REGIONAL MONITORING PROGRAM FOR WATER QUALITY IN SAN FRANCISCO BAY

sfei.org/rmp

Technical Review Committee

Tuesday June 23, 2026 at 9:00 AM – 4:00 PM

Hybrid Meeting

In Person: SFEI Large Conference Room

Remote Access: https://us06web.zoom.us/j/88380356016; **Meeting ID:** 88380356016

Dial by your location: +1 669 900 6833 US (San Jose), +1 253 215 8782 US (Tacoma)

AGENDA

1.	**Introductions and Review Agenda**	9:00 AM (10 mins) Bridgette DeShields
2.	**Decision: Approve Meeting Summary from March 25, 2026, Review/Confirm/Set Dates for Future Meetings** <u>Scheduled meetings</u> Technical Review Committee: ● Wednesday September 16, 2026 ● December 2026 - TBD (possible dates 12/9, 12/16, ?) Steering Committee: ● August 24, 2026 ● MYP Workshop and SC meeting - November 16, 2026 Annual Meeting: ● October 21, 2026 **Materials**: ● March TRC Meeting Summary, see pages 5-15 **Desired Outcomes:** ● Approve meeting summary ● Confirm meeting dates	9:10 AM (10 mins) Bridgette DeShields
3.	**Information: SC Meeting Summary from April 13, 2026** Topics discussed at the April SC meeting included: ● RMP Financial Update for 2026 Q1 ● RMP Planning Update ● Workgroup Planning Update ● 2026 S&T Monitoring Update ● AI Use on RMP Products **Materials**: April SC Meeting Summary, see pages 16-24 **Desired Outcome:** ● Informed Committee	9:20 AM (10 mins) Amy Kleckner

<table>
<tr><td>4.</td><td>Information/Discussion: RMP Planning Update

The RMP Manager will update the Committee with the current status of the Tracking Bay Health grant funding and review the special studies planning budget for 2027. The Committee will briefly discuss planning for 2028-2030 funding allotments. The agenda item will close with a discussion over the question of whether a special study should result in a journal article or technical report.

Materials: Slides presented at meeting

Desired outcomes:
● Informed Committee
● Guidance on planning related to future EPA funding allotments
● Guidance on special study final deliverables</td><td>9:30 AM
(45 min)

Amy Kleckner</td></tr>
<tr><td>5.</td><td>Discussion: Presentation of Special Study Proposals Recommended by Workgroups
Starting in March, the RMP workgroups met to develop proposals for special studies in 2027. For this agenda item, the recommended proposals and other outcomes of the WG meetings will be briefly summarized by the workgroup leads, followed by an opportunity for the TRC to ask clarifying questions. TRC recommendations for funding will be made in the next agenda item.

● Emerging Contaminants: 8 proposals (~25 mins)
● Microplastics: 1 proposal (~5 mins)
● Sources, Pathways, & Loadings: 5 proposals (~15 mins)
● Sediment: 4 proposals (~10 mins)
● PCBs: 1 proposal (~5 mins)

Materials: Summary tables, see pages 25-29; and proposals, see pages 30-166 (specific page numbers for each proposal are listed in Table 1 on pages 25-26)

Desired Outcome:
● Discussion and clarification on proposed studies</td><td>10:15 AM
(65 min)

Workgroup Lead Scientists</td></tr>
<tr><td></td><td>BREAK</td><td>11:20 AM
(10 mins)</td></tr>
<tr><td>6.</td><td>Decision: Recommendation for Special Studies for 2027

RMP Special Studies are identified and funded through a three-step process. Workgroups recommend studies for funding to the TRC. The TRC weighs input from all the workgroups and then recommends a slate of studies to the Steering Committee. The Steering Committee makes the final funding decision. The TRC will need to prioritize proposals to reach the amount of 2027 special studies funding available (approx. $2.75M). Additional funding may become available from SEP settlements in 2027. Proposals that exceed the 2027 special studies budget could be recommended to be added to the SEP list.</td><td>11:30 AM
(60 mins)

Bridgette DeShields</td></tr>
</table>

	Desired outcomes: ● Recommendation to Steering Committee on a suite of studies for 2027 special studies funding totaling approx. **$2.75M** ● Recommendation of any new proposals to be eligible for SEP funding	
	LUNCH	12:30 PM (30 min)
7.	**Information/Decision: Watershed Dynamic Modeling Workplan 2027** RMP lead watershed modeler will summarize the plan presented to and approved by the Sources Pathways and Loadings workgroup for use of Tracking Bay Health funds to advance the watershed dynamic model in 2027. Discussion will provide an opportunity for the TRC to ask clarifying questions. **Materials**: Slides presented at meeting; WDM 2027 Workplan, pages 118-127 **Desired Outcomes**: ● Informed Committee ● Committee approval to proceed with 2027 workplan	1:00 PM (30 min) Matthew Heberger
8.	**Information/Decision: PCB TMDL Studies 2027** The RMP Lead Scientist will summarize the plan under development by the PCB workgroup for use of Tracking Bay Health funds to support PCB monitoring studies to inform the PCB TMDL revision in 2028. Discussion will provide an opportunity for the TRC to ask clarifying questions. **Materials**: Slides presented at meeting; 2027 Stormwater Monitoring proposal, see pages 158-162 **Desired Outcomes**: ● Informed Committee ● Committee approval to proceed with 2027 study proposals	1:30 PM (30 min) Jay Davis, Alicia Gilbreath
9.	**Information/Decision: Fixed Monitoring Station Network Update** Project PIs will summarize the information presented to the Sources, Pathways, & Loadings workgroup using Tracking Bay Health funds to support the development of a Fixed Monitoring Station Network. Progress on the selection of a pilot station to be completed in 2026 will be shared. Discussion will provide an opportunity for the TRC to ask clarifying questions. **Materials**: Slides presented at meeting **Desired Outcomes**: ● Informed Committee ● Committee approval to proceed with plans for the FMSN	2:00 PM (30 min) Lester McKee, Alicia Gilbreath
	BREAK	2:30 PM (10 mins)

10.	**Discussion: Plus/Delta on Workgroup Meetings** Over the last three months, the RMP workgroups met to provide updates on current studies underway and develop proposals for special studies in 2027. **Desired outcome:** ● Feedback on 2026 workgroup meetings	2:40 PM (15 min) Amy Kleckner, Jay Davis
11.	**Discussion: Communications Update** Discuss progress on the 2026 RMP Pulse. Move toward finalizing the 2026 Annual Meeting agenda. Update on implementation of the Communications Strategy. **Desired outcomes**: ● Feedback and input from Committee	2:55 PM (40 min) Jay Davis, Sierra Garcia
12.	**Information: Status of Deliverables and Action Items** **Materials:** Deliverables and Action Item Reports, see pgs 167-180; slides presented at meeting **Desired outcome:** ● Informed Committee ● Feedback on progress and due dates	3:35 PM (15 min) Amy Kleckner
13.	**Discussion: Plan Agenda Items for Future Meetings** **Desired outcome:** ● Identify future agenda items	3:50 PM (5 min) Jay Davis
14.	**Discussion: Plus/Delta**	3:55 PM (5 min) Bridgette DeShields
	ADJOURN	4:00 PM

DRAFT FOR EXTERNAL REVIEW

Bay RMP Technical Review Committee Meeting

March 25, 2026

Draft Meeting Summary

Attendees

TRC Member	**Affiliation**	**Representing**	**Present**
Jamie Rose Sibley Yin	US Army Corps of Engineers	USACE	**Y**
Alicia Chakrabarti	EBMUD	POTW	**Y**
Tom Hall	EOA, Inc.	POTW	**Y**
Samantha Engelage	City of Palo Alto	POTW	N
Heather Peterson	City and County of SF	CCSF	N
Simret Yigzaw	City of San Jose	City of SJ	**Y**
Bridgette DeShields*	Integral Consulting	Refineries	**Y**
Chris Sommers	BAMSC (EOA, Inc.)	Stormwater	**Y**
Shannon Alford	Port of San Francisco	Dredgers	N
Richard Looker	SF Bay Regional WQCB	Water Board	N
Dan Hossfeld	US EPA	US EPA-IX	N
Aundi Mavoli	Baykeeper	NGOs	N

* Chair, alternates in gray and italicized

Staff and Others

- Jay Davis – SFEI
- Amy Kleckner – SFEI
- Martin Trinh – SFEI
- Sierra Garcia – SFEI
- Alicia Gilbreath – SFEI
- Michelle Azurin – SFEI
- Adam Wong – SFEI
- Don Yee – SFEI
- Cristina Grosso – SFEI
- Rebecca Sutton – SFEI
- Tom Mumley – Retired
- *Gerardo Martinez – SFBRWQCB*
- Setenay Frucht – SFBRWQCB
- Blake Brown – Central San
- *Bryan Frueh – City of San Jose*
- Paul Salop – AMS

1. Introductions and Review Goals for the Meeting (00:00:00)

Attendees introduced themselves, representing various entities including the Water Board, SFEI, and dischargers.

2. Decision: Approve Meeting Summary from December 9, 2025 Review/Confirm/Set Dates for Future Meetings, Confirm TRC Chair (00:03:00)

The meeting began with the formal approval of the meeting summary from December 9, 2025. Bridgette DeShields called for comments or changes, and receiving none, the summary was approved by the group. The Committee then moved to coordinate future meeting dates for 2026. For the June meeting, Bridgette noted a conflict with the 17th, leading the group to evaluate dates in late June. Chris expressed a preference for the 22nd or 23rd; the group ultimately reached a consensus to hold the meeting on Tuesday, June 23rd. Regarding the September meeting, Tom Mumley identified a conflict between the proposed 23rd date and the "Restoring the Nation’s Estuary Conference" in San Francisco. To avoid this overlap, the Committee selected September 16th. Finally, Amy Kleckner confirmed that the Annual Meeting is locked in for October 21st at the David Brower Center.

Martin Trinh shared that this would be his final TRC meeting after five years with the group. Jay Davis and the rest of the Committee expressed their gratitude for Martin’s excellent contributions to the RMP and fish studies, noting that Michelle Azurin would be stepping into his notetaker role temporarily. The session concluded with the confirmation of the TRC Chair. Chris nominated Bridgette to continue her leadership; the motion passed without opposition.

Decisions

- **Approved:** The meeting summary from December 9, 2025, was approved without changes.
- **Meeting Date Set:** The June TRC meeting is scheduled for **Tuesday, June 23rd**.
- **Meeting Date Set:** The September TRC meeting is scheduled for **September 16th**.
- **Chair Confirmed:** Bridgette was confirmed to continue as the TRC Chair.

Action Items

- **Calendar Invites:** Amy will send out calendar invites for the Annual Meeting on October 21st at the David Brower Center.
- **Scheduling:** Finalize and send invites for the newly agreed-upon June and September TRC dates.

3. Information: Steering Committee Meeting Summary from January 26, 2026 (00:10:17)

Amy provided an overview of the January 26, 2026, Steering Committee meeting, noting that the RMP Charter remains unchanged and the 2026 Multi-Year Plan has been officially approved and posted online. Financial updates for the fourth quarter of 2025 showed 99% of fees collected, with the Water Board assisting in recovering the final 1% of outstanding dredger fees. Looking ahead, the Committee discussed a two-year extension for the "Tracking Bay Health" grant and addressed an upcoming EPA policy change regarding Quality Management Plans, concluding that the RMP is already well-prepared with a designated Quality Assurance officer.

The update also highlighted staffing and project statuses, including the hiring of Jennifer Sun and Noah Rudko to the Emerging Contaminants team starting in April. While progress was made on many deliverables, the PFAS Synthesis and Strategy was identified as a high-priority delayed item, and a rejected NTA in Sediment manuscript will be reformatted as a technical report to fulfill enforcement order requirements. Communications efforts are showing growth in social media and webpage engagement, with the 2026 Annual Meeting theme confirmed as "Nutrients" and the Pulse report on track for an October release. There were no comments or questions from the group.

4. Information: RMP Planning Update (00:16:55)

The RMP planning update kicked off with the significant news that the final allotment for the Tracking Bay Health grant was received, bringing the overall five-year request to $23.5 million. This funding comes with a no-cost extension through September 2031, providing the team more time to execute complex studies and scale up staffing. Amy noted that the immediate focus is the semi-annual progress report due at the end of April and the initiation of RFQs for numerical modeling, field support, and laboratory analysis. To avoid redundant paperwork, the update to the Quality Assurance Program Plan (QAPP) will be deferred until the fall of 2026, once the 2027 studies are finalized. The conversation also touched on the logistical challenge of tracking matching funds; since "Tracking Bay Health" funds cannot be used as a match for other EPA grants, the team must be meticulous in balancing core RMP funds with restricted federal dollars.

Staffing remains a critical priority over the next six months. While two new hires are joining the Emerging Contaminants team in April, Amy highlighted a list of 5–6 upcoming positions ranging from environmental analysts to senior scientists, which will help create redundancy for Don Yee and Alicia Gilbreath. Jay then summarized a $3.2 million EPA proposal titled "Protecting Bay Fishers," which seeks to fund and expand a bioaccumulation monitoring plan originally developed under SWAMP. The proposal focuses on obtaining higher-resolution fish consumption data (targeting 1,300 surveys) and implementing risk communication strategies through partnerships with the Sequoia Foundation and the Department of Public Health.

The ensuing discussion focused on the frequency of fish monitoring. Tom and Chris both emphasized that while legacy contaminants like mercury and PCBs are declining very slowly, PFAS is a "high concern" driver that may show more rapid trends and require more frequent sampling than the current five-year cycle. Jay noted that the proposed 2027 sampling would hit the "middle" of the RMP's traditional cycle, providing a critical data set to detect trends. The Committee discussed the effort to secure matching funds for this proposal, which included a request for $40k/year in RMP strategy funds to cover Jay’s time. While the Steering Committee supported the match, Tom noted that future meetings should include a more strategic discussion on how matching funds are leveraged across different SFEI and external projects.

5. Information/Discussion: Workgroup Planning Update (00:43:40)

Amy opened the session by outlining the heavy workgroup schedule for the spring. Several strategy teams and workgroups (Selenium, Mercury, and Sediment) have already met, with upcoming two-day sessions for the Emerging Contaminants (ECWG) and Sources, Pathways, and Loadings (SPL) workgroups. Becky presented a diverse array of high priority proposals for the ECWG, highlighting a shift toward multi-year planning. Key initiatives include a three-year stormwater CEC monitoring plan focused on PFAS in the first year, a study on "ultra-short" PFAS in Bay water, and a new effort to track flame retardants in bird eggs. Becky also detailed work on tire-derived contaminants (6PPD-quinone and HMMM) and a high-priority study for BACWA on Quaternary Ammonium Compounds (QACs), which have been causing treatment upsets in wastewater facilities. Diana Lin followed with the Microplastics update, proposing a three-year stormwater monitoring study. She also sought to reallocate a surplus from previous strategy funds to cover budget shortfalls in vessel contracts and manuscript writing for the tire rubber study. Tom advised that while the request was reasonable, she should follow protocol by seeking formal Steering Committee approval for the budget shift.

Scott Dusterhoff and Matt Heberger provided updates on Sediment and SPL, respectively. Scott introduced a plan to develop sequential conceptual models for bay sub-embayments, with South Bay as the next priority, as part of the "Schoellhamer Cycle". He also discussed an ambitious 10-year, $7 million Bay Modeling Study Plan, suggesting that modeling coordination discussions might eventually need to move to a dedicated forum outside the Sediment workgroup. For SPL, Alicia and Matt highlighted the Watershed Dynamic Model (WDM) and the development of a fixed monitoring station network, with the first pilot site expected to be operational this fall. Jay concluded the workgroup reports by focusing on legacy contaminants. Mercury synthesis products are nearing a June deadline, while PCB efforts are pivoting toward a $2 million "Tracking Bay Health" plan. This plan is still under development but tentatively includes further development of Priority Margin Unit (PMU) conceptual models and expanding the OPTICS study from San Leandro Bay to Steinberger Slough.

The section wrapped up with Jay introducing a new "Cross-Workgroup Coordination" tool—a tracking table designed to manage projects that overlap multiple workgroup topics. The tool categorizes workgroups as Primary (P), Secondary (S), or Secondary Plus (S+), with the latter denoting a mandatory technical review role. Chris and Tom discussed the functional logistics of this tool, specifically how to ensure "S+" advisors are invited to the correct meetings without creating "meeting fatigue." Tom emphasized that this framework is essential for integrating Bay modeling and monitoring across the RMP. The group reached a consensus to use the table as a living document, adapting it as they learn which coordination methods (sharing reports vs. joint meetings) work best for different project types.

Action Items

- **Budget Protocol:** Diana will work with Amy to draft a formal request for the April Steering Committee meeting to reallocate the microplastics strategy surplus to underbudgeted contracts.
- **Meeting Invitations:** Jay and the workgroup leads will identify "S+" advisors for upcoming May meetings and ensure they receive invitations to relevant technical discussions.

6. Information/Discussion: 2025 Aquatic Toxicity Testing Results (01:56:47)

Ezra Miller presented the results from the 2025 water cruise aquatic toxicity testing, a check-in the RMP performs every six years. The testing utilized Mysid shrimp (*Americamysis bahia*) to evaluate 7-day survival and growth across nine stations. Ezra shared that no toxicity was observed at any station, with survival and growth rates mirroring the control groups. While the study was technically sound, it prompted a deeper discussion regarding the statistical methods and the long-term value of the program. Ezra asked the Committee to weigh in on whether to continue using the traditional "No Observed Effect Concentration" (NOEC) method or switch to the "Test of Significant Toxicity" (TST), which is now the standard for California effluent testing.

The Committee's discussion quickly pivoted from statistical nuances to whether ambient toxicity testing should be continued at all. Tom Hall questioned the value of spending resources on a test that hasn't yielded a "hit" in over 12 years, noting that 100% effluent rarely shows chronic toxicity anymore. Chris added that toxicity in the region is almost exclusively associated with urban pesticide use in creeks, which is already monitored and managed through other regulatory programs. The group reached a consensus that infrequent, ambient sampling is unlikely to capture episodic events and lacks a clear regulatory driver. Consequently, the TRC decided to recommend that the Steering Committee consider suspending the testing or, at minimum, aligning it with the 10-year California Toxics Rule (CTR) monitoring cycle to save costs and leverage concurrent data.

Decisions

- **TIE Sampling:** Agreed to immediately discontinue the collection of extra water volume for Toxicity Identification Evaluations (TIEs), as the logistical burden outweighs the minimal likelihood of needing a TIE.
- **Statistical Reporting:** If testing continues in any form, the RMP will have the labs report both NOEC and TST statistics, as the incremental effort for the lab is negligible.

- **Programmatic Recommendation:** The TRC recommends that the Steering Committee evaluate "suspending" or "deleting" ambient aquatic toxicity testing from the Status and Trends program, given the lack of observed toxicity over the last decade and the absence of a clear regulatory requirement.

Action Items

- **Steering Committee Briefing:** Jay and Amy will convey the TRC's recommendation to the Steering Committee, specifically highlighting the lack of regulatory necessity and the potential to reallocate these resources.
- **Alignment Check:** Jay and Amy will inquire with Water Board representatives if there are any specific management reasons or hidden regulatory drivers that would necessitate maintaining the current 6-year cycle before a final suspension is enacted.

7. Information/Discussion: 2026 S&T Monitoring Plans Update (02:27:40)

Amy provided an update on the 2026 Status and Trends (S&T) monitoring, with a focus on the North Bay Selenium study. The Selenium Strategy Team met on March 11 to review sampling results through 2023 and discuss future plans. A primary development for 2026 is a collaboration with the California Department of Fish and Wildlife (CDFW) beginning in April. RMP staff will join CDFW tagging cruises to collect sturgeon muscle plugs and egg/ovary tissue, a method that provides more samples for less money than previous private charters. Jay and Ezra discussed the potential to use these egg/ovary samples for both selenium and Contaminants of Emerging Concern (CECs), noting the need to coordinate on specific container types and tissue mass requirements. Amy confirmed that leftover tissue will be archived for future analysis, and that there will be additional opportunities to collect samples in 2027.

Logistically, the RMP will use the *Questuary* (Cal Poly Maritime) for water, clam, and sediment sampling, with field support from AMS. The USGS has been selected as the analytical partner for selenium in tissue samples because their methods require significantly less tissue mass than previous laboratories used. Amy also noted that she is currently reviewing a data release from the USGS that covers missing selenium data from 2011 to 2019, which will be included in a final report alongside new data by the end of 2027. On the stormwater front, Martin reported on a "mixed" season of precipitation. Despite long dry spells, the team successfully captured 18 of the targeted 22 CEC samples using small remote samplers. The "large remote" automated sampler pilot is technically ready but currently awaiting a significant storm to launch.

Action Items

- **CDFW Coordination:** Amy to contact Vanessa at CDFW immediately regarding the line-setting schedule for April.
- **Workgroup Agenda:** Amy to reach out to Becky about possibly adding the discussion of sturgeon ovary CEC analysis to the upcoming ECWG meeting agenda.

8. Discussion: AI use on RMP Products (02:47:10)

Amy presented an overview of the SFEI AI Framework and Governance, which distinguishes between established analytical AI and newer generative tools like Gemini, ChatGPT, and Claude. SFEI staff are currently approved to use Gemini within the secured Google Workspace environment, but use of personal accounts or non-Gemini tools requires specific IT permission. For projects funded by federal or state agencies, staff must confirm agency-specific AI permissions before use. The core standards of the policy dictate that humans must remain the lead intellectual contributors; AI is intended as a tool for efficiency rather than a replacement for human judgment. All AI outputs require human review, disclosure to partners, and a commitment to environmental responsibility.

