in the tidally influenced channels around their site. Steve Armann informed the group that the data provided by the RMP was used to require GE to clean out the 54th street storm drain and that GE is now moving forward with a workplan to begin this cleaning.

7. Information: Update on PMU Stormwater Sampling (2019 SEP, 2022 Augment)

Alicia Gilbreath of SFEI gave an update on the stormwater sampling efforts funded by a Supplemental Environmental Project (SEP). A key goal of the work was to improve load estimates into Emeryville Crescent and San Leandro Bay. Concentrations of PCBs and SSC were taken across three to four storms per watershed (three in Emeryville Crescent and two downstream of GE). She noted there was $25k left of the initial $67k budget with an additional $22k approved by the RMP to sample stormwater sites associated with the GE property. Alicia detailed key sites of high concentration, including Zone 12 Lines H and I which potentially drain the GE site, as well as Ettie Street Pump Station.Alicia noted many of these sites were associated with old industrial land use. She proceeded to review the watersheds draining into the Emeryville Crescent and San Leandro Bay. The team analyzed particle ratios for sampled storms and modeled average estimates across the area. In San Leandro Bay near the GE site, Alicia noted a lower PCB signal at Zone 12 Line H, which could be due to an influx of sediment from upstream - high concentrations at this site could also be diluted by the larger watershed.

The team will sample two upstream locations next rainy season. Steve Armann will reach out to Alicia to coordinate future upstream sampling with GE. He noted that there should be less PCBs leaving this site as GE has cleaned the 54th Street storm drain as well as all intersecting storm drains.

Alicia concluded the item by previewing future workplans. The RMP plans to continue sampling Zone 12 Lines H and I for two additional storms, adding the sites upstream of GE. Following laboratory analysis, a short data report will be generated that will include load estimates for the five watersheds, as well as findings for measured PCB concentrations upstream and downstream of the GE site. She noted that due to conflicting schedules, AMS is no longer able to assist the RMP with gaining access to these sites. The RMP will have to speak to Alameda County Flood Control District to obtain access permits; please contact Alicia if you have any leads on this issue.

8. Information: Progress on San Leandro Bay Sediment and Passive Sampler Study

Diana Lin of SFEI gave a project update on the progress of the San Leandro Bay sediment and passive sampler study. The project seeks to establish a baseline for monitoring the in-Bay response to expected PCB loading reductions from recent and pending clean up actions at the GE and Union Pacific Railroad sites. Diana reviewed preliminary work done in 2016 that took sediment and PE profiles at three sites. That study confirmed previously reported contamination trends and found a correlation between sediment PCBs and PE uptake. The recent project included sampling at nine sites downstream of the GE and Union Pacific Railroad sites in the mid-Bay for two months beginning in December 2021. Five slices of each sediment core, along with duplicates, were collected at each station, totaling 90 samples sent to Stanford. Sediment trap samples were analyzed for sediment PCBs, TOC, and grain size. Results will be received this fall and a report will be published next year. Tom Mumley suggested adding more analytes to this study if possible. However, the budget and timeline for this study will not allow for this addition. Frank recommended drying out the biofilm and weighing it before and after to potentially measure any PCBs that may have been discarded. Yeo-Myoung and Diana will keep this in mind for future studies. Jay thanked Stanford for its collaboration and noted upcoming CECs-focused stormwater work from graduate student Chandler Brown.

9. Discussion: In-Bay Contaminant and Sediment Fate Model Study

Jay opened the item by acknowledging the multiple connections between this study and others within the RMP, answering questions for the Emerging Contaminants and Sediment Workgroups, as well as the Nutrient Management Strategy (NMS). He also noted the various sources of funding that will support this effort, including $408k of SEP funds. The upcoming Water Quality Improvement Fund also presents an opportunity for potential additional support.

All comments have been received on the draft modeling strategy and the report will be finalized soon. Jay reviewed the management questions for PCBs, CECs, and sediment that guide the modeling strategy.

Craig Jones then provided an overview of the study plan. Craig began by acknowledging the EPA modeling strategy guide that recommends developing a conceptual site model that identifies the nature and extent of contamination and the processes relevant to ongoing contamination and recovery. After a complete modeling study is conducted, the results will be used in conjunction with empirical data to refine the conceptual model for the Bay and address management questions. He noted that models are not necessarily the only tools to address management questions. Craig proceeded to outline the model capability requirements for this effort, noting that the model will mainly be focused on particles and particle-bound contaminants. He gave examples of desired outputs such as distribution fields for contaminant loads from tributaries and other pathways over time, rates of sediment accumulation in areas of interest, and surface sediment and contaminant distributions.