Amy highlighted that current narrative meeting minutes require approximately 20 hours of labor to produce, leading to a discussion on whether such extensive documentation is necessary now that meetings are routinely recorded and transcribed. Committee members expressed that the existing "minutes" format is often excessive and favored transitioning to a more efficient, AI-assisted "true" summary format. This change is intended to focus on the core dialogue and logic leading to outcomes, utilizing AI to generate concise overviews while ensuring that staff remains the primary author of final decisions and action items. Sierra Garcia and Jay expressed caution, emphasizing that while AI can be a starting point, it often oversimplifies or misinterprets technical nuances, requiring a "triple check" by staff with institutional knowledge.

The group reviewed broader use cases such as drafting plain language summaries, report outlines, and code development. Matt confirmed that AI is already a valuable time-saver for writing code. Sierra highlighted a unique application: since the public may use AI to summarize long RMP reports, staff could use AI internally to see if their main points are being captured accurately; if the AI misses the mark, it indicates a need for clearer, plain-language writing in the original document. The session concluded with a brief mention of future discussions, including with the Steering Committee, regarding contractual requirements for subcontractors and AI usage.

Action Items

- **Steering Committee Briefing:** Amy will present the TRC's feedback on AI usage to the Steering Committee in a few weeks for further guidance.
- **Subcontractor Policy:** Table the discussion on subcontractor AI compliance and contractual language for the next SC meeting.
- **Summary Trial:** RMP staff will "play" with AI prompts to find a standardized summary length (e.g., one to two paragraphs per agenda item) and solicit feedback on the new format.

9. Discussion/Information: Informatics Update (03:22:20)

Adam Wong and Cristina Grosso provided the quarterly informatics update. Adam focused on the status of various RMP datasets in the upload pipeline. Per previous Committee guidance, the team is prioritizing mercury and PCB data, specifically those required for the ongoing mercury synthesis, such as 2024 bird eggs and sport fish. Tom Hall noted that for NPDES permit purposes, the "POTW world" urgently needs access to the 2021 and 2023 water cruise data, as the 2019 dataset is currently the newest available for reasonable potential analyses. Adam confirmed that these specific water datasets are in the final review stages and are expected to be available on CD3 within a couple of weeks. To improve transparency, the Committee requested that the tracking spreadsheet be updated to include "Target Completion Dates" for public accessibility. Amy also stated that this agenda item is an opportunity for the group to request that specific data sets be prioritized, if not already.

Cristina presented preliminary prototypes for new, topic-based RMP Data Dashboards designed to make curated data more accessible than the raw outputs found in CD3. The initial focus is on mercury sediment trends, featuring interactive maps and plots that mirror RMP Pulse visualizations while allowing users to "drill down" into the underlying tabular and raw data. Jay explained that complex graphics, like the TMDL-specified length-adjusted striped bass trends, will include explanations of the data selection and regression methods used to reach the finalized figures. Tom Hall suggested a specific "canned report" use case for the dashboards: an interactive tool to query the three most recent California Toxics Rule (CTR) metals and cyanide datasets by station. Cristina and Adam agreed to mock up this simplified reporting tool to help stakeholders easily access these frequently used permit-related figures.

Action Items

- **Spreadsheet Update:** Adam Wong will add a "Target Completion/Publicly Available Date" column to the “Dataset Upload Priority” tracking spreadsheet.
- **CTR Use Case:** Cristina Grosso will develop a mock-up for a simplified dashboard tool focusing on the most recent three sets of CTR metals and cyanide data by station.
- **S&T Data:** Adam to prioritize the final review of the 2021 and 2023 water cruise data for public release on CD3 within the next two weeks.
- **Interactive Prototype:** SFEI staff to share a more interactive version of the dashboard at a future meeting for Committee "play-testing."

10. Discussion: Communications Update (03:48:45)

Jay and Sierra provided a comprehensive update on the RMP’s communication efforts, starting with the 2026 Pulse. The report is currently on schedule, with a primary theme of Nutrients. Feature articles are being drafted by the Water Board, BACWA, and SFEI’s NMS team, and the RMP has secured a Santa Cruz-based artist to provide specialized phytoplankton illustrations. The Committee brainstormed ways to leverage this art at the Annual Meeting, including using it for name tags or as a prize for survey participants to increase engagement. Jay and the group discussed ideas for the meeting's technical sessions, including a focus on Legacy Contaminants/TMDLs Revisited (highlighting mercury and PCBs), and CECs and Microplastics (including the PFAS synthesis and a new dryer study). Jay is currently coordinating with Dave Senn to identify a high-profile keynote speaker, possibly an expert in nutrient modeling.

Sierra highlighted significant progress in expanding the RMP's reach, noting that collaborations with Maven's Notebook have nearly doubled readership for the articles on stormwater. A major focus of 2026 is the implementation of Plain Language Summaries, which will be developed on a case by case basis for reports that may be of interest to non-technical audiences. These "low-lift" documents use a standardized template to highlight key takeaways and implications of RMP reports. The Committee discussed the necessity of reviewing these summaries; while they were previously generated after a report was finalized, the TRC decided the plain language summary text (Intro, Key Findings, and Implications) should be included within the body of draft reports to allow for simultaneous technical and plain-language review. Sierra requested feedback from the Committee on the plain language summaries, including on formatting or color, especially if Committee members plan to print physical copies. She also introduced the concept of "mini fact sheets" and ready-to-use slide decks based on existing Pulse content to help stakeholders communicate RMP findings to their own constituents.

The discussion moved toward stakeholder engagement strategies, with Sierra planning "coffee chats" (informal interviews) with less-engaged stakeholders to gather feedback. Chris suggested that Sierra should speak directly to individual city and county stormwater managers to understand their specific data needs. Sierra also announced that SFEI is bringing on a part-time social media freelancer in May to expand capacity.

Decisions

- **PLS Integration:** Plain Language Summaries will now be included in the body of draft reports (Intro, Findings, and Implications) for TRC review to ensure the wording is vetted alongside the technical content.

Action Items

- **Homework Alert:** TRC members should watch their inboxes on **May 11th** for the first round of *Pulse* article drafts for a three-week review.
- **Stakeholder Outreach (Homework):** TRC members to assist Sierra by sharing the survey with stakeholder networks and suggesting stakeholder professional groups/settings to connect with the "less engaged" group (email sierrag@sfei.org)
- **Stormwater Connections:** Chris Sommers will coordinate with Sierra to provide contacts for individual stormwater managers following the BAMSC Steering Committee meeting.
- **Resource Sharing:** Ezra to tag Sierra in existing CEC summary slides used for BACWA presentations to assist in creating new comms slide deck templates.
- **Review PLS Set:** Jay and Sierra to send the full set of existing Plain Language Summaries to the TRC for high-level feedback on wording, formatting, and templates.

11. Information: Status of Deliverables and Action Items (04:34:26)

Amy provided a comprehensive update on RMP deliverables, highlighting a high volume of recently completed work, as well as overdue and delayed deliverables, which are viewable in the slide deck from the meeting.

The agenda item concluded with an emphasis on inter-program communication. Tom Hall advocated for better "crosswalks" between the TRC and the Nutrient Management Strategy (NMS), citing a recently finalized NMS science update as a prime example of a report with wide-reaching relevance. Sierra Garcia noted that future RMP e-updates will now include a dedicated "nutrients quarter" to ensure that such overlapping information is consistently shared and made accessible to both programs.

Action Items

- **NMS Integration:** Amy to check in with the NMS teams for any recently completed reports that should be added to the RMP deliverables review list.

12. Discussion: Plan Agenda Items for Future Meetings (04:46:37)

The Committee concluded the meeting by outlining the agenda for the upcoming June Technical Review Committee (TRC) session. A discussion ensued regarding a recurring agenda item: the "Review of S&T Target Analyte Lists and CEC Tiers." Amy sought clarification on its necessity, and Jay explained that it was historically used to ensure S&T monitoring remained aligned with emerging contaminants of concern. However, because ECWG now handles this process thoroughly, the Committee decided that a separate agenda item is no longer required. Instead, this information will be integrated into the general S&T planning update for 2027.

Decisions

- **Agenda Adjustment:** The "S&T Target Analyte List and CEC Tiers" will no longer be a standalone agenda item; it will be included as a slide within the S&T planning update.

13. Discussion: Plus/Delta (04:49:30)

The meeting concluded with a review of the room’s new integrated audio-visual setup, which was deemed a significant improvement in sound quality over the previous "Owl" system. While the increased microphone sensitivity improves clarity for remote participants, the Committee noted it also picks up side conversations. Additionally, the group addressed the current low camera angle, and the option of utilizing the secondary podium camera for split-screen views during presentations.

Action Items

- **Microphone Etiquette:** Amy to create a reminder slide for future large workgroup meetings (specifically the ECWG) to warn in-person attendees that the new mics may broadcast their side conversations to the entire Zoom call.

REGIONAL MONITORING PROGRAM FOR WATER QUALITY IN SAN FRANCISCO BAY

sfei.org/rmp

Bay RMP Steering Committee Meeting
April 13, 2026
San Francisco Estuary Institute
Hybrid Meeting

Meeting Summary

Attendees

SC Member	**Affiliation**	**Representing**	**Present**
Eric Dunlavey	City of San Jose	POTW-Large	**Y**
Amanda Roa	Fairfield Suisun	POTW-Small	**Y**
Karin North**	City of Palo Alto	POTW-Medium	**Y**
Adam Olivieri	BAMSC / EOA, Inc.	Stormwater	**Y**
Xavier Fernandez	SF Bay Regional WQCB	Water Board	**Y**
Tom Mumley*	SF Bay Regional WQCB (retired)	Water Board	**Y**
Maureen Dunn	Chevron	Refineries	**Y**
Luisa Valiela	Environmental Protection Agency	USEPA Region 9	**Y**
Laura Tam	Bay Planning Coalition	Dredgers	**Y**
Ellie Covington	US Army Corps of Engineers	USACE	**N**

* Chair, ** Vice Chair, alternates italicized

Staff and Others:

- Amy Kleckner, SFEI
- Jay Davis, SFEI
- Michelle Azurin, SFEI
- Emily Corwin, SFEI
- Rebecca Sutton, SEFI
- Noah Rudko, SEFI
- Sierra Garcia, SFEI
- Kelly Moran, SFEI
- *Setenay Frucht*, SFBRWQCB
- Melissa France, USACE
- Tom Hall, EOA

1. Introductions and Review Goals for the Meeting (00:00:00)

The meeting commenced with Chair Tom Mumley framing the session as a "bridge meeting" within the annual cycle. He noted that while the spring agenda didn't contain high-stakes items, it served as a critical transition point for planning the upcoming year. The primary objectives identified for the session included routine business updates and necessary financial decisions regarding the reallocation of funds. Participants in the meeting introduced themselves. Following the introductions, the Chair confirmed there were no major changes to the proposed agenda and moved to proceed with the scheduled items.

2. Decision: Approve Meeting Summaries from January 26, 2026, Review/Confirm/Set Dates for Future Meetings (00:02:55)

The meeting moved quickly into administrative approvals and scheduling. The summary from the January 26, 2026, meeting was approved without correction. Amy Kleckner provided an update on action items from the previous meeting, specifically addressing requests to optimize meeting efficiency. To accommodate this, the team abbreviated financial reporting and opted for a "working lunch" format. Additionally, updates to the Supplemental Environmental Project (SEP) proposal list are underway, incorporating feedback received via email for a revised release next quarter.

The committee then coordinated dates for future sessions, with a particular focus on the Multi-Year Planning meeting. While three dates were initially proposed for November, the committee immediately ruled out November 23rd due to the Thanksgiving holiday. The group reached a consensus to hold the all-day planning session and Autumn Steering Committee meeting on Monday, November 16, 2026. The section concluded with a brief overview of the "workgroup season" schedule and a reminder that the RMP Annual Meeting is set for October 21 at the Brower Center in Berkeley.

Decisions:

- Approved the January 26, 2026, meeting summary.
- Scheduled the Multi-Year Planning Meeting and Fall Steering Committee meeting for November 16, 2026.

Action Items:

- Amy Kleckner to incorporate comments into the SEP proposal list and recirculate it next quarter. (Due 7/31/26)

3. Information: TRC Meeting Summary from March 25, 2025 (00:08:12)

Amy provided an overview of the March Technical Review Committee (TRC) meeting, highlighting several key informatics and data accessibility initiatives. Adam Wong updated the TRC on the data services queue, noting that Mercury and PCB datasets—including 2024 bird eggs and sport fish—are being prioritized for upload. Per a request from Tom Hall, the 2021 and 2023 water cruise data are slated as the next priorities and are expected to be available on the Contaminant Data Display and Download (CD3) tool before the June TRC meeting. Additionally, Christina Grosso presented prototypes for new topic-based RMP data dashboards. These interactive tools, starting with mercury sediment trends, are designed to bridge the gap between high-level visualizations found in the RMP Pulse and raw tabular data, making the information more accessible to stakeholders.

The discussion also touched on the State's Integrated Report and 303(d) list process. Tom Mumley and Xavier Fernandez noted that the data solicitation period for Region 2 has begun and will conclude on August 10, 2026. Because the process has become more streamlined following a significant "catch-up" period in previous years, no major surprises are expected in the upcoming data pull. To further assist with regulatory data needs, the RMP team plans to create a preloaded query on CD3 to allow users to access California Toxics Rule (CTR) data with fewer clicks.

4. Information/Decision: RMP Financial Update for 2026 Quarter 1 (00:14:15)

Michelle Azurin presented the first-quarter financial update, highlighting the integration of the 2026 budget, which currently holds a balance of $2.8 million and a surplus of $77,000. A primary focus of the discussion was the management of "Tracking Bay Health" (EPA) funds alongside core RMP funds. While there was a previous attempt to combine these into a single view, the team has returned to separate reporting to better accommodate how the Institute tracks these specific allotments. Tom Mumley noted that as these grant resources grow over the coming years, the committee may eventually need to reevaluate how funding is tracked to ensure continuity, but for now, the priority remains drawing down EPA funds expeditiously before tapping into core fee-based RMP funds.

Regarding budget execution, 10% of the 2026 budget has been expended, and invoicing is still pending. For the 2025 budget, which is 49% expended, the team is working to collect outstanding payments, including from Caltrans. The committee also addressed two specific funding requests: an increase for the Mercury Synthesis project and a reallocation of unused microplastics strategy funds. The Mercury Synthesis project required an additional $50,000 to cover coordination and technical drafting ahead of a June deadline set by the Water Board. Additionally, Diana Lin requested to repurpose $18,000 in unused strategy funds to cover tire storage for the tire rubber marker analysis, manuscript writing with partner NIVA, and vessel charter costs. Tom Mumley emphasized that while he supports the manuscript in principle, the group needs to check in again once the study results are available toward the end of the year. This will allow the committee to confirm that the findings warrant a formal publication before the RMP fully commits to funding the manuscript production. Additionally, Diana will use the remaining unused Microplastic strategy funds from 2024/2025 to cover 2026 strategy costs instead of making a request to the committee for additional funds.

Decisions:

- Approved the request to pull $50,000 from undesignated funds for the Mercury Synthesis project.

- Approved the request to use $18,000 of unused Microplastics Strategy funds (2024/2025) for tire study storage, a NIVA manuscript/open access fees, and vessel charter costs, on the condition that an update be provided to the committee in late 2026 (likely the January 2027 meeting) regarding the Tire Rubber Marker study results to confirm a final decision on funding the manuscript with NIVA.

Action Items:

- Michelle to follow up with Jazzy at the Water Board and/or Caltrans regarding the outstanding 2025 payment, noting potential personnel turnover at the agency. (Due 4/30/26)
- Diana Lin to provide an update in late 2026 (likely the January 2027 meeting) regarding the Tire Rubber Marker study results to confirm the final decision on funding the manuscript with NIVA. (Due 1/31/27)

5. Information/Discussion: RMP Planning Update (00:38:00)

Amy announced that the EPA officially awarded the RMP its full Tracking Bay Health grant of $23.5 million on March 10, 2026, which included a no-cost extension through September 2031. This significant funding allows for long-term planning through 2030, with the first nine months of 2031 serving as a buffer. Next steps include a semi-annual progress report due at the end of April and the launch of RFPs/RFQs for modeling, field support, and lab analyses. The committee discussed using these funds to enhance communications, data services (including new dashboards), and multi-year special studies, which provides workgroups with greater funding certainty compared to the traditional year-to-year RMP cycle.

The committee also engaged in a detailed discussion regarding the "dredger deficit" and the 18.2% fee contribution target set in 1993. Xavier Fernandez noted that in-bay disposal volumes have dropped from 6 million to 2.8 million cubic yards over two decades, making the original percentage-based target difficult to reach. Tom Mumley proposed moving away from the "deficit" framing by "right-sizing" the expectations and potentially absorbing the difference, which is possible with grant funds from the EPA, rather than increasing fees for other stakeholders. Members of the group preferred to maintain the current fee structure for now while the Regional Water Board and LTMS work on a more predictable, consistent funding model to be presented later this year.

Jay Davis updated the committee on the "Protecting Bay Fishers" proposal, a $3.2 million EPA request with $1.1 million in RMP and partner matching funds. The project will focus on a major fish monitoring effort in 2027, consumption surveys, and risk communication related to PCBs, mercury, and PFAS. To manage the growing complexity of such requests, Beth Birmingham has developed an RMP Grant Match Project Tracker. The program will continue to ensure commitments are properly tracked, and do not circumvent the program's governance structure or overextend future budgets.

Decisions:

- Agreed upon a joint review process for rapid, off-cycle grant match decisions that includes both the Steering Committee and the Technical Review Committee (TRC) via email.
- Confirmed that RMP will not "advertise" the availability of match funds to external groups to prioritize its own strategic needs, though it will entertain specific high-nexus partnerships.

Action Items:

- Xavier Fernandez and the dredger fee subgroup to develop 2–3 alternatives for a revised dredger fee structure (e.g., flat fees vs. volume-based) for committee discussion later this year. (Due 10/31/26)

6. Information/Discussion: Workgroup Planning Update (001:37:17)

Amy provided an update on the RMP's workgroup planning, emphasizing the program's shift toward better integration across focus areas. A primary focus is the coordination of projects that cross workgroup boundaries, such as the "Mapping Mudflat Morphodynamics" study, which originated in the PCB workgroup and was presented to the Sediment workgroup. To manage this complexity, the RMP is identifying "Secondary (S)" and "Secondary Plus (S+)" advisors—technical experts from one workgroup who provide formal review for projects in another. The committee also reviewed the distribution of strategy funds, which typically account for 6% to 8.5% of the total special studies budget. These funds are used by workgroup leads for essential non-administrative tasks, including literature reviews, stakeholder coordination, and tracking emerging scientific trends.

A significant portion of this discussion was dedicated to the long-term funding and governance of Bay modeling. The Sediment workgroup recently finalized a comprehensive study plan totaling $7.2 million, sparking a debate on how the RMP should sustain such high-cost, multi-year technical efforts. Tom Mumley and other committee members advocated for treating Bay modeling as a core RMP function rather than forcing it to compete annually for limited special studies funds. Discussion centered on a proposed $500,000 annual commitment for the next 3–4 years to support a Bay modeling team involving SFEI, USGS, Stanford, and private contractors. While some funding options like reallocating Nutrient Management Strategy (NMS) funds were met with resistance from POTW representatives, there was strong support for exploring a mix of undesignated reserves, multi-year special study pool adjustments, and future EPA grant opportunities, which would support a longer term strategy.

Action Items:

- Amy Kleckner and Tom Mumley to develop a funding recommendation for Bay modeling—including a mix of reserves and multi-year budget adjustments—and add it as an agenda item for the August Steering Committee meeting. (Due 8/15/26)

7. Information/Discussion: 2026 S&T Monitoring Update (02:22:20)

Amy presented the findings from the 2025 aquatic toxicity testing, which was conducted at nine open Bay stations. The results showed no significant reductions in survival or growth, continuing a decade-long trend of zero observed toxicity in these areas. Based on these consistent results and the high logistical burden of preparing for Toxicity Identification Evaluations (TIEs), the Technical Review Committee (TRC) recommended that the Steering Committee evaluate whether to suspend or eliminate this specific monitoring task and reallocate the cost toward higher-priority items.

The Steering Committee engaged in a nuanced debate regarding the "value of proving a negative." While some members suggested suspending the testing or extending the frequency to once every 10 years, others argued that maintaining a recurring validation is essential for regulatory attainment and for telling a successful "good news" story of the Bay's recovery. The discussion also touched on the potential to modernize the program by shifting focus from traditional species to endpoints more relevant to emerging contaminants (CECs). Ultimately, the committee decided not to "pull the plug" yet, opting instead to have the RMP team design a more strategic, cost-balanced approach for future consideration.

The section concluded with operational updates on selenium and stormwater sampling. For 2026, the RMP is utilizing EPA TBH funds and collaborating with the California Department of Fish and Wildlife for collecting sturgeon muscle plug samples, which is critical due to new endangered species constraints. Additionally, Kelly Moran, a long-time champion of pollution prevention and stormwater science at SFEI, announced her retirement effective summer 2026. The committee recognized her foundational contributions to the program, particularly in strengthening relationships with the DTSC and the Department of Pesticide Regulation.

Action Items:

- Amy Kleckner to report back at the August Steering Committee meeting with a proposed approach for the future of toxicity monitoring (e.g., revised species, scale, or frequency) for the 2027/2028 multi-year plan. (Due 8/15/26)

8. Discussion/Decision: AI Use on RMP Products (02:54:35)

Amy introduced the RMP's strategy for integrating Artificial Intelligence (AI) into its workflow, based on internal guidance developed at SFEI. The Institute has equipped staff with Gemini and established a set of guidelines, including requiring all AI-assisted outputs to be reviewed by subject matter experts to ensure technical accuracy and the preservation of SFEI's "intellectual labor" standards. While the Technical Review Committee (TRC) supported using AI for meeting summaries and administrative tasks, they strongly advised against using it for formal reports, literature reviews, or technical scientific interpretation at this stage.

The Steering Committee discussed the practical benefits and pitfalls of AI based on early trials. Michelle noted that while AI-assisted meeting summaries save initial drafting time, the need for humans to verify technical details against long recordings remains a significant workload. Adam Olivieri shared cautionary examples of AI generating circular logic and falsifying scientific references. Despite these risks, the committee acknowledged AI's strength in non-technical areas like slide deck aesthetics and its transformative potential in software coding for remote samplers. Luisa noted that the federal government is beginning to shift toward promoting AI use and there appears to be no requirement for AI clauses in contracts from the EPA at this time.

Decisions:

- Approved the adoption of SFEI's AI policy for RMP products, emphasizing that a human must remain the lead intellectual contributor.
- Approved a "summary trial" for meeting summaries, where note-takers will focus on documenting specific decisions and action items while using AI to draft the general narrative of the discussion.

Action Items:

- Amy Kleckner to share the SFEI AI guidance slides with Luisa for internal EPA review. (Due 5/31/26)

9. Discussion: Communications (03:12:05)

Jay and Sierra Garcia provided an update on the RMP's multi-channel communication efforts. The 2026 Pulse of the Bay, focused on nutrients, is currently in progress with draft articles slated for review on May 11th. A notable feature of this edition will be a custom set of illustrations identifying the top 24 phytoplankton species in the San Francisco Bay. The committee reviewed the proposed agenda for the Annual Meeting (October 21, 2026), which will feature two sessions on nutrients, one on legacy contaminants/modeling, and one on CECs. Tom Mumley suggested considering sediment explicitly as an agenda given its recent strategic importance. He also stated that the Statewide Plastic and Microplastic Monitoring Strategy might not be worth presenting but will reach out directly to Jay to discuss further.

Sierra introduced a new plain language summary template designed to make technical findings more accessible to non-expert stakeholders. This initiative responds to consistent feedback that the program's highly technical reports can be a barrier to engagement. Sierra also highlighted recent media successes, including an ABC 7 news segment on remote stormwater samplers that was triggered by a reporter who was part of SFEI's email list reading an article on the SFEI website. SFEI is also onboarding a freelance social media editor in May 2026 to increase the consistency of RMP's digital presence.

Recent surveys of the Bay Area Pollution Prevention Group (BAPPG) indicated that "less engaged" stakeholders still find RMP information difficult to navigate. Sierra is addressing this through "coffee chats"—semi-structured interviews to identify barriers to information access. Tom Mumley noted that the website still features dated content (e.g., "help us name the stormwater robots") and requested a protocol for archiving old stories. The session concluded with the introduction of Noah Rudko, PhD, the newest member of the emerging contaminants team, who will focus on PFAS and stormwater projects.

Decisions:

- Approved the general structure of the 2026 Annual Meeting agenda, with the June TRC meeting tasked to fill remaining speaker gaps.

Action Items:

- Steering Committee members to review Pulse articles during the three-week window starting May 11, 2026.
- Sierra Garcia to ensure the new "Non-target Analysis of CECs in Sediment" fact sheet is prominently pinned to the CECs publication page. (Due 5/31/2026)
- Steering Committee members to share communications survey with stakeholder networks
- Sierra Garcia to develop a "content lifecycle" protocol, for implementation by future new RMP staff, to ensure dated website stories are periodically archived or removed. (Due 8/15/2026)

10. Information: Status of Deliverables and Action Items (03:44:38)

Amy Kleckner concluded the meeting with a "lightning round" update on RMP deliverables. While several key milestones have been reached—including the completion of the Stormwater CECs Strategy approach report—a significant number of deliverables remain overdue or delayed due to staff capacity and lab communication challenges. Notably, the reporting for OPEs, Bisphenols and Other Plastic Additives in Wastewater is being delayed as SFEI transitions the contract from a less responsive academic partner to a new collaborator at Michigan Tech. Similarly, the PFAS NMR Analysis at the University of Minnesota is being rerun due to unexpected initial results, with a revised timeline pending a check-in with the lab.

Data prioritization remains a focus, particularly regarding Mercury and PCB datasets needed for upcoming syntheses. Progress is being made on the PCBs in Sediment and Fish report, with a final draft expected in May. For projects involving external partners, such as the Suspended Sediment Flux at Richmond Bridge, publication is now anticipated for late April or May. Additionally, the Wet Season Water Pilot Report, originally drafted by Martin Trinh, will be finalized and posted by Amy shortly.

11. Discussion: Plan Agenda Items for Future Meetings (03:52:28)

The meeting concluded with a brief preview of the August Steering Committee session. Key priorities for the next meeting include making final decisions on the 2027 special studies and reviewing the formal agenda for the Annual Meeting, which Jay Davis will circulate in advance. Additionally, the committee will begin preparations for the Multi-Year Planning workshop by reviewing the management drivers table. There were no comments from the committee.

Action Items:

- Jay Davis to email the committee the 2026 RMP Annual Meeting agenda ahead of the August Steering Committee meeting. (Due 8/1/26)

12. Discussion: Plus/Delta (03:53:00)

In the final wrap-up, the committee reflected on the meeting's format and time management. Tom Mumley noted that while the team intentionally planned a shorter agenda to reduce the burden on attendees, the depth of dialogue on several key items caused the meeting to run approximately 15 minutes over the scheduled time.

Table 1: Summary of Proposals for RMP Special Studies in 2027

Workgroup	Study Name	PI / Lead Agency	2027 Funding Request	Ranking	Time sensitive	Multi-year study	Cross-workgroup study	Notes	Agenda Package Page Numbers
Emerging Contaminants	Emerging Contaminants Strategy for 2027	Sutton / SFEI	$90,000	N/A				**Early release of funding requested;** *WG recommended increasing this budget by $10k to include development of an NTA strategy*	30
Emerging Contaminants	Tires Strategy for 2027	Sutton & Miller / SFEI	$10,000	N/A					31
Emerging Contaminants	Stormwater Contaminants of Emerging Concern (SW CECs) Monitoring 2027	Sutton & Gilbreath / SFEI	$451,000	1	Yes	Yes $1.2 - 1.6M over 3 yrs	Yes, secondary WG SPL	**Early release of funding requested;** *Tier 1 - $338k + Tier 2 - $113k; WG supports Multi-Year baseline funding for PFAS and OPEs*	32-38
Emerging Contaminants	Newly Identified Tire- and Vehicle-derived Contaminants in Bay Water and Stormwater - Year 2 of 2	Miller / SFEI	$105,000	2	Yes	No	No	**Early release of funding requested**	39-44
Emerging Contaminants	Nontarget Analysis of Bay Area Stormwater - Water Year 2027 (Year 3 of 3)	Sutton & Miller / SFEI	$156,000	3	Yes	No	Yes, secondary WG SPL	**Early release of funding requested**	45-49
Emerging Contaminants	Quaternary Ammonium Compounds (QACs) in Wastewater and Upstream Sources	Mendez & Sutton / SFEI	$203,000	4	No	No	No		50-55
Emerging Contaminants	Ultra-Short Chain and Extended List of Per- and Polyfluoroalkyl Substances in Bay Water	Sutton / SFEI	$140,000	5	Yes	No	No	**Early release of funding requested;** *$96k USC only, $140k USC + extended list*	56-62
Emerging Contaminants	PFAS in Precipitation: Year 2 and Year 3	Mendez & Sutton / SFEI	$62,000	6	Yes	Yes Yr 2: $62k; Yr 3: $121k	No	**Early release of funding requested;** *WG supports Multi-Year funding*	63-66
Emerging Contaminants	Parabens and Related Transformation Products in Bay Area Wastewater Effluent	Mendez & Sutton / SFEI	$94,000	7	No	No	No		67-71
Emerging Contaminants	Contaminants of Emerging Concern in San Francisco Bay Bird Eggs	Sun & Sutton / SFEI	$9,000	S&T SEP	Yes	No	No	**Early release of funding requested; *WG recommends funds to support archiving 2027 samples to allow for analysis in the future;*** *SEP budget $184k*	72-78
Emerging Contaminants		**Total**	**$1,320,000**						
Microplastics	Microplastics Strategy for 2027	Lin / SFEI	$3,000	N/A					79
Microplastics	Evaluation of Tire Wear Particles in Urban Stormwater Runoff, and Method Evaluation for Other Types of Microplastics	Lin / SFEI	$150,200	1	Yes	Yes Yr 2: $50k; Yr 3: $50k	No	**Early release of funding requested;** *WG supports Multi-Year funding*	80-84
Microplastics		**Total**	**$153,200**						
Sources Pathways and Loading	Sources Pathways and Loadings Strategy and Program Management for 2027	Gilbreath & Heberger / SFEI	$80,000	N/A					85-87
Sources Pathways and Loading	Develop Discharge Rating Curves at Existing Stage Monitoring Stations	Mariniuk & Heberger / SFEI	$100,000	1	Yes	Yes Yr 2: $65k; Yr 3: $75k	No	**Early release of funding requested;** *WG supports Multi-Year funding*	88-97
Sources Pathways and Loading	Stormwater Monitoring Systems Improvements	Dougherty & Gilbreath / SFEI	$60,000	2	Yes	Yes Yr 2: $60k; Yr 3: $60k	No	**Early release of funding requested;** *WG supports Multi-Year funding*	98-100
Sources Pathways and Loading	Stormwater Monitoring at Fixed Stations	Gilbreath & McKee / SFEI	$144,000	3	Yes	Yes $500k for 2028-2029	No	**Early release of funding requested;** *uncertainty about MY funding source*	101-108

Table 1: Summary of Proposals for RMP Special Studies in 2027

Workgroup	Study Name	PI / Lead Agency	2027 Funding Request	Ranking	Time sensitive	Multi-year study	Cross-workgroup study	Notes	Agenda Package Page Numbers
Sources Pathways and Loading	Small Automated Sampler Continued Improvements	Paterson / SFEI	$60,000	4	Yes	No	Yes, secondary WG EC	**Early release of funding requested**	109-111
Sources Pathways and Loading	Improved Watershed Delineation to Support Modeling, Data Interpretation, and Site Selection	Gilbreath & Heberger / SFEI	$75,000	5	No	No	No		112-117
Sources Pathways and Loading	WDM 2027 Workplan	Heberger / SFEI	$580,000	N/A	Yes	Yes	Yes	**Funding allocated in TBH**	118-127
Sources Pathways and Loading	Fixed Monitoring Station Network	Gilbreath & McKee / SFEI	N/A	N/A	Yes	Yes	Yes	**Funding allocated in TBH**	N/A
Sources Pathways and Loading		**Total**	**$519,000**						
Sediment	Sediment WG Strategy Funding 2027	Dusterhoff / SFEI	$25,000	N/A					128
Sediment	Develop Sediment Conceptual Model for South Bay and Lower South Bay	Stark & Dusterhoff / SFEI	$186,800	1,2,3	No	Possible	No	Could break out funds for tasks not to be completed until 2028	129-134
Sediment	Eden Landing Strategic Placement Follow-Up Study: Year 3 Benthos & Bathymetry	Stevens & De La Cruz / USGS	$154,538	1,2,3	Yes	No	No	**Early release of funding requested**	135-144
Sediment	Workplan for Golden Gate Sediment Flux Monitoring	Nowacki & Hart / USGS	$42,000	1,2,3	No	No	No	**Early release of funding requested**	145-146
Sediment	Expansion of Sedimentation Estimates in Restored Marshes	Thorne & Braud / UCD & SFEI	$120,000	4	No	No	No		147-156
Sediment		**Total**	**$528,338**						
PCBs	PCB Strategy 2027	Davis / SFEI	$20,000	N/A				Additional $10k will be allocated from the $2M PCB TMDL TBH funds	N/A
PCBs	PCB Synthesis	Davis / SFEI	$103,000	1	Yes	No	No		157
PCBs	PCB Stormwater Monitoring WY27	Gilbreath & Davis / SFEI	$210,000	N/A	Yes	No	Yes, secondary WG SPL	Will be allocated from the $2M PCB TMDL TBH funds	158-162
PCBs		**Total**	**$123,000**						
Nutrients	Moored sensor high-frequency observation network	Senn / SFEI	$250,000	N/A	Yes	Yes $250k annually	N/A	**Early release of funds requested to align with NMS FY27;** *consider multi year funding approval through use of TBH funds.*	163-166
Nutrients		**Total**	**$250,000**						
Sport Fish Strategy Team	Sport Fish Strategy 2027	Davis / SFEI	$40,000	N/A	Yes	Yes $200k over 5 years	No	RMP match funds for Protecting bay Fishers grant	
Sport Fish		**Total**	**$40,000**						

Table 2: Proposal Descriptions and Deliverables for RMP Special Studies in 2027

Workgroup	Study Name	Budget	Description	Deliverables
Emerging Contaminants	Emerging Contaminants Strategy for 2027	$90,000	The staff and effort needed to manage the RMP's CECs focus area has increased significantly in recent years. For the RMP CEC Strategy to remain relevant and timely, it needs to be updated annually with new information from the RMP and others. In addition, a higher level of coordination and integration within and across workgroups is essential to optimize resources. Core deliverables include tracking new information regarding contaminant sources, occurrence, and toxicity and updating the RMP's tiered risk-based framework via an ECWG presentation; responding to requests for information from the Water Board, state agencies, and RMP stakeholders; and coordinating pro bono analyses by partners. An additional $10k was added per a recommendation from the ECWG to start development of an NTA strategy.	1. Updated CEC Strategy document (to include NTA strategy) and presention to the ECWG - Spring 2028
Emerging Contaminants	Tires Strategy for 2027	$10,000	This proposal describes support for the final year of a five-year cross-workgroup strategy for the RMP's efforts around tire microplastics and tire-related water pollutants. Core deliverables include tracking new information regarding tire chemicals and particles, their environmental occurrence, and their toxicity and updating the RMP's tiered risk-based framework; responding to requests for information from the Water Board, state agencies, and RMP stakeholders; and coordinating pro bono analyses by partners.	N/A
Emerging Contaminants	Stormwater Contaminants of Emerging Concern (SW CECs) Monitoring 2027	$451,000	This proposal describes a plan for a multi-year monitoring effort. Three years of monitoring are included, as well as subsequent data review, interpretation, and reporting. The base funding (Tier 1) needed for WY27 totals $338k. The prioirities for water year 2027 are to prioritize PFAS, the current Focus Contaminant Class, and collect samples via three types of collection methods (manual, small and large automated). The sampling design includes repeated sampling at some sites and sampling many sites acorss the region. In WY27 we anticipate monitoring larger tributaries (a gap from previous sampling years) and including newer analytical methods offered by SGS AXYS (pending review of pilot data). Additional (Tier 2) funding ($113k) in WY27 would support additional PFAS sampling using the small remote samplers and sampling for OPEs. Plans for subsequent monitoring years will be reviewed annually with the Stakeholder Science Advisor Team prior to implementation. A report on PFAS as the Focus Contaminant Class is anticipated in Summer 2028.	1. Sampling and Analysis Plan - October 2026 2. Sample collection - completion by April 2027 3. Lab Analysis - completion by August 2027 4. SW CECs SST meeting - September 2027 5. Data QA - November 2027 6. PFAS Focus Contaminant Class DRAFT report - February 2028 7. PFAS Focus Contaminant Class FINAL report - July 2028 8. CEDEN Upload - July 2028
Emerging Contaminants	Newly Identified Tire- and Vehicle-derived Contaminants in Bay Water and Stormwater - Year 2 of 2	$105,000	This study will quantify tire- and vehicle-derived contaminants in storwater runoff and Bay water samples collected following storm events to provide information on the impact of stormwater discharges on Bay contaminant concentrations. Results will indicate whether these stormwater-transported contaminants reach concentrations of concern in Bay waters, and provide an early indicator of changes to tire formulations in response to 6PPD management actions. In water year 2027, samples will be collected at 5 near-field sites and 5 in Bay sites shortly after 2 storm events, plus up to 12 other stormwater monitoring sites during two storms. A report summarizing the data, a toxicity review of new compounds previously unstudied by the RMP, and recommendations for future study is expected in October 2027.	1. Sampling and Analysis Plan - October 2026 2. Sample collection - completion by April 2027 3. Lab Analysis - completion by May 2027 4. Data management - August 2027 5. DRAFT technical report - April 2027 6. FINAL technical report - October 2027 7. CEDEN Upload - May 2028
Emerging Contaminants	Nontarget Analysis of Bay Area Stormwater - Water Year 2027 (Year 3 of 3)	$156,000	This proposal adds a third year of NTA sample collection and analysis to the ongoing RMP stormwater CECs monitoring efforts. NTA samples will be collected alongside other stormwater CECs manual sampling efforts. Two types of nontarget analysis will be conducted by UC Davis. The deliverables will include a spreadsheet of tentatively identified compounds, publically accessible baseline spectra for future NTA comparisons, and a manuscript (led by UC Davis) in May of 2028.	1. Sample collection - completion by April 2027 2. Lab Analysis - completion by July 2027 3. Reporting of contaminants detected - October 2027 4. DRAFT manuscript - February 2028 5. FINAL manuscript - May 2028
Emerging Contaminants	Quaternary Ammonium Compounds (QACs) in Wastewater and Upstream Sources	$203,000	This proposal will continue assessing QACs in wastewater to better understand this contamination pathway with respect to Bay water quality, the effectiveness of removal by the treatment process, and changes in QAC use over time. Samples (influent, effluent, and biosolids) will be collected from up to five WWTPs during the summer of 2027. Samples will be analyzed by the University of Minnesota using a previously published method. This study also inlcudes a interlab comparison to ensure comparability between methods used in previous RMP studies and methods available to WWTPs. Duplicate influent and effluent samples will be collected and sent to Hydro Solutions for analysis and comparison to results obtained by University of Minnesota. Additionally this study will examine sources upstream of WWTPs to identify possible contributions that could disrupt the treatment process. The results from this study will inform possible source control strategies and guide future monitoring efforts. Results will be presented at the 2029 ECWG meeting. A manuscript or technical report, prepared by the University of Minnesota, is expected in July 2029.	1. Study Design and Sampling Plan - June 2027 2. Sample collection - completion by October 2027 3. Lab Analysis - completion by July 2028 4. Data management - November 2028 5. DRAFT manuscript (led by UM) - March 2029 6. Presentation of results to ECWG - April 2029 7. FINAL manuscript (led by UM) - July 2029
Emerging Contaminants	Ultra-Short Chain and Extended List of Per- and Polyfluoroalkyl Substances in Bay Water	$140,000	Ultra-short chain PFAS are a key focus for study due to their anticipated elevated concentrations in local pathways (stormwater and wastewater) and atmospheric transport entering the Bay. This study seeks to apply the ultra-short chain and extended list methods to Bay water to investigate the occurance, fate, and potential risks associated with PFAS. The results will establish crucial baseline data, enabling comparison with ongoing monitoring data from various Bay pathways. This monitoring effort will help inform risk assessment and prioritize monitoring efforts as regulatory frameworks evolve to encompass the broader class of PFAS beyond PFOS and PFOA. Bay water samples wil be collected in both the wet and dry seasons and analyzed by SGS AXYS. A technical report to include results from all analyses, comparisons to other matrices, and recommendations for future study is expected in October 2028.	1. Study Design and Sampling Plan (wet season) - November 2026 2. Sample collection (wet season) - completion by April 2027 3. Study Design and Sampling Plan (dry season) - August 2027 4. Sample collection (dry season) - completion by September 2027 5. Lab Analysis - completion by January 2028 6. Data management - April 2028 7. Presentation of results to ECWG - April 2028 8. DRAFT report - August 2028 9. FINAL report - October 2028
Emerging Contaminants	PFAS in Precipitation: Year 2 and Year 3	$62,000	This proposal continues the investigation of PFAS in precipitation in the Bay Area for an additional two years. The goals are to establish baseline data, assess the potential influence of precipitation on stormwater concentrations, and continue to estimate direct wet deposition. Sampling will be conducted at both urban and remote sites to compare results and develop an initial understanding of local versus long-range transport in the Bay. Samples will be collected at up to 15 sites during storm events in WY27 and WY28. Up to 40 field samples per year plus all QA/QC samples will be analyzed by Dr. Marta Venier at Indiana University by high-performance liquid chromatography using method EPA 1633. A technical report to include results from all three sampling years, comparisons to other matrices, and recommendations for future studies is expected in October 2029.	1. Study Design and Sampling Plan - December 2026 2. Sample collection - completion by April 2027 3. Lab Analysis - completion by September 2027 *4. Data management - March 2029* *5. DRAFT report - August 2029* *6. FINAL report - October 2029* ***Tasks 4-6, tied to Year 3 funding***
Emerging Contaminants	Parabens and Related Transformation Products in Bay Area Wastewater Effluent	$94,000	This study proposes monitoring parabens and their transformation products in wastewater effluent. Ten WWTPs effluent will be sampled twice during Summer 2027 and Winter 2027-28. Samples will be analyzed at Baylor University. The findings will help inform and guide future Bay water quality management and monitoring efforts. A manuscript or technical report, prepared by Baylr University, is planned for April 2029.	1. Study Design and Sampling Plan - June 2027 2. Sample collection - completion by January 2028 3. Lab Analysis - completion by June 2028 4. Data management - October 2028 5. DRAFT manuscript / Technical Report - January 2029 6. FINAL manuscript / Technical Report - April 2029