Acknowledging the request for more details that the group voiced during the April PCB Workgroup meeting, Craig outlined the general workplan for this modeling strategy. This five-phase workplan will begin in 2022 with Phase 1, using the existing NMS hydrodynamic model to address specific PCB loading and sediment recovery questions in an area of high management interest, San Leandro Bay (SLB). Craig noted the RMP already has a wealth of data from SLB, and with its broad intertidal flats, SLB is an excellent microcosm of the Bay. The present model grid stretches from Alameda to San Leandro Bay with good resolution. Sediment boundary conditions for tributaries and local sediment data will be compiled and evaluated, from the wealth of data already available in the Bay. A diagnostic model will be set up for local SLB simulations in dry and wet condition scenarios with a focus on sediment-associated PCBs. Each of the four main loading scenarios will be evaluated, investigating the load of PCBs entering the Bay and attempting to locate areas of influence. Diagnostic model simulations will be conducted to compare modeled sediment distribution alongside sensitivity testing. Additional scenarios for CEC model evaluation and diagnostics will be developed with a focus on dissolved phase transport. Taking a sidebar to speak about sediment transport, Craig noted the model would begin by only investigating sediment loadings and the immobile sediment bed, then moving to fine sediment before investigating the depositional footprint.

Following the presentation of the first phase of the plan, advisors provided feedback. Earl Hayter appreciated that the study began with a smaller microcosm and inquired about the boundaries of the model. Craig explained that, as a subset of the full NMS grid, this submodel will be able to operate with much higher resolution. Frank Gobas also appreciated this concentrated approach but voiced concern about the spatial resolution of the grid. Additionally, he was skeptical of using one comprehensive model to answer many diverse management questions.

Dave Senn of SFEI provided additional context of the multifaceted nature of the questions each team was trying to answer, with the NMS interested in light extinction in conjunction with

modeling PCBs as different approaches to measuring sediment transport. Dave noted that the NMS previously had not invested in a sediment transport model but that now is a good time with other groups building momentum seeking to answer related questions. He also acknowledged the eight years of data that the hydrodynamic model has accumulated. Frank advised the team to continue fine tuning objectives. Tom Mumley pointed out that this project is able to remain flexible due to the support of SEP funds, as the project proceeds with the knowledge it will have to adapt to many situations. He suggested conducting flux work at key points of interest, such as the San Leandro Bay Bridge. This could help groundtruth the Bay models as there is high confidence when measuring here. Richard Looker inquired about the multi-box model results and the difficulty of simultaneously tracking sediment movement and estimating sediment loads. He inquired about the workload necessary to use the model to track PCBs and nutrients. Craig explained that TSS consists of both organic and inorganic sediment, although this ratio is highly variable.

The workgroup will also investigate transport and dilution patterns of CECs from various sources of interest in the Bay. Phase 2 of the workplan consists of expanding the modeling process to Redwood Creek with Phase 3 developing and validating a whole Bay sediment and contaminant transport model for use in addressing management questions. Phase 4 is focused on developing and validating a bioaccumulation model suitable for application with PMU models. Phase 5 would consist of investigating long term scenarios, maintaining the model, and providing model applications to other management challenges in the Bay. To help validate the hydrodynamic model, salinity data will be compared to USGS cruise data.

$56k has been allocated for 2022 with additional proposed budget amounts and timing in the writeup idealized without limits on funding or workflow. Craig concluded his review of the draft modeling strategy by noting the balance that must be reached by modeling: increasing complexity will increase accuracy up to a point at which uncertainty will be introduced. Complexity will only be increased as we understand more about the model and the Bay.

Jay noted the need for more frequent check-ins for this model development and will schedule meetings accordingly for the watershed dynamic model in SLB portion and for the whole Bay model in general. He noted the overlap with the pilot integrated modeling of watersheds and the Bay effort and the close connection between watershed and Bay monitoring. Jay concluded the item by thanking Craig for his contributions to this effort and all advisors and workgroup members in shaping this document.

10. Discussion: Update of the PCBWG Multi-Year Plan

Jay updated the group on the status of the PCB workgroup's Multi-Year Plan. Keeping a focus on priority management questions, the group had allocated $56k in 2022 for the fate modeling study. An additional study proposed for 2023 is the chemical analysis and reporting for the

Steinberger Slough/Redwood Creek Sediment and Prey Fish Study. By 2023, the fate model will be funded by other sources such as the SEP and WQIF for the remainder of its duration. In 2024, sport fish will be monitored in PMUs as part of long-term trend modeling. It is possible to monitor three PMUs. In 2027, the tentative plan is for passive samplers to be used to monitor Steinberger Slough, followed by Redwood Creek in 2028. Tom advised the group to be ready to accept new penalty funds should they be made available. Jay proposed to record flux measurements as a study eligible for SEP funding with advisors agreeing that flux measurements are key to informing relationships between PMUs and the Bay while also able to validate models. Don also recommended measuring sedimentation rates, with Frank supporting this. Tom noted these efforts could be mobilized quickly if funding and staffing are available.

11. Review Next Steps and Action Items and Adjourn

To end the meeting, Jay outlined the following next steps and action items. Comments on Steinberger Slough/Redwood Creek passive sampler report should be submitted by June 21st. The Year 2 proposal of the Steinberger Slough/Redwood Creek preyfish study will be brought to the June Technical Review Committee meeting. Don will draft SEP concepts for the sediment flux studies to present to the TRC as well. Alicia and Steve will coordinate a sampling workplan for the GE site. Jay will plan and schedule additional check-ins for the Bay contaminant and Sediment Fate Model, for which a final report will be released in three weeks.