Table 2: Proposal Descriptions and Deliverables for RMP Special Studies in 2027

Workgroup	Study Name	Budget	Description	Deliverables
Emerging Contaminants	Contaminants of Emerging Concern in San Francisco Bay Bird Eggs	$9,000	This study will leverage 2027 Status & Trends Bird Egg monitoring (Hg, Se, PCBs, PBDEs, PFAS, and legacy pesticides) to include additional sampling and archiving for targeted organophosphate esters, additional brominated flame retardants, and nontarget analysis. Future funding (possibly through a SEP) would support analysis of these and additional archived samples. Concentrations observed in this study would be compared to available risk thresholds. Study outcomes would include updates to the tiered risk-based framework for quantified contaminants and recommendations for future monitoring efforts.	1. Sampling and Analysis Plan - January 2027 2. Sample collection - completion by March 2027 3. Compositing and shipment to archives - completion by September 2027
ECWG	**Total**	**$1,320,000**		
Microplastics	Microplastics Strategy for 2027	$3,000	To maintain leadership and stay engaged in future statewide developments, strategy funds support participation in discussions and updates to the RMP's Microplastics Strategy with new information and study findings from the RMP and others. Additionally a higher level of coordination and integration within and across workgroups is essential to optimize RMP resources. Core deliverables include tracking new information regarding microplastics monitoring and analysis methods, contaminant sources, occurence, and toxicity; updating the RMP's microplastics science and monitoring strategy; responding to information requests from stakeholders and collaborating on science and monitoring studies with partners. Surplus frunds from previous years will utilized in 2027.	N/A
Microplastics	Evaluation of Tire Wear Particles in Urban Stormwater Runoff, and Method Evaluation for Other Types of Microplastics	$150,200	This multi-year proposal includes a screening study to quantify tire wear partiles in urban stormwater runoff from 7 watersheds during 1 storm event + 2 sites sampled during a second storm event (to evaluate inter-storm variability) to benchmark the levels of tire wear particles in urban runoff and to evaluate uncertainty in analytical methods. This study will pilot and evaluate microplastic extraction and analysis methods for other types of microplastics in urban runoff using LDIR systems. The deliverable for this study is a report expected in by June 2030.	1. Study Design and Sampling Plan - November 2026 2. Year 1 Sample collection - completion by March 2027 3. Method review and development - September 2027 4. Lab Analysis - completion by November 2027 5. QA/QC evaluation of microplastics methods - February 2028 6. MPWG project update presentation - April 2028 ***Additional sampling and reporting in years 2 & 3***
MPWG	**Total**	**$153,200**		
Sources Pathways and Loading	Sources Pathways and Loadings Strategy and Program Management for 2027	$80,000	To support the SPLWG program management capacity to ensure effective coordination and implementation of this integrated program, including coordinating regular internal SPL team meetings; organizing three to four external update meetings annually with the Water Board and BAMSC; updating the Multi-Year Plan; and participating in meetings to coordinate with other focus area leads on ongoing projects as well as the development of future proposals. The Strategy and Program Management funds also allow staff to respond to external requests for data and products, stay abreast of other local, state, and federal monitoring programs that work in the Bay Area, and identify opportunities to leverage through collaboration with external partners.	
Sources Pathways and Loading	Develop Discharge Rating Curves at Existing Stage Monitoring Stations	$100,000	This proposal covers fieldwork and analysis to develop discharge rating curves for rivers and streams draining to the Bay at locations of existing stage-only gages operated by local agencies. For WY27 Task 1 covers the staff time required to learn and operate the equipment and the dissemination of information to other field staff. As a deliverable, staff will produce a standard operating procedure (SOP) outlining how to use and maintain ADCP units. Task 2 covers the administrative duties required to collect field measurements which includes selecting sites, obtaining permits, purchasing equipment, and field sheet development. Task 3 covers storm watching, preparation, sampling, and data handling during four monitoring events. A report will be produced at the end of the three year monitoring effort and the data will be shared with the modeling team and posted to the RMP website. Early release of funds requested.	1. Standard Operating Procedures Documented for ADCP Discharge Monitoring - May 2027 ***Additional monitoring, data management and reporting deliverables in years 2 & 3***
Sources Pathways and Loading	Stormwater Monitoring Systems Improvements	$60,000	The proposed work includes development of an automated QA/QC planning tool, regular coordination meetings, field checklists with integrated maps, centralize site information database using ArcGIS Survey123, support for a sample and equipment manager and additional tasks as identified and needed. Deliverables planned for 2027 are the QA/QC planning form, sites information database and an annual progress summary and plan for the upcoming year presented at the 2027 SPLWG meeting. Early release of funds requested.	1. QA/QC Planning Form - July 2027 2. Sites Information Database - August 2027 3. Summary of planned tasks and deliverables in 2028 - May 2027
Sources Pathways and Loading	Stormwater Monitoring at Fixed Stations	$144,000	This project will implement stormwater monitoring at the first pilot station in the Fixed Monitoring Station Network (FMSN). Planned sampling a total of four storm events per year, with four discrete samples collected during each event to span the range of turbidity conditions. One storm event being a first-of-season flush event (forecast ≥0.5 inches of rainfall over 6 hours or 0.75 inches over 12 hours), one of the three largest storm events of the year, and two additional storm events distributed across the wet season. The project with collect and analyze a core set of “no-regrets” contaminants: PCBs, mercury, SSC, total metals, and total organic carbon. All data will be quality assured, publicly released, and used to inform future station implementation and regional monitoring efforts. The QA'd analytical laboratory data will be made publicly available by uploading it to CEDEN. Proposed deliverables include a project progress presentation to the SPLWG in 2027, a draft and final technical report in early 2028 and data uploaded to CEDEN in 2028. Early release of funds requested.	1. Sample collection during four storm events - completion by May 2027 2. Presentation at SPLWG - May 2027 3. Lab Analysis - completion by July 2027 4. Data management and QA Analysis - October 2027 5. DRAFT Technical Report - November 2027 6. FINAL Technical Report - February 2028 7. Data uploaded to CEDEN - April 2028 ***If four storm events are not sampled due to a dry year or otherwise, sampling will continue into WY 2028 and deliverable due dates will be delayed by one year***
Sources Pathways and Loading	Small Automated Sampler Continued Improvements	$60,000	The proposed work includes development of an automated QA/QC planning tool, regular coordination meetings, field checklists with integrated maps, centralize site information database using ArcGIS Survey123, support for a sample and equipment manager and additional tasks as identified and needed. Deliverables planned for 2027 are the QA/QC planning form, sites information database and an annual progress summary and plan for the upcoming year presented at the 2027 SPLWG meeting. Early release of funds requested.	1. Setup and Construction Manual, posted on GitHub - May 2027 2. Operation Manual, posted on GitHub - May 2027
Sources Pathways and Loading	Improved Watershed Delineation to Support Modeling, Data Interpretation, and Site Selection	$75,000	Watershed boundary delineation is a fundamental task for understanding the sources and pathways of pollutants to a given point, such as a monitoring location or a river reach in a watershed model. The project will include a targeted literature review to inform the approach, the development of an ArcGIS-based tool, the acquisition of up to 10 municipal storm drain datasets, and the delineation of watershed boundaries for 30–40 priority locations. Deliverables also the ESRI tool and user guide packaged and published on the RMP website and a presentation to the SPL workgroup in 2028.	1. 30-40 watersheds delineated using new tool - March 2028 2. Draft toolbox and user guide for review by stakeholders and science advisors - March 2028 3. Presentation at SPLWG - May 2028 4. Final ESRI tool and user guide packaged and published on website - June 2028
SPLWG	**Total**	**$519,000**		
Sediment	Sediment WG Strategy Funding 2027	$25,000	To support the SedWG coordinating regular internal meetings and collaboration with the Wetlands Regional Monitoring Program (WRMP), Regional Board, and other partners.	

Table 2: Proposal Descriptions and Deliverables for RMP Special Studies in 2027

Workgroup	Study Name	Budget	Description	Deliverables
Sediment	Develop Sediment Conceptual Model for South Bay and Lower South Bay	$186,800	* Next step in the "Schoellhamer Cycle" (2025 - Suisun Bay & San Pablo Bay concept model, 2026 - Central Bay concept model, 2027-2028 - South Bay & LSB concept model) * Focus on adding new elements and incorporating results from recent studies * Would be developed in coordination with WRMP and other partners	1. Sediment Workgroup Presentation - May 2027 2. Sediment Workgroup Presentation - May 2028 3. Draft Report - June 2028 4. Final Report - October 2028
Sediment	Eden Landing Strategic Placement Follow-Up Study: Year 3 Benthos & Bathymetry	$154,538	* Resample a uniform 50-m grid overlaid across the entire placement and the reference areas just north of San Mateo Bridge * Translate response of the benthic invertebrate community into impacts on trophic support for commercially important fish species using the Benthic Resources Assessment Technique (BRAT). This technique involves calculating the energy available to specific fish species and age classes based on prey energetic content, size and depth in substrate. * Compare Year 3 findings to those from 6 months and 12 months after the strategic placement * Multi-beam bathymetry survey of the dredged sediment mounds * Sediment sampling and analysis to determine bed properties (grain size, bulk density) to understand compaction and change in seabed texture over time * Deployment of instrumented tripods on and off the mound to characterize hydrodynamic roughness. The tripods will measure near-bed currents, ssc, waves, erosion and deposition via distance between the sensor and seafloor, and water properties. Analysis of the data will be used to determine hydrodynamic bed roughness	1. Multi-beam bathymetry survey and benthic community sampling - January 2027 2. Benthic sample processing - completed by December 2027 3. Presentation to SedWG - May 2028 4. Draft manuscript or USGS Open-File Report - September 2028 5. Conference presentation - October 2028 6. Final manuscript or USGS Open-File Report - January 2029
Sediment	Workplan for Golden Gate Sediment Flux Monitoring	$42,000	* Develop a workplan with the SedWG in 2026/2027 to monitor sed flux at that answers key questions (e.g., what conditions do we want to monitor?), works out key logistics (e.g., do we have the equipment needed to do the monitoring we want to do?), and provides the budget for the full effort8 * This then sets up USGS to go for funds in May 2027 to monitor GG flux in 2028 * These funds would be requested to be released early (as soon as possible)	1. Draft workplan - January 2027 2. Final workplan - February 2027 3. Presentation to the SedWG - March 2027
Sediment	Expansion of Sedimentation Estimates in Restored Marshes	$120,000	* Expand the marsh accumulation work being done at WRMP benchmark sites to marsh restoration sites around SF Bay * Use newly collected data, newly available LiDAR, and other data to determine accumulation rates * Could also determine recent accumulation rates in established marshes	1. Presentation to the SedWG - May 2027 2. Data release: Elevation time series, volume and accretion estimates as spatial and tabular data - January 2028 3. Draft report (manuscript) - February 2028 4. Presentation to the SedWG - May 2028 5. Presentation to local or regional conference - October 2028
SedWG	**Total**	**$528,338**		
PCBs	PCB Strategy 2027	$20,000		Additional $10k will be allocated from the $2M PCB TMDL TBH funds
PCBs	PCB Synthesis	$103,000	The Regional Water Board (WB) will be revising the PCBs TMDL for the Bay in 2030. The WB has identified a list of information needs to be addressed by July 2028 in order to support the revised TMDL. One of the main items on the list is a synthesis of information generated on PCBs in the Bay since the last synthesis was published in 2014. This work would be done in coordination with waterboard staff and with close consultation with the PCBWG.	1. Draft report - April 2028 2. Final report - July 2028
PCBs	PCB Stormwater Monitoring WY27	$210,000	This project will implement stormwater monitoring for PCBs at watersheds across the region to support calibration and verification of the Watershed Dynamic Model (WDM) PCB module. A total of 12 storm event efforts will be conducted at three to four watersheds during three to four storms per watershed. The approach involves collecting composite samples during four storm events per year collected at different times across the hydrograph for each event to capture a broad range of conditions. Targeted events include the first flush of the season, a large storm event, an additional storm earlier in the wet season, and a later-season storm. The analyte list includes PCBs and suspended sediment concentration (SSC), allowing for normalization to particle concentrations and comparison of estimated particle ratios (EPCs) for PCBs to previously measured EPCs at the same sites. The PCB TMDL Reevaluation is planned for 2030 and watershed load estimates to the Bay are fundamental for modeling recovery trajectories. The kind of intensive dataset proposed will provide for model calibration and verification and, when paired with historical datasets, will help start to assess long-term trends in contaminant concentrations. All data will be quality assured, publicly released, and used to inform future station implementation and regional monitoring efforts.	1. Sample collection - completed by May 2027 2. Presentation to the PCBWG - May 2027 3. Lab Analysis - completed by August 2027 4. Data management and QA analysis - November 2027 5. Draft technical report - February 2028 6. Final technical report - April 2028 7. Data uploaded to CEDEN - April 2028
PCBWG	**Total**			
Nutrients	Moored sensor high-frequency observation network	$250,000	This project supports the collection of high-frequency water quality data (15-min) at the SFEI-NMS network of mooring sites, distributed across the South, Lower South, Central, and (newly) San Pablo Bays. Work includes monthly maintenance trips, instrument maintenance and calibration, standard data QA/QC and management, and ongoing refinements to data management tools.	
Nutrients	**Total**	**$250,000**		
Sport Fish Strategy Team	Sport Fish Strategy 2027	$40,000		
SFST	**Total**	**$40,000**		

Emerging Contaminants Strategy for 2027

Summary

Increasing interest in emerging contaminants from the San Francisco Bay Regional Water Board, RMP stakeholders, and the general public is reflected in headline news and management actions at local, state, and federal levels. The staff and effort needed to manage the RMP's CECs focus area has increased significantly in recent years. For the RMP CEC Strategy to remain relevant and timely, it needs to be updated annually with new information and study findings from the RMP and others. In addition, a higher level of coordination and integration within and across workgroups is essential to optimize RMP resources.

Core deliverables include tracking new information regarding contaminant sources, occurrence, and toxicity and updating the RMP's tiered risk-based framework via an ECWG presentation and, as appropriate, a CEC Strategy Update document; responding to requests for information from the Water Board, state agencies, and RMP stakeholders; and coordinating pro bono analyses by partners. An additional urgent priority identified during the April 2026 emerging contaminants workgroup meeting is a strategy for followup work addressing nontarget analysis observations, which would be summarized in the CEC Strategy Update. To accomplish all of these tasks with our expanded CECs team, $90,000 is requested.

Proposed by Rebecca Sutton (SFEI)
Estimated Project Cost $90,000
Oversight Group(s) ECWG
Time Sensitive? Yes. Early release of funds requested to begin the strategy for followup on nontarget analysis observations.

Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Information gathering on contaminant sources, occurrence, and toxicology from a variety of sources (e.g., literature review, scientific conferences) throughout the year to inform Task 4	Year-round
Task 2. Assistance to the Water Board and other RMP stakeholders concerning scientific information and presentations relating to emerging contaminants	Year-round
Task 3. Coordination of pro bono studies conducted in collaboration with Status and Trends monitoring activities	Year-round
Task 4. Updates to the RMP CEC tiered risk-based framework and related documents; presentation at spring ECWG meeting	Spring 2028

Tires Strategy for 2027

Summary

This proposal describes support for a cross-workgroup strategy for the RMP's efforts around tire microplastics and tire-related water pollutants. Through development of the tires conceptual model (Moran et al., 2021), we have identified key information gaps around the connections between tires and the health of aquatic habitats. As a result, the RMP established a short-term strategy and multi-year plan spanning up to five years, based on stakeholder needs and the special capabilities of the RMP. This proposal would fund year five, the final year of this tires strategy. Tire-related work that is needed after the five-year horizon of this strategy would be integrated into future workgroup-specific strategies and multi-year plans.

Core deliverables include tracking new information regarding tire chemicals and particles, their environmental occurrence, and their toxicity and updating the RMP's tiered risk-based framework; responding to requests for information from the Water Board, state agencies, and RMP stakeholders; and coordinating pro bono analyses by partners. To accomplish all of these tasks, $10,000 is requested.

Proposed by Rebecca Sutton, Ezra Miller (SFEI)
Estimated Project Cost $10,000
Oversight Group(s) ECWG
Time Sensitive? Yes

Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Information gathering on contaminant sources, occurrence, and toxicology from a variety of sources (e.g., literature review, scientific conferences) throughout the year to inform Task 4	Year-round
Task 2. Assistance to the Water Board and other RMP stakeholders concerning scientific information and presentations relating to emerging contaminants	Year-round
Task 3. Coordination of pro bono studies conducted in collaboration with Status and Trends monitoring activities	Year-round
Task 4. Updates to the RMP CEC tiered risk-based framework and related documents; presentation at spring ECWG meeting	Spring 2028

References

Moran, K.D., Miller, E.L., Mendez, M., Moore, S., Gilbreath, A.N., Sutton, R., Lin, D., 2021. A Synthesis of Microplastic Sources and Pathways to Urban Runoff (No. Contribution No. 1049). San Francisco Estuary Institute, Richmond, CA.

Multi-year Monitoring of Contaminants of Emerging Concern in Stormwater

Summary

This proposal outlines multi-year stormwater CECs monitoring activities consistent with the recently published stormwater CECs monitoring approach. Three water years of monitoring are included, as well as subsequent data review, interpretation, and reporting. For Water Year 2027, we will continue to prioritize monitoring PFAS, our current Focus Contaminant Class. Our monitoring design will be guided in part by data needs for stormwater PFAS data analysis and loads modeling that will be conducted starting in 2027 under our USEPA-funded PFAS Sources to Solutions grant. Additional samples may be collected to characterize important contaminant classes previously monitored (e.g., for assessment or examination of long-term changes), pending resource availability and a resolution to analytical issues. The monitoring effort described here also serves as a platform for exploratory monitoring of CECs not previously examined in stormwater, which will be identified in separate special study proposals. Monitoring priorities for subsequent Water Years will be selected with the guidance of the Stormwater CECs Stakeholder-Science Advisor Team (SST), which includes representatives from the Steering and Technical Review Committees, as well as science advisors and stakeholders. SST meetings will serve as a forum for critical decisions, such as when to scale back PFAS monitoring to a more sustainable ongoing level as we focus on data interpretation and/or shift to prioritize intensive work on another class of contaminants. Monitoring study designs will respond to previously identified priority near-term management questions around CEC product sources, changes, and loads. This proposal coordinates with other ECWG and SPLWG stormwater efforts, including the Fixed Monitoring Station Network.

Proposed by Rebecca Sutton and Alicia Gilbreath (SFEI)
Estimated Project Cost $1,205,000 to $1,554,000 over three years
(Year 1: $338,000 to $451,000)
Oversight Group(s) ECWG and SPLWG, Stormwater CECs SST
Time Sensitive? Yes. Continues stormwater CECs monitoring, supports PFAS grant. Early release of funds requested to prepare for WY27 wet season.

Table 1. Study objectives and applicable management questions (only list management questions that are relevant to the proposal)

Study Objective	Management Question
Implement stormwater CECs monitoring with a design that supports watershed loads modeling and source-oriented data analysis.	ECWG MQ2: What are the sources, pathways, loadings, and processes leading to the presence of individual CECs or groups of CECs in the Bay? Stormwater CECs near-term priority MQs supporting ECWG MQ2:

	• Load. How does the local watershed runoff load to San Francisco Bay compare to loads from other pathways? • Sources. (a) What are the likely sources? (b) What land features correlate with presence, concentration, and load in runoff?
Conduct monitoring capable of informing general understanding of changes in CECs presence in the stormwater pathway.	ECWG MQ4: Have levels of individual CECs or groups of CECs changed over time in the Bay or pathways? What are potential drivers contributing to change? Stormwater CECs near-term priority MQ supporting ECWG MQ4: • Changes. (a) Are presence or concentration in local watershed runoff changing over time? (b) Are presence, concentration, or load expected to change in the future?

Background

Stormwater is a major pathway for contaminants of emerging concern (CECs) to enter San Francisco Bay (Peter et al., 2024). Since 2023, the RMP has been building a long-term stormwater CECs monitoring and modeling program. Our recently completed monitoring design approach outlines multiple levels of monitoring, ranging from exploratory screening studies to more intensive and specialized efforts for contaminant classes with higher data needs (Moran et al., 2026). The three near-term priority management questions guiding stormwater CECs monitoring address watershed CECs loads to the Bay, changes in CECs presence and concentration in watershed runoff, and the true sources of CECs in stormwater runoff (e.g., products and contaminated sites).

This proposal describes a multi-year monitoring effort, reducing the need for annual funding approvals. Three Water Years of monitoring are included, as well as subsequent data review, interpretation, and reporting. The priorities for the first monitoring year, WY 2027, are described, as well as a process for refining priorities in subsequent years.

Contaminant selection and study design flows out of the prioritization process in the RMP's tiered risk-based framework for CECs. The recently updated RMP CECs Strategy (Sutton et al., 2024) recommends ongoing monitoring of multiple contaminants in the high and moderate concern tiers, including PFAS, organophosphate esters (OPEs), and 6PPD-quinone.

The RMP is supporting intensive monitoring for PFAS, which is currently considered our Focus Contaminant Class within the overall stormwater CECs monitoring approach

(Moran et al., 2026). Our US EPA Water Quality Improvement Fund “PFAS Sources to Solutions” project (PFAS grant) is providing significant additional resources for laboratory analysis, data management, modeling, and interpretation.

We anticipate maintaining our focus on PFAS for WY 2027 at a minimum. Subsequent shifts in monitoring priorities, design, and implementation will be made in consultation with the Stormwater CECs Stakeholder Science Advisor Team (SST) via annual meetings prior to the start of the wet season.

Recommended recurrent monitoring for OPEs has been paused due to analytical challenges; pending resolution of laboratory issues and availability of additional (i.e., Tier 2) resources, we propose establishing recurrent monitoring activities as part of this multi-year proposal. Recurrent monitoring is expected to be coordinated with the development of the RMP’s Fixed Monitoring Station Network.

Monitoring for 6PPD-quinone is being conducted via an exploratory screening study of a number of tire- and vehicle-derived contaminants (year one funded, year two proposed for 2027) that leverages the monitoring activities described in this proposal.

Approach

We will collect stormwater composite samples with up to three different types of stormwater sampling methods: traditional manual sampling and both small and large automated samplers. Manual sampling provides the opportunity to collect samples for the broadest range of contaminant classes due to the ability to customize collection methods, containers, and volumes. A single Fixed Monitoring Station Network site is expected to be available for sampling in WY 2027, which could accommodate sample collection through a large automated sampler as well as manually. For WY 2027, we anticipate up to twelve sets of manual or large automated samples to be collected at up to eight sites, with one or two storm events at each site, and QA sample collection generally consistent with the RMP Quality Assurance Program Plan (QAPP). Plans for subsequent Water Years will be reviewed with the SST prior to implementation. In WY 2028, we anticipate a study design that includes collecting samples at two additional Fixed Monitoring Stations; a fourth station is expected to be ready in WY 2029.

The small automated sampler can currently collect two sample containers, and has been used for PFAS target and total oxidizable precursor (TOP) analysis. Additional capabilities may be forthcoming. For WY 2027, the small remote samplers will be deployed for two storm events and will include two QA duplicates (two samplers deployed side-by-side). With additional resources (i.e., Tier 2 funding), we would recommend deployment for a third storm event. Depending on storm event characteristics, sampling location proximities, and staff availability, we anticipate deploying 6-12 samplers per event, for a total of 12 to 24 field samples (or up to 36 field samples with Tier 2 funding). Plans for subsequent Water Years will be reviewed with the SST prior to implementation.

For WY 2027, we plan to prioritize PFAS, our current Focus Contaminant Class, and expect to collect samples via all three types of collection methods. To best provide the data needed to support addressing the near-term priority management questions, the recommended long-term hybrid monitoring design approach involves repeated sampling at some sites (fixed stations) and sampling at many sites across the region (spatially distributed sites), with collection of composite whole water storm event samples. Site selection will begin this summer using designated funds from the WY 2026 monitoring project. Site selection criteria will be reviewed and revised at that time. We anticipate addressing some gaps not yet filled during prior sampling years, such as monitoring larger tributaries (e.g., Coyote, Alameda, or Sonoma Creeks) and monitoring specific sites for multiple storms (e.g., at sites under consideration for the Fixed Monitoring Station Network). We anticipate including newer methods offered by SGS AXYS (e.g., ultra-short chain PFAS), pending review of pilot data by the ECWG. We also plan to collect suspended sediment concentration (SSC) samples manually and with the large automated sampler (analysis by SFEI staff).

For WY 2027, the analytical budget is covered by the PFAS grant, and is expected to include target and TOP analyses at all sites, and additional PFAS (e.g., extended target list, ultra-short chain compounds, fluorotelomer alcohols) at manual and large automated sites. The data services budget is partially covered by the PFAS grant (target and TOP assay), with additional funds requested via this proposal to cover QA of the additional PFAS analyses.

PFAS monitoring priorities in subsequent years (Water Years 2028 and 2029) will be determined via annual engagement with the Stormwater CECs SST. It may be appropriate to collect PFAS samples at a larger number of sites for some time, if stakeholders indicate specific data are needed to inform management actions. Alternatively, we may reduce effort to the level of recurrent monitoring as we focus on data interpretation and/or shift to focus on another class of contaminants. The current analytical and data services budgets for WYs 2028 and 2029 would cover PFAS target analyses across a similar number of sites, plus one additional analysis selected with support from the SST, such as the TOP assay, ultra-short PFAS, or vehicle- and tire-derived contaminants. Cost savings could be achieved by reducing the number of sites and/or eliminating the additional analysis.

The data interpretation and reporting associated with stormwater PFAS monitoring will largely be supported by our PFAS grant, which includes piloting data analysis and load estimation processes to address RMP stormwater CECs management questions. As a result, this proposal includes only a modest allocation of funds towards interpretation and reporting in later years, should the RMP indicate the need for additional analyses not covered by our PFAS grant. These activities would occur when sufficient data are available, and are not tied to an annual cycle.

Pending results of an interlaboratory comparison study, we hope to restart recurrent monitoring of organophosphate esters, a class of high concern for the Bay. Recurrent monitoring is expected to leverage the Fixed Monitoring Station Network, which will provide the sites for monitoring manually and/or with the large automated sampler. All sample collection labor would be covered with the present proposal. Recurrent monitoring and associated QA is considered a Tier 2 priority at this time.

In addition to the measurements provided by the commercial lab, Dr. Heather Stapleton has offered to perform a pro bono analysis on the sample extracts to characterize them for additional organophosphate esters. Her laboratory has a panel that quantifies 33 different OPEs by GC-HRMS. While the extracts will be in a LC-MS favorable solvent (e.g., methanol), her laboratory will conduct a solvent exchange on the extract prior to the GC-HRMS analysis. While this exchange may result in the loss of some more volatile OPEs, the analyses will still provide insight into the presence of additional OPEs in the San Francisco Bay. To help address the loss of volatile OPEs, measurements can be compared for OPEs that are present in both panels (measured by SGS AXYS and Dr. Stapleton's laboratory), such as TCCP and TPhP.

For all elements, after QA/QC evaluation we will upload all commercial laboratory data to the California Environmental Data Exchange Network (CEDEN).

Proposed annual budgets for all recommended monitoring (Tables 3A and 3B) do not exceed those indicated in the multi-year plan (up to $575,000 per year). Costs could be reduced through use of fewer analyses (currently budgeted to cover target PFAS and one additional analysis per set of samples in WY 2028-29) and elimination of OPEs recurrent monitoring. This would reduce not only laboratory costs but also associated planning, data services, and reporting costs. If the budgeted number of samples are not collected and analyzed in any given year, the budget surplus will be carried forward to reduce the future year's budget needs. Conversely, if the SST recommends increased monitoring, there may be a future proposal request to add funds to this multi-year effort.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Sampling and analysis plans	October 2026, 2027, 2028
Task 2. Sample collection	April 2027, 2028, 2029
Task 3. Laboratory analysis	August 2027, 2028, 2029
Task 4. Stormwater CECs SST meeting	September 2027, 2028, 2029
Task 5. Data QA	November 2027, 2028, 2029
Task 6. PFAS Focus Contaminant Class draft report	February 2028
Task 7. PFAS Focus Contaminant Class final report	July 2028
Task 8. CEDEN upload	July 2028, 2029, 2030

Table 3A. Tier 1 Budget - Stormwater CECs Monitoring Platform, PFAS

Expense	Cost WY27	Cost WY28	Cost WY29
SFEI Labor			
Task 1. Project Management	28,000	30,000	32,000
Task 2. Site Selection, Sampling and Analysis Plans, Wet Season Prep	34,000	34,000	34,000
Task 3. Permits	23,000	23,000	23,000
Task 4. Sample Collection man/lrg	85,000	88,000	90,000
Task 5. Sample Collection small	70,000	72,000	75,000
Task 6. PFAS Data Services	37,000 (& PFAS grant)	43,000	45,000
Task 7. Analysis and Reporting	(PFAS grant)	50,000	
Task 8. Sampler Maintenance	10,000	10,000	11,000
Task 9. Annual SST Meeting	20,000	21,000	22,000
Subcontracts			
PFAS Focus Contaminant Class Subcontractor SGS AXYS	(PFAS grant)	50,000	52,000
Direct Costs			
Equipment	10,000	10,000	10,000
Travel and per diem	3,000	3,000	3,000
Shipping	8,000	8,000	8,000
Permit Fees	10,000	10,000	10,000
GRAND TOTAL	**$338k**	**$427k**	**$440k**

Table 3B. Tier 2 Budget - Recurrent Contaminants, Additional Small Automated Deployment for PFAS

Expense	Cost WY27	Cost WY28	Cost WY29
SFEI Labor			
Task 1. Project Management	10,000	10,000	10,000
Task 2. Sampling Plan	5,000	5,000	5,000
Task 4. Sample Collection man/lrg	5,000	5,000	5,000
Task 5. Sample Collection small	35,000	36,000	37,000
Task 6. Data Services	23,000	24,000	25,000
Subcontracts			
PFAS and Recurrent Contaminants Subcontractor(s) TBD	30,000	31,000	33,000
Direct Costs			

Equipment	1,000	1,000	1,000
Travel	0	0	0
Shipping	4,000	4,000	4,000
GRAND TOTAL	**$113k**	**$116k**	**$120k**

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Newly Identified Tire- and Vehicle-derived Contaminants in Bay Water and Stormwater - Year 2 of 2

Summary

6PPD-quinone and other contaminants derived from tires have been observed in Bay Area stormwater and in-Bay receiving waters. A dramatic increase in scientific research on exposure and impacts of tire-derived contaminants means our state of knowledge concerning chemicals of interest, sampling and analytical methods, and toxicity and risk thresholds are currently rapidly changing. This proposed study would continue to evaluate the concentrations of previously observed tire- and vehicle-derived contaminants of concern, including 6PPD-quinone, while also significantly expanding the analyte list using the newest analytical methods. New analytes of interest include potential replacements for 6PPD in tires and their transformation products, many of which have been observed in recent Washington State stormwater samples.

Leveraging ongoing RMP sampling, this project will quantify tire- and vehicle-derived contaminants in stormwater runoff and Bay water samples collected following storm events to provide information on the impact of stormwater discharges on Bay contaminant concentrations. Results will indicate whether these stormwater-transported contaminants reach concentrations of concern in Bay waters, and provide an early indicator of changes in tire formulations in response to 6PPD management actions.

Proposed by Ezra Miller (SFEI)
Estimated Project Cost $105,000
Oversight Group(s) ECWG
Time Sensitive? Yes; year two of a multi-year study. Leverages wet season sampling efforts; early release of funds requested.

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
Monitor a wider suite of tire-derived contaminants in Bay Area stormwater and Bay nearshore water.	MQ1: Which CECs have the potential to adversely impact beneficial uses in San Francisco Bay?
Evaluate concentrations in Bay water relative to stormwater. Evaluate future stormwater and Bay monitoring needs.	MQ2: What are the sources, pathways, loadings, and processes leading to the presence of individual CECs or groups of CECs in the Bay?
Evaluate prevalence of 6PPD replacements.	MQ6: What are the effects of management actions?

Background

Numerous chemicals are present at relatively high concentrations in aqueous leachates from tire particles, both chemicals used or formed as byproducts during manufacture, and those formed via transformation during use. We estimate that 1.9–2.4 kg of tire particles are released per capita every year in the Bay Area, and stormwater washes trillions of these particles into the Bay (Moran et al., 2023). Known chemical emissions from tires and vehicles include heavy metals like zinc, polycyclic aromatic hydrocarbons (PAHs), and a broad swath of emerging contaminants, including vulcanization accelerators; crosslinking agents, corrosion inhibitors, and their transformation products; antidegradants and antiozonants/antioxidants; plasticizers; stabilizers; aromatic and paraffinic oils; formaldehyde; and rubber polymers (Mayer et al., 2024).

A number of potentially toxic tire-derived contaminants have been observed in Bay Area stormwater, including the salmonid toxicant, 6PPD-quinone (6PPDQ), derived from a ubiquitously used tire preservative chemical, 6PPD (Peter et al., 2024; Sutton et al., 2024; Tian et al., 2021). 6PPDQ is considered a Moderate Concern in the RMP tiered risk-based framework for CECs, while the larger class of tire- and vehicle-derived contaminants is considered Possible Concern due to currently limited occurrence and toxicity data.

From 2021-2024, the RMP conducted a three-year pilot monitoring effort to quantify tire and vehicle-derived contaminants in Bay water samples collected following storm events (Miller et al., 2026). Ten tire-derived contaminants were included in this effort: 6PPDQ, hexamethoxymethylmelamine (HMMM), diphenylguanidine (DPG), 1,3-dicyclohexylurea (DCU), 2-(4-morpholinyl)benzothiazole (2,4-MoBT), 2-amino-benzothiazole (2-NH2-BTH), 2-hydroxybenzothiazole (2-OH-BTH), benzotriazole, 5-methyl-1H-benzotriazole (5-Me-1-BTR), and N-cyclohexyl-1.3-benzothiazole-2-amine. This screening study showed that many of these contaminants are present in quantifiable levels not only in stormwater, but also in both the nearshore Bay and the surface waters of the open Bay (main channel) during the wet season (Miller et al., 2026).

In 2023, the California DTSC Safer Consumer Products Program became the first agency in the world to regulate 6PPD in tires, using RMP data as justification for potential risk to California aquatic life (DTSC, 2023). Under this regulation, tire manufacturers were required to submit Preliminary Alternatives Analyses in March 2024. These submittals are being followed by more in-depth analyses of promising alternatives. Preliminarily identified possible 6PPD alternatives include other PPDs such as 7PPD, as well as a few non-PPDs that likely pose greater challenges in incorporating into tire chemistry.

Work by the Kolodziej group (University of Washington) and others has begun to identify 6PPD alternatives and their transformation products in stormwater runoff, indicating the tire industry may already be changing formulations. This study is conducting recurrent monitoring of tire- and vehicle-derived contaminants in stormwater runoff and Bay water during the wet season, with an expanded analyte list that includes several possible 6PPD alternatives and transformation products for exploratory/pilot monitoring.

Approach

Sampling will leverage other SFEI sampling efforts as much as possible. Stormwater samples will piggyback on other stormwater monitoring (including manual, fixed station, and remote sampling; details will be determined through the stormwater CECs monitoring project) from up to 12 sites, with up to four sites sampled during two storms. This proposal assumes leveraging other stormwater monitoring efforts for additional samples. For stormwater sampling in the watershed, SFEI uses 0.75 inches of rain in six hours as its sampling criterion.

Bay water sample collection will coordinate with other wet season monitoring activities in Water Year 2027. Prior near-field wet season monitoring for tire- and vehicle-derived contaminants included four near-field sites sampled during two storms per year (Miller et al., 2026). The near-field sites included three stations near stormwater inputs plus one station that is also influenced by wastewater input. An additional, stormwater-influenced near-field site in the Richmond Harbor was added for water year 2026. Water samples for this project will be collected at all five near-field sites shortly following both storms, including the first flush if possible. Sampling at near-field sites will be completed within two tidal cycles of the storm. Five in-Bay sites will be sampled within three weeks following the sampling of the near-field sites, leveraging monthly USGS sampling cruises.

QA/QC samples, including field blanks and field duplicates, will be collected for every type of sample (Table 2).

Table 2. Sample Types and Number

Site Type	Number of Sites/Storms	QA/QC Samples	Total Samples
Stormwater	up to 12 sites, with 4 for 2 storms	1 blank, 1 dup per sampling method*	up to 20
Near-field wet season	5, 2 storms	1 blank, 1 dup	12
In-Bay wet season	5, 2 storms	1 blank, 1 dup	12
Overall Total Number of Samples, including QA/QC			up to 44

*different field blanks and field duplicates will be sampled for manual vs. remote sampling

Unfiltered samples will be analyzed by the Kolodziej Laboratory (University of Washington) with a newly expanded, targeted analytical method using multi-residue solid phase extraction (SPE) and liquid chromatography with tandem mass spectrometry (LC-MS/MS). Approximately 30 compounds will be monitored (Table 3), including a broad swath of tire-derived analytes and a few pharmaceuticals and current use pesticides. This suite of representative tracers for urban runoff includes a broad range of contaminants with different physical-chemical parameters (e.g., various chemical functionalities, wide range of polarities and biodegradation potential).

Standard RMP data management procedures will be used for this project. Data will be uploaded to CEDEN as well as summarized in a report that will also include toxicity review of new compounds previously unstudied by the RMP and recommendations for future study.

Table 3. Analytes

Analyte	CEC Class	MQL (ng/L)
44PD	Tire- and Vehicle-derived Contaminants	TBD
6PPD*		4
7PPD*		5.5
77PPD		TBD
IPPD		3.3
DPPD*		6.1
DTPD*		4.3
CCPD		TBD
Aniline		TBD
4-Nitrosodiphenylamine		3.5
1,3-Dimethylbutylamine*		14
4-Aminodiphenylamine		1.9
4-Nitrodiphenylamine		3.9
4-Hydroxy-diphenylamine		4.8
6PPDQ		0.9
IPPDQ		3.2
7PPDQ		3.4
DPPDQ		1.2
DTPDQ		4
Diphenylguanidine		3.01
HMMM		1.95
NCBA		3.25
Dicyclohexylurea		4.2
Benzotriazole		7.6
5-Me-1-BTR		1.6
2-NH2-BTH		1.8
2-OH-BTH		28
2,4-MoBT		4.5
Caffeine	Pharmaceuticals	2.1
Cotinine		0.96
Diuron	Current Use Pesticides	1.7
DEET		6.2

*Less sensitive analyte; TBD = to be determined

Table 4. Proposed deliverables and timeline

Deliverable	Due Date
Task 1: Sampling and analysis plan	October 2026
Task 2. Field collection of samples	April 2027
Task 3. Laboratory analysis	May 2027
Task 4. Data services	August 2027
Task 5. Draft technical report	April 2027
Task 6. Final technical report	October 2027
Task 7. CEDEN upload	May 2028

Table 5. Budget

Expense	Est. Hours	Cost
Labor		
Study Design	32	$7,000
Sample Collection	74	$13,100
Data Technical Services		$27,900
Analysis and Reporting	90	$20,600
Design services	0	$0
Project Management	28	$5,400
Subcontracts		
Ed Kolodziej, University of Washington		$25,000
Direct Costs		
Equipment		$1000
Travel		$1000
Shipping		$4000
GRAND TOTAL		**$105,000**

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Nontarget Analysis of Bay Area Stormwater - Water Year 2027

Summary

The RMP is developing a stormwater CECs monitoring approach that addresses both Emerging Contaminants Workgroup (ECWG) and Sources, Pathways, and Loadings Workgroup (SPLWG) management questions. Nontarget analysis (NTA) is an advanced analytical approach that can be used to identify potentially concerning contaminants that are novel or unexpected. This proposed study would leverage stormwater sample collection efforts by collecting additional stormwater samples for NTA. At the UC Davis laboratory of Dr. Tom Young, samples would be subjected to two types of NTA, allowing a more comprehensive assessment of the presence of both polar and nonpolar contaminants. Contaminants will be tentatively identified via matching to available spectral libraries. This proposed study represents the third and final year of NTA stormwater monitoring using consistent methods on a limited number of manually collected stormwater samples over multiple years. The deliverables include a spreadsheet of contaminant detections and a draft manuscript that describes the findings over all monitoring years. Results will be used to inform future stormwater and Bay monitoring priorities.

Proposed by Rebecca Sutton and Ezra Miller (SFEI), Tom Young (UC Davis)
Estimated Project Cost $156,000
Oversight Group(s) ECWG
Time Sensitive? Yes; year three of a multi-year study. Early release of funds requested to prepare for the wet season.

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
Identify stormwater contaminants not yet characterized by targeted monitoring efforts. Evaluate future stormwater and Bay monitoring needs and toxicity data gaps.	MQ2: What are the sources, pathways, loadings, and processes leading to the presence of individual CECs or groups of CECs in the Bay?

Background

The RMP is developing a stormwater CECs monitoring approach that addresses both Emerging Contaminant Workgroup (ECWG) and Sources, Pathways, and Loadings Workgroup (SPLWG) management questions. At the spring 2024 ECWG meeting, stakeholders and experts recommended adding nontarget analysis (NTA) to this effort.

NTA is an advanced analytical approach that can be used to identify potentially concerning contaminants that are novel or unexpected. This powerful tool based on mass spectrometry provides a broad, open-ended view of thousands of synthetic and naturally derived chemicals simultaneously, in contrast to more typical targeted analysis of known contaminants with which you can only observe what you are looking for. NTA can rely on either liquid chromatography (LC), best suited for identifying polar compounds, or gas chromatography (GC), best suited for identifying nonpolar compounds. For a more comprehensive screening for the presence of unanticipated contaminants, applying both LC- and GC-based methods is useful. Prior RMP special studies using NTA have resulted in detection of new CECs of potential concern (e.g., tire-derived contaminants, ethoxylated surfactants) that merited follow-up targeted monitoring, and have informed overall RMP monitoring priorities (Overdahl et al., 2021).

The second year of NTA stormwater monitoring is underway now. This proposal would add a third and final year of leveraged sample collection and analysis to this effort. Overall, we recommend consistent application of NTA to a modest number of manually collected stormwater composite samples for multiple years, resulting in sufficient data for broader interpretation. New contaminants identified via this effort could be candidates for follow-up targeted monitoring in stormwater and the Bay, providing data for risk screening and addition to the RMP's tiered risk-based framework for CECs.

Preliminary review of findings from the six field samples collected in the first year of monitoring are largely consistent with expectations in terms of identified contaminants. In addition to many of the compounds and contaminant classes already prioritized in the tiered risk-based framework, we also detected a variety of compounds associated with plastics, paints, and coatings. Analysis is underway on the second year of samples.

Approach

Sample Collection
Manual sampling is recommended for stormwater NTA composite sample collection as it avoids potential background contamination by the tubing and materials used in both large and small remote sampling devices (e.g., ISCO pump, SFEI small remote sampler). Anticipated stormwater monitoring in water year 2027 includes limited manual sampling for multiple contaminants at locations that are infeasible for SFEI's small remote sampler installation and/or locations that are candidates for future permanent fixed sampling locations.

Samples are collected into 1 L amber glass containers and shipped on ice overnight to UC Davis. The preferred hold time is one day, though up to seven days is acceptable. This proposal includes a budget for up to 12 field samples (dependent on rain), 1 field blank, and 1 matrix spike.

Analysis
The Young laboratory at UC Davis has developed and validated general-purpose broad-scope screening strategies based on integrated application of liquid and gas chromatography with quadrupole time-of-flight mass spectrometry (LC-QTOF/MS and GC-QTOF/MS) capable of analyzing diverse environmental sample types (Alaimo et al., 2021; Black et al., 2021, 2019; Hattaway et al., 2024; Moschet et al., 2018, 2017; Young

et al., 2021). Aqueous-phase compounds are concentrated using solid phase extraction cartridges, and the cartridges are eluted. Extracts are split and solvent exchanged to produce appropriate samples for LC- and GC- analysis and are further concentrated as necessary to facilitate analysis. Each extract is spiked with internal standard; the LC mixture contains 12 labeled internal standards to support retention time alignment (Aalizadeh et al., 2021) and assessment of matrix suppression effects. Compounds in the GC-fractions are analyzed using an Agilent 7200B GC-QTOF/MS with electron ionization (EI) and retention indexing is conducted using a standard normal alkane series (C8-C32). The LC-fractions are analyzed on an Agilent 6530 LC-QTOF/MS in both positive and negative electrospray ionization (ESI+/ESI-) modes. Raw data from all GC- and LC-QTOF/MS experiments are converted from vendor format to analysis base file format for further processing (Reifycs Analysis Base File Converter v. 4.0.0). All data are subsequently deconvoluted and aligned using MS-DIAL (v. 4.90) (Tsugawa et al., 2015).

A primary advantage of this workflow is the ability to handle both GC-EI and LC-ESI data using similar workflows. Deconvoluted and aligned features in each data set are tentatively identified by searching against relevant databases (e.g., NIST17 for GC-EI data and vendor and online databases including MassBank of North America for LC-ESI data). Extensive parameter selection experiments and workflow performance evaluations have been performed for these workflows (Black et al., 2021, 2019; Moschet et al., 2018, 2017; Young et al., 2021). Annotations of GC-EI compounds are cross-checked against results from Agilent Unknowns Analysis (v. 10). Compounds prioritized using these methods are subsequently obtained commercially (when possible) and the identities are confirmed.

The laboratory contract will cover up to 12 field samples (dependent on rain), 1 field blank (billable), 1 matrix spike (billable) and 1 method blank (unbillable) per run, at a per sample cost of $3,400 (includes independent analyses using LC-ESI+, LC-ESI- and GC-EI), and full suspect screening of data from each platform. The fixed cost for data analysis, interpretation, and lead authorship on a scientific manuscript is $62,500. Including the negotiated indirect rate of 10%, the total subcontract with UC Davis covering the above work is $121,110.

Deliverables
The deliverables will include a spreadsheet of tentatively identified compounds, publicly accessible baseline spectra for future NTA comparisons, and a draft and final manuscript.

Extracts from all water samples and associated quality assurance samples will be stored frozen (-20 °C) at UC Davis for a minimum of three years beyond the completion of the project to facilitate subsequent confirmation and/or retrospective analyses (e.g., identification of new contaminants of concern, identification of causes of toxicity). All chromatography and mass spectrometry results from the study will be made accessible to SFEI in a format and location to be decided at the end of the study period.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Collect NTA stormwater samples	April 2027
Task 2. Laboratory analysis	July 2027
Task 3. Reporting of contaminants detected	October 2027
Task 4. Draft manuscript	February 2028
Task 5. Final manuscript	May 2028

Table 3. Budget

Expense	Est. Hours	Cost
Labor		
Study Design	12	2400
Sample Collection	24	4800
Data Technical Services	0	0
Analysis and Reporting	88	20840
Design services	0	0
Project Management	16	3200
Subcontracts		
Tom Young, UC Davis		121,110
Direct Costs		
Equipment		500
Travel		500
Shipping		2650
GRAND TOTAL		**$156,000**

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Quaternary Ammonium Compounds (QACs) in Wastewater and Upstream Sources

Summary

Quaternary ammonium compounds (QACs) are surfactants widely used as antimicrobials and in various consumer products. Their release to the environment has increased, particularly following the COVID-19 pandemic's surge in QAC-containing product use. In a study from 2020-2023, wastewater treatment plants (WWTPs) have shown notable levels of QACs in influent, effluent, and biosolids, with influent levels often linked to disinfectant products. High concentrations (µg/L) of QACs entering WWTPs may be linked to treatment process upsets at some facilities, which is especially detrimental to nutrient removal needed to protect Bay water quality. Given the previously limited Bay water data, these contaminants are currently classified as a Possible Concern under the RMP tiered risk-based framework; potential revision to this classification will be discussed at the ECWG meeting.

We propose a study to continue assessing QACs in wastewater (influent, effluent, and biosolids) to build a better understanding of this contamination pathway with respect to Bay water quality, effectiveness of removal by the treatment process, and changes in QAC use over time. This will include an interlaboratory comparison study to ensure comparability between methods previously used by the RMP and those most readily available to WWTPs. Furthermore, we propose examining sources upstream of WWTPs to pinpoint the main contributors responsible for the elevated levels that potentially disrupt the treatment process. The results from this study will be essential for informing potential source control strategies and guiding future monitoring efforts.

Proposed by Miguel Méndez, Rebecca Sutton (SFEI)
Dr. Bill Arnold (University of Minnesota)

Estimated Project Cost $203,000

Oversight Group(s) ECWG

Time Sensitive? No

Table 1. Study objectives and applicable management questions (only list management questions that are relevant to the proposal)

Study Objective	Management Question
Characterize levels of QACs in wastewater influent, effluent, and biosolids. Evaluate sources upstream of wastewater influent to understand QACs inputs.	2) What are the sources, pathways, loadings, and processes leading to the presence of individual CECs or groups of CECs in the Bay?
Compare levels of QACs in wastewater influent, effluent, and biosolids to previously detected levels (from 2020-2023).	4) Have levels of individual CECs or groups of CECs changed over time in the Bay or pathways? What are potential drivers contributing to change?

Background

QACs are a major class of primarily cationic (positively charged) surfactants known for their antimicrobial, anti-static, and surfactant properties. As QACs are key active ingredients in many antimicrobial products, their use has notably increased, particularly in response to COVID-19 (Arnold et al., 2023). Many of these chemicals are also designated as high production volume compounds (Arnold et al., 2023).

QACs are used in a wide array of consumer, industrial, and medical products, which results in significant amounts ending up in wastewater. Research indicates that effluents from WWTPs are a major pathway of QACs to the environment (Arnold et al., 2023; Mahony et al., 2025; Pati and Arnold, 2020). Designed to be biocidal, many QACs have also been shown to be toxic to various aquatic organisms, including algae, invertebrates, fish, and microorganisms (Arnold et al., 2023; Zhu et al., 2010).

A recent study focused on QACs in wastewater found them consistently in influent, effluent, and biosolids (Mahony et al., 2025). The QACs detected at the highest levels in influent were similar to those found in disinfectant products, indicating these as a large source of QACs to wastewater. While decreasing levels from influent to effluent suggest significant removal through the typical WWTP treatment process, the concentrations discharged remain a concern for Bay water quality. Further, a significant portion of QACs are sorbed into biosolids, which may not be a major pathway to the Bay, but are a better matrix to characterize trends over time. QACs are currently classified as a Possible Concern in the Bay due to limited occurrence data. A potential revision to that classification based on Bay water data from RMP sampling in 2025 will be discussed at the 2026 ECWG meeting.

Several studies have documented the problematic impacts of high concentrations (> 2 mg/L) entering WWTPs, which can lead to the breakdown of treatment processes, especially nitrification/denitrification (Chen et al., 2018; Hora et al., 2020; Yang et al., 2015). Treatment plant upsets may lead to greater discharges of nutrients and possibly other contaminants to Bay waters. Already, a few Bay Area WWTPs have experienced treatment upsets potentially due to high QAC levels. While only some local WWTPs currently implement nitrogen removal, this process will expand to many more facilities over the next few years, making it critical to understand the potential impacts of QAC concentrations on these systems.

Given the serious concerns with concentrations entering WWTPs and discharged to the Bay, examining upstream sources of QAC contamination is recommended. In the Bay Area, dairy and butcher operations are potential high emitters to WWTPs, as QACs are extensively used in food processing and the food service industry (Arnold et al., 2023). One study also identified laundry operations as a significant contributor (Guo et al., 2026). These and other potential sources, especially those contributing to WWTPs that may already be experiencing treatment upsets, warrant further study.

This proposal outlines a study to further investigate QAC contamination in wastewater, assessing treatment removal effectiveness and tracking changes in QAC usage over time. This includes an interlaboratory comparison study to compare commercially available methods (used by WWTPs) with those typically conducted by the RMP (in collaboration with academic labs). Crucially, we will also examine sources upstream of WWTPs to identify the main contributors of elevated QAC levels that are disrupting the treatment process. The findings will be essential for informing potential source control measures and developing a future Bay monitoring strategy.

Approach

Sample Collection

We will monitor up to five WWTPs in the Bay Area, selected based on factors including previous QAC monitoring, treatment type, potential sources, and suspected QAC-related treatment issues. At each facility, 24-hour composites of influent and effluent, and grabs of biosolids will be collected twice during Summer 2027. Each influent and effluent sample will be collected in duplicate to provide samples to both laboratories (University of Minnesota and Hydro Solutions) conducting analyses as a part of an inter-lab comparison study. Upstream sampling (grabs, 24-hour composites preferred) will also occur twice at up to 10 suspected or known sources of QACs, including predominantly residential areas, food processing sites, and others identified in collaboration with WWTP staff. Samples will be collected on weekdays to avoid weekend variation.

Up to 10 samples of both influent, effluent, and biosolids, plus quality assurance and quality control (QA/QC) samples (field replicate, field blank, and matrix spike; one per matrix), will be collected for analysis by a commercial lab (HydroSolutions).

Up to 50 field samples will be collected, including relevant QA/QC samples (a replicate and spike per sample; a field blank per matrix), for analysis by the University of Minnesota.

Analysis

Samples from all matrices will be analyzed by Dr. Bill Arnold at the University of Minnesota using a previously published method (Mahony et al., 2023). At least 20 analytes will be evaluated, which represent some of the important subgroups of QACs (Table 2). Briefly, samples will be spiked with three surrogate standards, extracted by methods specific to each matrix, cleaned up by solid-phase extraction (SPE), and then analyzed via liquid chromatography triple quadrupole mass spectrometry (LC/MS-MS). Concentrations in all samples are calculated via external standard quantification calibration, normalized by an internal standard with corrections for surrogate recovery.

Table 2. Current QACs in the University of Minnesota method, including their limits of detection (LOD).

Abbrevation	Target Compound	LOD (ng/L)*
ATMAC C10	alkyl trimethyl ammonium compound C10	0.02
ATMAC C12	alkyl trimethyl ammonium compound C12	0.2
ATMAC C14	alkyl trimethyl ammonium compound C14	0.5
ATMAC C16	alkyl trimethyl ammonium compound C16	0.2
ATMAC C18	alkyl trimethyl ammonium compound C18	1.0
BAC C8	benzyl alkyl dimethyl ammonium compound C8	0.02
BAC C10	benzyl alkyl dimethyl ammonium compound C10	0.03
BAC C12	benzyl alkyl dimethyl ammonium compound C12	0.6
BAC C14	benzyl alkyl dimethyl ammonium compound C14	0.8
BAC C16	benzyl alkyl dimethyl ammonium compound C16	0.4
BAC C18	benzyl alkyl dimethyl ammonium compound C18	0.4
DADMAC C8:C8	dialkyl dimethyl ammonium compound C8:C8	~1
DADMAC C8:C10	dialkyl dimethyl ammonium compound C8:C10	1.1
DADMAC C10:C10	dialkyl dimethyl ammonium compound C10:C10	0.9
DADMAC C12:C12	dialkyl dimethyl ammonium compound C12:C12	0.4
DADMAC C14:C14	dialkyl dimethyl ammonium compound C14:C14	0.2
DADMAC C16:C16	dialkyl dimethyl ammonium compound C16:C16	0.6
DADMAC C18:C18	dialkyl dimethyl ammonium compound C18:C18	2.3
EBAC C12	ethylbenzyl alkyl dimethyl ammonium compound C12	0.5
EBAC C14	ethylbenzyl alkyl dimethyl ammonium compound C12	0.9

*LODs are concentrations in the original sample after a 1000-fold concentration.

Influent and effluent samples will be analyzed by Hydro Solutions to compare reported results to those obtained by the University of Minnesota. This method analyzes the free and total presence of the following QAC compounds using LC-MS (Table 3).

Table 3. Current QACs in the HydroSolutions method.

Abbreviation	Target Compound
ATMAC C14	alkyl trimethyl ammonium compound C14
ATMAC C16	alkyl trimethyl ammonium compound C16
ATMAC C18	alkyl trimethyl ammonium compound C18
BAC C12	benzyl alkyl dimethyl ammonium compound C12

BAC C14	benzyl alkyl dimethyl ammonium compound C14
BAC C16	benzyl alkyl dimethyl ammonium compound C16
DADMAC C8:C8	dialkyl dimethyl ammonium compound C8:C8
DADMAC C10:C10	dialkyl dimethyl ammonium compound C10:C10
DADMAC C12:C12	dialkyl dimethyl ammonium compound C12:C12
Benzethonium	benzethonium
APyrC C16	alkyl pyridinium compound C16

Deliverables

A draft and final manuscript (or technical report, based on the findings) will be prepared by the University of Minnesota. The manuscript will be submitted to a journal with a free green open-access agreement (1-year after publication) with the pre-acceptance version published in an online repository for immediate access. Results will be presented at the ECWG meeting in 2029.

Table 4. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Study Design and Sampling Plan	June 2027
Task 2. Wastewater Sample Collection	October 2027
Task 3. Lab Analysis	July 2028
Task 4. Data Management: Formatting and QA	November 2028
Task 5. Draft Manuscript (by University of Minnesota)	March 2029
Task 6. Presentation of Results at ECWG	April 2029
Task 7. Final Manuscript (by University of Minnesota)	July 2029

Table 5. Budget

Expense	Est. Hours	Cost
Labor		
Task 1. Study Design	42	7,100
Task 2. Sample Collection	48	8,500
Task 4. Data Management	175	38,000
Task 5,6,7. Reporting	64	11,800
Task 8. Project Management	40	7,100
Subcontracts		
Task 3. Dr. Bill Arnold, University of Minnesota		112,000
Task 3. Hydro Solutions		12,000
Direct Costs		
Equipment		1,000
Travel		500
Shipping		5,000
GRAND TOTAL		**$203,000**

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Ultra-Short Chain and Extended List of Per- and Polyfluoroalkyl Substances in Bay Water

Summary

Per- and polyfluoroalkyl substances (PFAS) are a vast class of thousands of fluorine-rich, chemically stable compounds widely used in consumer and industrial products. Because concentrations of PFAS in Bay fish have been linked to potential human health risks, they are classified as a High Concern within the RMP tiered risk-based framework. Continued Bay monitoring for PFAS remains a high priority, supported by recent RMP analyses of these compounds in Bay water. To date, however, most studies have relied on methods that analyze at most 40 individual PFAS.

Incorporating new analytical methods for ultra-short chain (USC) and an extended list of PFAS is crucial for a more comprehensive understanding of these contaminants in the Bay. Recent RMP stormwater studies utilizing these new methods have already revealed substantial concentrations of USC PFAS and identified other previously undetected analytes. Upcoming use of these or similar methods to analyze rain and wastewater will provide further insights into their significance for Bay water monitoring. A decision on using the extended list for Bay water will be made after further results for stormwater and wastewater are examined, expected by Fall 2026. Therefore, we propose analyzing Bay water in the dry and wet season for USC and potentially the extended PFAS list. The wet season samples would also be analyzed using the usual method for 40 PFAS. This assessment will enhance current Status and Trends (S&T) monitoring of target PFAS, better characterize the overall presence of this class of compounds, and further inform the ongoing monitoring strategy.

Proposed by Miguel Méndez, Rebecca Sutton

Estimated Project Cost USC Only: $96,000
USC and Extended List: $140,000

Oversight Group(s) ECWG

Time Sensitive? Yes, leverages Dry Season S&T Monitoring of Water in 2027. Early release of funds requested for the collection of wet season samples in Water Year 2027.

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
Assess an expanded suite of PFAS present in Bay water.	1) Which CECs have the potential to adversely impact beneficial uses in San Francisco Bay?
Evaluate the detected concentrations by comparison with prior measurements from rain, stormwater, and wastewater samples.	2) What are the sources, pathways, loadings, and processes leading to the presence of individual CECs or groups of CECs in the Bay?

Background

PFAS constitute a class of thousands of human-made compounds extensively utilized in consumer, commercial, and industrial applications. Monitoring efforts in the San Francisco Bay spanning more than twenty years have consistently detected PFAS across various environmental media. Historically, studies primarily employed methods that analyzed up to 40 individual PFAS; however, advances in analytical techniques now enable the surveying of additional PFAS classes. These additional methods are important for understanding the broader scope of PFAS in the environment.

Ultra-short chain (USC) PFAS are a key focus for study due to their anticipated elevated concentrations in local pathways (stormwater and wastewater) and atmospheric transport entering the Bay. This subclass is highly persistent, forms from the breakdown of many PFAS precursors, and exhibits extremely high water solubility, allowing them to move efficiently through aquatic environments. USC are also known to form and travel in the atmosphere from the degradation of refrigerant compounds released into the air, resulting in dry and wet deposition into the subsurface environment (Zhi et al., 2024). Consequently, USC PFAS are expected to be discharged into and widely dispersed throughout the Bay. Preliminary results from WY 2025 Bay Area stormwater monitoring support this, with detections of trifluoroacetic acid (TFA), the most well-known USC PFAS, at concentrations of hundreds of ng/L. These levels are one to two orders of magnitude higher than those of the 40 PFAS typically analyzed in stormwater. While data for other Bay pathways will not be available until later in 2026, global results have shown TFA in wastewater and rain at concentrations similar to those found in Bay Area stormwater (Zhi et al., 2024).

Coastal and estuarine waters remain poorly characterized for USC PFAS, with no recent research conducted in California or the US. Data available for global surface waters, which primarily focus on rivers and other freshwaters, show concentrations with a wide range (tens to hundreds of ng/L), generally on the lower end of those found in various pathways (Zhi et al., 2024). One study in Northern California found that between 1998 and 2021, concentrations of TFA in streams downwind of the Bay Area increased more than tenfold (Cahill, 2022). These sites also reported the highest TFA concentrations of any samples in the study (ranging from 288 to 2,790 ng/L), suggesting that sources from urban areas are a factor in this increase (Cahill, 2022).

Research on the toxicity of USC PFAS is currently limited, with the majority of studies concentrating on TFA. While TFA generally exhibits low-to-moderate toxicity in traditional toxicity testing (Arp et al., 2024), its extreme persistence is concerning from a toxicological perspective due to continuous releases increasing environmental concentrations, leading to increased exposures and therefore increased probabilities for known and unknown health effects (Cousins et al., 2020). Findings from mammalian studies indicate that TFA poses risks for reproductive and liver toxicity (Arp et al., 2024). To fully assess the toxicity of USC to both human health and the environment, a broader range of organism studies is necessary.

Beyond USC PFAS, other subclasses may merit further investigation in Bay water. The SGS AXYS extended list method includes 35 novel PFAS not previously examined in Bay water, including 8 new subclasses and expansion of three existing classes. Of particular interest are polyfluoroalkyl phosphate esters (PAPs), known replacements to legacy PFAS and widely used in consumer products. Preliminary results of WY 2025 Bay Area stormwater using the extended list found 6:2 diPAP in nearly all analyzed samples (6/7) at levels similar to legacy PFAS (low ng/L). Wastewater analysis globally has shown diPAPs as a dominant PFAS detected (Ao et al., 2024). A decision on using the extended list for Bay water will be made after examining preliminary results for stormwater and wastewater, expected by September 2026.

This proposed study seeks to apply the USC and extended list methods to Bay water to gain a deeper understanding of the occurrence, fate, and potential ecological and human health risks associated with PFAS. For a complete understanding of PFAS and parity with the dry season sampling effort, the wet season samples will also be analyzed using the EPA method 1633 for 40 PFAS. The results will establish crucial baseline data, enabling comparison with ongoing monitoring data from various Bay pathways. By providing essential data, this monitoring effort will help inform risk assessment and prioritize monitoring efforts as regulatory frameworks evolve to encompass the broader class of PFAS beyond PFOS and PFOA.

Approach

Ambient Bay Water

Collection of Bay water samples will be coordinated with the RMP S&T dry season Bay water monitoring cruise in the summer of 2027. Wet season samples will be collected at near-field locations (closer to watershed discharge points) during Water Year 2027. During the dry season water cruise, 22 sites will be sampled. During the wet season, 5 near-field sites will be sampled twice directly after a storm. All samples will be grab samples of Bay water. The dry season effort will include the collection of two field replicates, two field blanks, and two matrix spikes, while only one of each QA sample will be collected during wet season monitoring. Dry and wet season monitoring (field samples and QA) will total 41 samples for each new method. Wet season samples (13 samples) will also be analyzed using EPA method 1633.

Collection during the upcoming water year is important to compare to PFAS pathways (wastewater, stormwater, rain), which will also be analyzed for USC this year. If samples are not collected in the upcoming wet season, they will be postponed to the following season (WY 2028) and delay laboratory and reporting deadlines by up to 8 months.

Analysis

Samples will be analyzed by SGS AXYS (Sidney, BC, Canada) using SGS AXYS Method MLA-110 (EPA 1633) to quantify 40 PFAS, SGS AXYS method MLA-120 to quantify 5 USC PFAS (Table 2), and MLA-121 for an additional 35 PFAS analytes (Table

3). After spiking with isotopically labeled surrogate standards and cleanup on SPE cartridges, aqueous samples are analyzed by ultra-high performance liquid chromatography/mass spectrometry (UHPLC-MS/MS). Final sample concentrations are determined by isotope dilution/internal standard quantification.

Table 2. Ultra-short chain PFAS and their reporting limits (RLs) in SGS AXYS Method MLA-120.

Acronym	Analyte	RL based on Low Cal.
	Perfluoroalkyl Carboxylates	
TFA; PFEtA	Trifluoroacetic acid	100
PFPrA	Pentafluoropropionic acid	20
	Perfluoroalkyl Sulfonates	
PFMeS	Trifluoromethanesulfonic acid	10
PFEtS	Pentafluoroethanesulfonic acid	5
PFPrS	Heptafluoropropanesulfonic acid	5

Table 3. Extended List PFAS and their reporting limits (RLs) in SGS AXYS Method MLA-121.

Acronym	Analyte	RL
	Perfluoro sulfonamides	
TFSI	Bis(trifluoromethane)sulfonimide	0.1
PFBSA	Perfluorobutylsulphonamide	0.1
PFHxSA	Perfluorohexanesulfonamide	0.1
PFHpSA	Perfluoroheptanesulfonamide	0.1
PFDSA	Perfluorodecanesulfonamide	0.1
N-MeFBSA	N-Methylperfluorobutanesulfonamide	0.2
	Perfluoroalkylsulfonamidoacetic acids	
N-MeFBSAA	N-Methyl-n-perfluorobutanesulfonylglycine	0.2
N-MeFHSAA	N-Methyl-n-perfluorohexanesulfonylglycine	0.2
PFOSAA	Perfluoro-1-octanesulfonamidoacetic acid	0.2
	Fluorotelomer carboxylic acids	
6:2 FTCA	6:2 Fluorotelomer carboxylic acid	5
8:2 FTCA	8:2 Fluorotelomer carboxylic acid	5
10:2 FTCA	10:2 Fluorotelomer carboxylic acid	5
6:2 FTUCA	6:2 Fluorotelomer unsaturated carboxylic acid	1
8:2 FTUCA	8:2 Fluorotelomer unsaturated carboxylic acid	0.5
PFECHS	Perfluoroethylcyclohexane Sulfonate	0.25

Acronym	Analyte	RL
	Nafion byproducts	
Nafion BP2	Nafion Byproduct 2 (aka PFESA)	0.2
	Fluorotelomer sulfonates	
10:2 FTS	10:2 Fluorotelomer sulfonate	1
	Perfluoroether carboxylates	
PFMOAA	Perfluoro-2-methyoxyacetic acid	2
PFO3OA	Perfluoro-3,5,7-trioxaoctanoic acid	2
PFO4DA	Perfluoro-3,5,7,9-butaoxadecanoic acid	2
PFO5DoA	Perfluoro-3,5,7,9,11-pentaoxadodecanoic acid	2
PFO6TeA	Perfluoro-3,5,7,9,11,13-hexaoxatetradecanoic acid	2
HydroEVE	HydroEve acid	0.24
	Perfluoroalkylphosphonic acid	
PFHxPA	Perfluorohexylphosphonate	2.5
PFOPA	Perfluorooctylphosphonate	2.5
PFDPA	Perfluorodecylphosphonate	2.5
	Polyfluoroalkyl phosphate monoester	
6:2 PAP	1H,1H,2H,2H-perfluorooctylphosphate	2.5
8:2 PAP	1H,1H,2H,2H-perfluorodecylphosphate	2.5
	Perfluoroalkylphosphinate	
6:6 PFPi	Bis(perfluorohexyl)phosphinate	0.1
6:8 PFPi	Perfluorohexylperfluorooctylphosphinate	0.1
8:8 PFPi	Bis(perfluorooctyl)phosphinate	0.1
	Polyfluoroalkyl phosphate di-ester	
6:2 diPAP	Bis(1H,1H,2H,2H-perfluorooctyl)phosphate	0.5
8:2 diPAP	Bis(1H,1H,2H,2H-perfluorodecyl)phosphate	0.5
	Perfluorocarboxylates	
PFHxDA	Perfluorohexadecanoic acid	0.5
PFODA	Perfluorooctadecanoic acid	0.5

Deliverables

A draft and final technical report will be prepared, including results from all analyses, comparisons to other matrices, and recommendations for future study.

Table 4. Proposed deliverables and timeline

Deliverable	Due Date

Task 1. Study Design and Sampling Plan	November 2026 (Wet) August 2027 (Dry)
Task 2. Sample Collection (Wet Season)	April 2027
Task 3. Sample Collection (Dry Season)	September 2027
Task 4. Lab Analysis	January 2028
Task 5. Data Management: Formatting and QA	April 2028
Task 6. Presentation of Preliminary Results at ECWG	April 2028
Task 7. Draft Report	August 2028
Task 8. Final Report	October 2028

Table 5. Budget

Expense	Est. Hours	Cost (USC + 1633 Wet Season)	Cost (Incl. Extended List)
Labor			
Task 1. Study Design	24	4,200	
Task 2. Wet Season Collection	30	5,300	
Task 3. Dry Season Collection	10	1,800	
Task 5. Data Management: Formatting and QA	138-202	30,000	*44,000*
Task 6,7,8. Reporting	130-148	23,000	*30,300*
Task 9. Project Management	30	5,300	
Subcontracts			
Task 4. SGS AXYS		21,400	*43,100*
Direct Costs			
Equipment		500	
Travel		2,500	
Shipping		2,000	3,000
GRAND TOTAL		**$96,000**	**$140,000**

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PFAS in Precipitation: Year 2 and Year 3

Summary

Per- and polyfluoroalkyl substances (PFAS), a class of thousands of fluorine-rich, chemically stable compounds used widely in consumer and industrial products, are pervasive in the Bay environment. Due to concentrations in Bay fish linked to potential human health risks, PFAS are categorized as a High Concern within the RMP tiered risk-based framework. Recent analyses have demonstrated that stormwater is a significant pathway for PFAS to the Bay, with median levels of individual PFAS on par with those in wastewater. Furthermore, wet deposition, including snow and precipitation, has been shown globally to contain PFAS at levels exceeding USEPA drinking water health advisories, even in remote areas. Currently, local data on PFAS in precipitation are lacking, preventing an assessment of this pathway's overall importance to watersheds and the Bay relative to outdoor PFAS sources distributed within the surrounding urban landscape.

A pilot year of rainwater sampling (n=10) found 6:2 FTS detected at the highest concentrations, up to 11 ng/L. A variety of other PFAS were present at low levels (<1 ng/L individually). We propose two additional years of investigation into the presence of PFAS in precipitation across the San Francisco Bay Area. This continued data collection aims to establish baseline data and clarify the potential influence of precipitation on stormwater PFAS concentrations.

Proposed by Miguel Méndez, Kayli Paterson, and Rebecca Sutton (SFEI)
Dr. Marta Venier (Indiana University)

Estimated Project Cost $183,000 over two years
(Year 2: $62,000; Year 3: $121,000)

Oversight Group(s) ECWG

Time Sensitive? Yes, to continue the pilot study and inform the interpretation of ongoing RMP PFAS stormwater monitoring and the PFAS Source to Solutions project. Early release of funds is requested to conduct sampling in the coming wet season.

Table 1. Study objectives and applicable management questions (only list management questions that are relevant to the proposal)

Study Objective	Management Question
Continued collection of rainwater to understand its potential as another pathway for PFAS to the Bay; establish baseline data	2) What are the sources, pathways, loadings, and processes leading to the presence of individual CECs or groups of CECs in the Bay?

Background

Given the detection of per- and polyfluoroalkyl substances (PFAS) across various matrices in the San Francisco Bay, it is crucial to identify all potential sources and transport pathways. One pathway that remains understudied in the Bay is the transport of PFAS via local and long-range atmospheric movement. This process results in atmospheric deposition (both wet and dry) throughout the Bay watershed, with subsequent movement through stormwater runoff directly into the Bay.

Studies globally and in the US have established the significance of atmospheric transport and deposition. For instance, PFAS have been detected at low ng/L levels in precipitation and snow in remote regions like Antarctica and Mount Everest, underscoring long-range transport (Casal et al., 2017; Miner et al., 2021). US-specific studies have also found various PFAS, particularly short-chain compounds, at similar low ng/L levels in both urban and rural areas (Kim et al., 2023; Xia et al., 2024). Initial findings from the first year of the RMP rain study (n=10) are consistent with previous US studies, with detection of various short-chain compounds (particularly PFBA) at levels close to those reported in previous studies (Xia et al., 2024). One unique feature not seen in previous studies was the widespread detection of 6:2 FTS, a precursor that can break down to short-chain compounds, at the highest levels in all Bay samples (up to 11 ng/L).

Ultra short-chain PFAS are particularly known to form and travel in the atmosphere from the degradation of refrigerant compounds released into the air, resulting in dry and wet deposition into the subsurface environment (Zhi et al., 2024). In Bay Area stormwater, pilot testing has quantified trifluoroacetic acid (TFA), the most well-known USC PFAS, at hundreds of ng/L, which is several times higher than other consistently detected PFAS. Global results have shown TFA in rain at concentrations similar to those found in Bay Area stormwater, with preliminary rain data to be presented and discussed at ECWG (Zhi et al., 2024).

This proposal continues the investigation of PFAS in precipitation in the Bay Area for an additional two years. The goals are to establish baseline data, assess the potential influence of precipitation on stormwater concentrations, and continue to estimate direct wet deposition. Sampling will be conducted at both urban and remote sites to compare results and develop an initial understanding of local versus long-range transport in the Bay. Ultimately, this project will complement current and future PFAS research, enhancing the understanding of sources and pathways contributing to San Francisco Bay contamination.

Approach

Sample Collection

Samples will be collected at up to 15 sites around the Bay Area during storm events in WY27 and WY28. Sites that will be sampled multiple times during a storm season will be prioritized, as well as the sampling of sites in more remote locations. The samples will be collected in large HDPE buckets deployed before a storm event. In addition to precipitation samples, stormwater runoff samples will be collected at specific co-located sites for comparison (up to 10 sites).

The laboratory contract will cover the analysis of up to 40 field samples per year, plus all relevant quality assurance and quality control analyses, which are generally 5-10% of the total number of samples analyzed per matrix.

Analysis

Samples will be analyzed by Dr. Marta Venier at Indiana University for the typical 40 analytes quantified using EPA 1633, as well as USC PFAS. Samples are analyzed by high-performance liquid chromatography (LC-MS/MS; Xia et al., 2024).

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Study Design and Sampling Plan WY 27, WY 28	December 2026, December 2027
Task 2. Sample Collection WY27, WY 28	April 2027, April 2028
Task 3. Lab Analysis WY 27, WY 28	September 2027, September 2028
Task 4. Data Management: Formatting and QA	March 2029
Task 5. Draft Report	August 2029
Task 6. Final Report	October 2029

Deliverables

A draft and final technical report will be prepared, including results from all three sampling years, comparisons to other matrices, and recommendations for future study.

Table 3. Budget

Expense	Est. Hours	Cost WY27	Cost WY28
Labor			
Task 1. Study Design	80	6,800	6,800
Task 2. Sample Collection	136	11,900	11,900
Task 4. Data Technical Services	230	-	33,000
Task 5,6. Reporting	134	-	25,800
Task 7. Project Management	50	5,300	3,500
Subcontracts			
Task 3. Laboratory Analysis: Dr. Marta Venier, Indiana University		35,000	35,000
Direct Costs			
Equipment		1,500	1,500
Travel		-	2,000
Shipping		1,500	1,500
GRAND TOTAL		**$62,000**	**$121,000**

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Parabens and Related Transformation Products in Bay Area Wastewater Effluent

Summary

Parabens, a class of preservatives frequently used in various indoor consumer products, are a source of environmental contamination. These biocidal preservatives are added to consumer goods, leading to the release of these toxic contaminants into the environment. While some parabens are regulated in California for use in cosmetics and food products, there has been limited study of these compounds within the state. Still, these compounds remain a concern due to their links to endocrine disruption, carcinogenicity, reproductive harm, and developmental toxicity. Of particular concern is the global detection of parabens in wastewaters, where they are known to transform into more toxic compounds during the treatment process.

This study will evaluate the presence of 13 parabens and their transformation products in wastewater effluent. The findings will help inform and guide future management and monitoring efforts by clarifying the anticipated extent and significance of these contaminants as a concern for Bay water quality.

Proposed by Miguel Méndez, Rebecca Sutton (SFEI)
Dr. George Cobb (Baylor University)

Estimated Project Cost $94,000

Oversight Group(s) ECWG

Time Sensitive? No

Table 1. Study objectives and applicable management questions (only list management questions that are relevant to the proposal)

Study Objective	Management Question
Characterize levels of parabens and related transformation products in wastewater effluent	2) What are the sources, pathways, loadings, and processes leading to the presence of individual CECs or groups of CECs in the Bay?

Background

Preservatives are commonly incorporated into consumer products to inhibit the growth of mold and bacteria. Given their inherent toxicity, some preservatives may present risks to aquatic organisms once they are released from products and enter the environment. The RMP has already prioritized the monitoring of certain antimicrobial preservatives, such as carbendazim, isothiazolinones, and quaternary ammonium compounds, and has identified further work on other preservatives as a priority (Sutton et al., 2024).

Parabens are a group of preservatives widely utilized in food, pharmaceuticals, and cosmetics. Due to their widespread use and chemical stability, parabens are commonly detected across various environmental compartments, including wastewater, sediments, surface waters, and aquatic organisms, as well as in human tissues and fluids (Agarwal et al., 2025; Chatterjee et al., 2024). These chemicals are a class of interest due to their association with several toxicological effects. Specifically, parabens are linked to endocrine disruption, developmental toxicity, reproductive harm, and carcinogenicity in humans (Agarwal et al., 2025; Chatterjee et al., 2024). Furthermore, they pose a risk to aquatic life, exhibiting toxicity and bioaccumulation potential, and may also contribute to the development of antimicrobial resistance (Caioni et al., 2023).

California has been actively regulating certain parabens in recent years. Effective in 2025, the state's Toxic-Free Cosmetics Act (AB 2762) will ban isobutylparaben and isopropylparaben from cosmetics, marking California as the first state to prohibit these specific chemicals. Furthermore, the California Food Safety Act (AB 418) prohibits propyl paraben in food products, beginning January 1, 2027. The California Department of Toxic Substances Control is also considering the regulation of butylparaben by adding Leave-on Products containing Preservatives as a Priority Product (DTSC, 2026).

One paraben, butylparaben, has been examined in a previous RMP study in Bay wastewater effluent, though no samples showed a detection (MDL: 18 ng/L; Vuckovic et al., 2023). However, the larger class of parabens have not been comprehensively monitored. Studies elsewhere have found parabens in wastewater effluent, including the presence of transformation products (Chatterjee et al., 2024; Penrose and Cobb, 2023, 2022; Rita Pereira et al., 2024). Halogenated parabens are produced during water disinfection via chlorination or UV treatment, and these transformation products appear to be more persistent and toxic than the parent compounds (Penrose and Cobb, 2022; Rita Pereira et al., 2024).

This study proposes monitoring parabens and their transformation products in wastewater effluent. This monitoring is critical for understanding the occurrence and environmental pathway of these contaminants. Wastewater effluent is an ideal medium for early detection because it generally contains higher concentrations of contaminants due to its direct connection to sources. The results will be used to guide future management and Bay monitoring efforts.

Approach

Sample Collection: Wastewater

Ten wastewater treatment plants (WWTPs) will be monitored to represent the occurrence in the Bay Area, with selection based on factors including the size of effluent flows to the Bay and treatment type. At each facility, 24-hour composites of effluent will be collected twice during Summer 2027 and Winter 2027-2028. Samples will be collected during the week to avoid any variation from the weekend. Two samples will be collected on different days at each facility, plus quality assurance and quality control (QA/QC) samples, typically comprising 5-10% of the 40 total field samples collected.

Analysis

Samples will be analyzed by Dr. George Cobb at Baylor University using a developing method for para-hydroxybenzoic acid (PHBA), 5 parent parabens, 4 chlorinated paraben transformation products, and 3 hydroxylated products (Penrose and Cobb, 2023; Table 2).

Briefly, samples will be spiked with five surrogate standards, acidified to a pH of 3, filtered, extracted using Oasis HLB cartridges, concentrated using nitrogen evaporation, and then analyzed via ultra-performance liquid chromatography-mass spectrometry (UPLC-MS). Concentrations in all samples are calculated via internal standard quantification.

Table 2. Parabens in the Baylor University Method (Penrose and Cobb, 2023 A, B), including their limits of detection (LOD).

Abbreviation	Compound Name	LOD (ng/L)
MeP	Methyl paraben	0.072
EtP	Ethyl paraben	0.047
PrP	Propyl paraben	0.020
BuP	Butyl paraben	0.004
BzP	Benzyl paraben	0.005
PHBA	Para-hydroxybenzoic acid	0.345
DHBA	3,4-dihydroxybenzoic acid	0.308
MePOH	methyl 3,4-dihydroxybenzoic acid	0.005
EtPOH	ethyl, 3,4-dihydroxybenzoic acid	0.015
ClMeP	methyl 3-chloro-4-hydroxybenzoic acid	0.050
ClEtP	ethyl 3-chloro-4-hydroxybenzoic acid	0.012
Cl_2MeP	methyl 3,5-dichloro-4-hydroxybenzoic acid	0.009
Cl_2EtP	ethyl 3,5-dichloro-4-hydroxybenzoic acid	0.017

Deliverables

A draft and final manuscript (or technical report, based on the findings) will be prepared by Baylor University. The manuscript will be published open-access.

Table 3. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Study Design and Sampling Plan	June 2027
Task 2. Wastewater Sample Collection	January 2028
Task 3. Lab Analysis	June 2028
Task 4. Data Management: Formatting and QA	October 2028
Task 5. Draft Manuscript/Technical Report	January 2029
Task 6. Final Manuscript/Technical Report	April 2029

Table 4. Budget

Expense	Est. Hours	Cost
Labor		
Task 1. Study Design	28	4,900
Task 2.Sample Collection	48	8,400
Task 4. Data Management	150	28,000
Task 5,6. Reporting	54	9,900
Task 7. Project Management	30	5,300
Subcontracts		
Task 3. Dr. George Cobb, Baylor University		30,000
Direct Costs		
Equipment		1,000
Travel		500
Shipping		2,000
Open Access Journal Fee		4,000
GRAND TOTAL		**$94,000**

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Contaminants of Emerging Concern in San Francisco Bay Bird Eggs

Summary

In 2027, cormorant eggs will be collected as part of Status and Trends contaminant monitoring, including analysis of 40 PFAS and PBDEs. We propose a special study that leverages this sample collection by collecting and archiving additional tissue samples, in support of additional analysis of related contaminants that can be funded through alternative funding opportunities (e.g. Supplemental Environmental Project funds). Funding through this proposal will support study design, sample collection and sample archiving.

We recommend additional sample collection to support analyses of three broad contaminant classes. First, we recommend targeted analysis of organophosphate esters and additional brominated flame retardants beyond the contaminants covered by the Status and Trends program. Members of these classes are persistent, bioaccumulative, and toxic, and there are little to no data for San Francisco Bay bird eggs. Second, nontarget suspect screening analysis of additional hydrophobic halogenated compounds will provide a means to identify unanticipated contaminants that may merit follow-up targeted monitoring. Third, we recommend nontarget screening of PFAS in both 2027 and archived samples. 2027 samples could be analyzed alongside archived bird egg tissues available beginning in 2009 to develop long-term trend data, and inform whether newly identified compounds pose ongoing, increasing, or decreasing risks. Study outcomes would include updates to the tiered risk-based framework for quantified contaminants, as well as identification of priorities for future investigations of CECs observed in bird eggs. We may also develop additional recommendations for the Status and Trends monitoring effort.

Proposed by Jennifer Sun, Rebecca Sutton (SFEI); Marta Venier (Indiana University); Bernard Crimmins (AEACS, Clarkson University)

Estimated Project Cost $9,000

Oversight Group(s) ECWG

Time Sensitive? Yes, leverages 2027 bird egg monitoring. Early release of funds requested to prepare for spring sample collection.

Table 1. Study objectives and applicable management questions (only list management questions that are relevant to the proposal)

Study Objective	Management Question
Evaluate contaminant concentrations in bird eggs relative to available toxicity thresholds. Screen CECs identified via nontarget analysis for potential toxicity concerns, future monitoring needs, and data gaps.	1) Which CECs have the potential to adversely impact beneficial uses in San Francisco Bay?

Evaluate chemical profiles for evidence of source types.	2) What are the sources, pathways, loadings, and processes leading to the presence of individual CECs or groups of CECs in the Bay?
Evaluate patterns in targeted contaminant profiles with respect to bioaccumulation potential. Assess results of nontarget analysis for the presence of unanticipated transformation products.	3) What are the physical, chemical, and biological processes that may affect the transport and fate of individual CECs or groups of CECs in the Bay?
Compare current contaminant concentrations to those of earlier study on flame retardants in bird eggs. Analyze additional archived bird egg samples available since 2009 to establish long-term trends for any newly identified priority chemicals.	4) Have levels of individual CECs or groups of CECs changed over time in the Bay or pathways? What are potential drivers contributing to change?

Background

Double-crested cormorants (*Phalacrocorax auritus*) are routinely monitored by the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) as a sentinel species for open waters of the Bay. Cormorants primarily hunt in the subtidal shallows and over mudflats and large sloughs when the tide is in (Dorr et al., 1999). Cormorant eggs were selected as an exposure indicator for multiple reasons, including: they are full-time residents in the Bay; they eat Bay fish almost exclusively; they have been the subject of many contaminant studies in the Bay and elsewhere; their eggs are easy to collect at several Bay locations; the colonies and eggs are reliably present; and they are known to accumulate a variety of contaminants (JRM Ross et al., 2016).

RMP Status and Trends bird egg monitoring has included PBDEs since 2002 and PFAS (13-40 compounds) since 2006. Monitoring has been sufficient to show subembayment-scale differences in contaminant concentrations (JRM Ross et al., 2016), as well as temporal trends including declines in PBDEs and PFOS in response to management actions (Sedlak et al., 2017; Sutton et al., 2015). Previous pilot-scale screening efforts include characterization of three composite samples collected in 2008 for alternative brominated flame retardants (Klosterhaus et al., 2012). Bird eggs have not been evaluated as part of more recent RMP studies on additional emerging contaminants.

We propose the collection and archive of additional bird egg tissue samples in 2027, leveraging the 2027 Status and Trends collection effort to develop baseline data on a broader range of emerging contaminants. We propose collecting samples to support three specific analyses in bird eggs.

First, targeted analysis would focus on two classes of persistent, bioaccumulative, and toxic contaminants that are known to be widely used as replacements for PBDE. The prior study of alternative brominated flame retardants was conducted shortly after the phase-outs of PBDE in the US began. Although concentrations of the alternative brominated flame retardants were relatively low compared to PBDE, ongoing monitoring was recommended by the study authors due to expectations for increasing use as the PBDE phase-out continued. We propose analysing the 2027 bird eggs for organophosphate esters (OPEs; with a focus on chlorinated OPEs and others known to bioaccumulate), as well as alternative brominated flame retardants. Concentrations observed in Bay bird eggs would be compared to available risk thresholds to inform risk screening and classification within the tiered risk-based framework for emerging contaminants. Additional archive samples as far back as 2009 could also be leveraged to assess long-term trends and identify whether concentrations of these replacements are increasing.

Similarly, we propose applying a nontarget screening analysis for PFAS to identify additional compounds that are not typically analyzed in targeted monitoring studies. These analyses could identify both legacy PFAS that have not been previously identified (e.g. fluorinated phosphate esters, phosphinic acids, phosphonic acids, other long-chained or branched perfluoroalkyl acids), or novel and replacement PFAS that have been increasingly produced in recent years (e.g. short-chained sulfonamides, ethers, substituted perfluoroalkyl acids).

In addition, we propose conducting a broad nontarget screening analysis of non-polar organic contaminants to detect other unanticipated contaminants that may be accumulating in Bay wildlife. Should results reveal that most compounds are already included in targeted monitoring studies, this will help confirm that current Bay monitoring sufficiently captures priority contaminants. The cormorant NTA component will add a comprehensive avian contaminant profile complementing the ongoing marine mammal and fish NTA studies. Together these studies will identify regionally relevant chemicals that are not currently monitored within the Bay ecosystem.

Approach

Sample Collection

Cormorant egg samples will be collected in spring 2027 at three locations (Figure 1). Bird eggs will be hand collected from nests by USGS-WERC using approved USGS protocols. At each station, 21 eggs are collected for a total of 63 eggs, which are composited into three samples of seven eggs each to minimize analytical costs and allow a wider range of analyses than would be possible using tissue from single eggs.

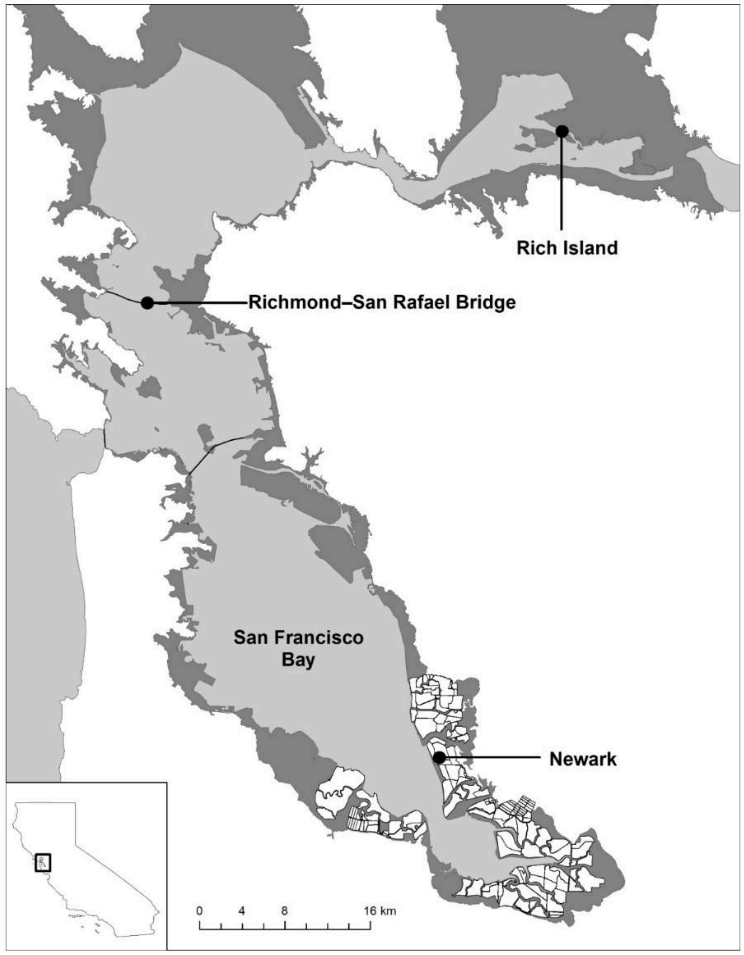

Figure 1. Bird egg sampling locations (projected). Long-term status and trend monitoring stations, three sites representing the northern, central, and southern stretches of the Bay. Specific stations may vary depending on colony location.

Future Work

Future and/or alternative funding would support chemical analyses of the 2027 bird eggs and archives. Details of the proposed analytical methods are provided below.

OPEs and Alternative Brominated Flame Retardants Analysis

The egg extraction procedure will be similar to methods previously published (Guo et al., 2018, 2017; Xu et al., 2015). Briefly, ~2.0 g of egg samples will be thawed to room temperature and extracted using Soxhlet extraction with hexane:acetone (1:1) after mixing with anhydrous Na_2SO_4 and spiking with surrogate standards. The extracts will be concentrated, subjected to acid cleanup and neutralization, and further purified using a multilayer column cleanup. Two fractions will be collected and analyzed for alternative brominated flame retardants (BFRs) and organophosphate esters (OPEs). OPEs are analyzed by high-performance liquid chromatography coupled to a triple quadrupole mass spectrometer (LC-MS/MS; Agilent 1290 Infinity II UPLC─6470 QQQ-MS) with Acquity BEH C18 (1.7 µm, 2.1x50mm column), operated in APCI source. BFRs will be measured using an Agilent GC-MS (Agilent 7890A-5975C) operating in negative CI mode with an RTX 1614 column (30 m x 0.25 mm x 0.1 µm).

Nontarget Analysis for Non-Polar Compounds

Nontarget screening for non-polar compounds will also be performed in the Crimmins lab. Given the mass required (20 grams), only a subset of samples will be analyzed. DCM will be eluted through desiccated bird egg homogenates followed by size exclusion chromatography for lipid removal (Fernando et al., 2018). Extracts will then be analyzed using a 2-dimensional gas chromatography equipped with a high-resolution time of flight mass spectrometer (GC×GC-HRT, LECO) in accordance with previously published methods (Fernando et al., 2018; Renaguli et al., 2020). The GC×GC resolves the extract mixture into 1000's of individual components. The exact mass spectra of these components will be compared against a reference library containing over 500,000 chemicals. Previously, this analysis has only been performed using electron impact ionization. The new system also has electron capture negative chemical ionization capabilities (ECNI) (Abskhroun et al., 2025). This mode selects for compounds that generate negative ions (halogenated components) and is traditionally used by low resolution instruments to quantify legacy halogenated chemicals (e.g., polybrominated diphenyl ethers). The new system is one of few available in the world that provides enhanced sensitivity of ECNI and 2-D chromatographic (GC×GC) and exact mass (30,000) resolution. The result will be a list of halogenated compounds and concentration estimates using one or more representative reference standards. Compound identifications will be qualified by retention time, library matching, and spectral interpretation with exact mass accuracy (< 5 ppm).

Nontarget Analysis for Fluorinated Compounds

For nontarget screening for PFAS (Crimmins lab; AEACS, Clarkson University), bird eggs will be processed in accordance with previously published methods (Crimmins et al., 2014; Fakouri Baygi et al., 2021). 5 g of tissue homogenate will be extracted using acidified ACN with an SPE-WAX clean up, following previously described methods (Point et al., 2019). Samples will be analysed by ultra-high performance liquid chromatography-quadrupole time-of-flight mass spectrometry (UPLC-QToF) in electrospray ionization (ESI) mode. The instrument will be configured to operate in a data independent MS/MS mode, alternating between low and high energy channels to capture precursor and product ions for identification and confirmation of detected species. The data files will be analyzed using an algorithm developed in house to screen for halogenated acids including polyfluorinated acids (Fakouri Baygi et al., 2021, 2016). The data reduction will consist of isolating species containing halogenated acid, ether, and sulfonate moieties.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Sampling and analysis plan	January 2027
Task 2. Sample collection	March 2027
Task 3. Sample compositing and shipment to sample archives	September 2027

Table 3. Budget

Expense	Est. Hours	Cost
SFEI Labor		
Task 1. Study Design	20	4,000
Task 2. Sample Collection	20	4,000
Direct Costs		
Equipment & Shipping		900
Archive Subsampling		100
GRAND TOTAL		**$9,000**

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Microplastics Strategy for 2027

Summary

Increasing interest in microplastics from RMP stakeholders, State and Regional Water Boards, other state and federal agencies and programs, and the general public is reflected in headline news and management actions at local, state, and federal levels. Additionally, the Ocean Protection Council is taking leadership in developing and implementing a statewide microplastics monitoring strategy. For the RMP Microplastics Workgroup to maintain leadership and stay engaged in future statewide developments, it needs to participate in discussions and update the RMP's Microplastics Strategy with rapidly developing new information and study findings from the RMP and others. In addition, a higher level of coordination and integration within and across workgroups is essential to optimize RMP resources.

Core deliverables include tracking new information regarding microplastics monitoring and analysis methods, contaminant sources, occurrence, and toxicity and updating the RMP's microplastics science and monitoring strategy via an MPWG presentation and, as appropriate, a Microplastics Strategy Update document; responding to requests for information from the Water Boards, state agencies, and RMP stakeholders; and coordinating and collaborating on science and monitoring studies with partners. To accomplish all of these tasks, $16,000 is budgeted. However, due to the remaining balance of Microplastics Strategy funds from previous years, only $3,000 is requested for 2027.

Proposed by Diana Lin (SFEI)
Estimated Project Cost $3,000 **Oversight Group(s)** MPWG
Time Sensitive? Yes

Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Information gathering on contaminant sources, occurrence, monitoring and analysis methodology, and toxicology from a variety of sources (e.g., literature review, scientific conferences, scientific workshops) throughout the year to inform RMP's Microplastics Workgroup	Year-round
Task 2. Coordination and collaboration with regional and state agencies and partners relating to developing a statewide microplastics monitoring strategy and program implementation.	Year-round
Task 2. Assistance to the Water Board and other RMP stakeholders concerning scientific information and presentations relating to emerging contaminants Task 4. Updates to the RMP CEC tiered risk-based framework and related documents; presentation at spring ECWG meeting	Spring 2027

Evaluation of Tire Wear Particles in Urban Stormwater Runoff, and Method Evaluation for Other Types of Microplastics

Summary

Microplastics in urban stormwater runoff are composed of different categories of microplastics that vary greatly in their abundance, physical characteristics, and size. This multi-year proposal includes a screening study to quantify tire wear particles (TWP; mass and particle counts) and other types of microplastics in urban stormwater runoff. Specifically 9 stormwater sampling events (7 watersheds locations sampled during a single storm event + 2 sites sampled during a second storm event to evaluate inter-storm variability) will be sampled. All sampling events will be analyzed for TWP, using previously demonstrated LDIR analytical methods. A subset of 5 locations will be further analyzed to evaluate the feasibility of using parallel workflows quantifying other types of microplastics including fibers using LDIR. Findings and lessons learned will be synthesized and used to inform RMP's future microplastics stormwater monitoring strategy and statewide microplastics monitoring strategy.

Proposed by Diana Lin (SFEI), Barbara Beckingham (College of Charleston)
Estimated Project Cost: $250,200 (Year 1: $150,200; Y2: $50K; Y3: $50K)
Oversight Group(s): Microplastics Workgroup
Time Sensitive? Yes, will inform statewide microplastics monitoring strategy, early release of funds requested to begin work in preparation for the 2027 wet season.

Table 1. Study objectives and applicable management questions (only list management questions that are relevant to the proposal)

Study Objective	Management Question
• Evaluate performance of analytical methods for quantifying tire wear particles and other types of microplastics in urban stormwater runoff. Update approach for stormwater monitoring. • Conduct screening study to evaluate levels of tire wear particles and other microplastics in stormwater. • Lay groundwork for future evaluation of microplastic loadings from stormwater.	3) What are the sources, pathways, processes, and relative loadings leading to levels of microplastics in the Bay?

Background

Monitoring microplastics in stormwater runoff is a high-priority data gap identified in the RMP Microplastics Monitoring and Science Strategy (Paterson et al., 2024) as well as the draft Statewide Microplastics Monitoring Strategy (Lin et al., 2026) prepared for the California Ocean Protection Council. Based on findings from the San Francisco Bay Microplastics Project (Sutton et al., 2019), urban stormwater runoff is the dominant pathway for microplastics entering the Bay.

In the RMP's pilot study of microplastics in urban stormwater runoff (WY2025), preliminary results indicate TWP in stormwater runoff are several orders of magnitude above previously reported levels (unpublished data; Sutton et al., 2019), and greater than any other microplastic types identified. These novel findings may be explained by the application of Laser Directed Infrared (LDIR) and automated software to quantify TWP, which resulted in ability to quantify particles between 20-125 μm which were not quantified previously and improved ability to obtain a rubber spectra match to identify TWP. Using complementary analytical methods, TWP mass as measured via pyrolysis GC-MS showed concentrations in the low mg/L range.

Concentrations of other microplastics (referred to as microplastics in the rest of this proposal, excluding tire wear particles) were significantly lower compared to TWP, but still significantly above the 1-30 microplastics/L in stormwater runoff reported previously (Sutton et al., 2019). The most abundant types of microplastics measured via FTIR (not including tire wear particles) were polypropylene (31% of stormwater particles quantified), polyethylene (28%), and polystyrene (22%). The recent results are partially explained by lower size detection limits (20-50 μm) compared to previous size limits (125 μm).

Important uncertainty in the recent microplastic analytical approach was also identified. Low matrix spike recoveries were observed for the smallest particle sizes, indicating potential losses from the extraction process (i.e., digestion and density separation). Background contamination was also a concern. Additionally, fibers were difficult to quantify with the automated imaging software. Therefore, microplastic counts were significantly undercounted and may be considered qualitative.

These lessons highlight the need to continue piloting TWP and microplastics analytical methods with careful QA/QC evaluations to address management questions. The significant difference in particle concentrations and characteristics (e.g., TWP versus other microplastics) suggests the need for different sample processing and analysis workflows. In this multi-year stormwater study, we outline a plan to continue piloting, evaluating, and improving methods for monitoring TWP and other microplastics in stormwater.

Approach

In this multi-year study, we seek to address a few key questions for microplastics in urban stormwater runoff.

Screening Study of TWP Levels in Stormwater
We will collect stormwater samples from at least 9 stormwater sampling events (based on 7 different urban watershed locations during a single storm, plus a second event sampled at 2 watershed locations to assess inter-storm variability) over the course of the next 2 years (WY2027, WY2028) as a screening study to evaluate TWP and other microplastic concentrations in urban stormwater runoff. Sampling sites and events will be coordinated with other RMP stormwater monitoring needs to leverage stormwater sampling efforts. Because antecedent dry period may be an important factor, wet season first flush sampling will be prioritized for sampling OR at least 2 weeks of antecedent dry period. Since we are trying to assess spatial variability, we will also seek to include geographic diversity as well as include watersheds with higher and lower proportion of roadway land uses, residential land uses, commercial land uses, and industrial land uses. Samples will be collected as a single composite during the storm event with an ISCO pump sampled as a depth-integrated sample, or at mid-water column if needed due to logistics. Turbidity in the water column will be measured at three different depths after each aliquot to confirm that the water column is relatively well-mixed during storm flows.

Separate 1-L grab samples will be collected for TWP mass (pyrolysis GC-MS) and particle identification (LDIR). Field blanks and field duplicates at each sampling event will be collected. LDIR will be used to analyze TWPs greater than 20 µm using previously applied methods. In addition, filtered samples (using 0.4 µm cellulose filter) will be used to quantify TWP mass using pyrolysis GC-MS using previously applied methods and using the tire rubber marker database anticipated from the separately funded 2025 RMP special study on tire rubber chemical markers. Uncertainty and variability in measured TWP will be evaluated to inform method performance and data gaps.

Evaluation and Development for Analysis of Microplastics Stormwater
Recent scientific publications will be reviewed to inform microplastics extraction and analysis methods. LDIR will be applied to quantify other types of microplastics >20 µm, including polyethylene, polypropylene, and polystyrene. Additionally the feasibility and method performance of quantifying microplastic fibers will be evaluated. An additional density separation step will be applied to augment particle counts for microplastics above detection limits. Method performance will be evaluated with laboratory blanks and matrix spike recovery tests. Samples from a subset of 4 stormwater sampling events described above (4 different watershed locations sampled during a single event). Field blanks and field replicates will be collected from each event. Single stormwater composites collected as aliquots over the course of hydrograph and at a mid-water column depth will be collected as 10-L sieved samples for analysis. At least 6 matrix

spikes using spheres, fragments and fibers will be analyzed along with field samples to evaluate method performance.

Data Interpretation
Results will be analyzed and discussed with the RMP QA officer to evaluate the QA/QC of TWP and microplastic analyses. Results will be used to inform our understanding of how best to apply TWP and microplastic sampling and analytical workflows to inform RMP and statewide management questions. Results will be discussed and shared with the RMP Microplastics Workgroup and summarized in a draft and final report. The report will also provide recommendations for future microplastics stormwater monitoring.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Study design and planning	November 2026
Task 2. Year 1 stormwater sample collection	March 2027
Task 3. Method review and development for microplastics	September 2027
Task 4. Completion of Year 1 sample analysis	November 2027
Task 5. QA/QC evaluation of microplastics methods	February 2028
Task 6. MPWG project presentation update	April 2028
Task 7. Year 2 stormwater sample collection	March 2028
Task 8. Year 2 sample analysis	November 2028
Task 9. QA/QC evaluation of microplastic results	April 2029
Task 10. MPWG project presentation	April 2029
Task 11. Draft Report	August 2029
Task 12. Final Report	November 2029
Task 13. (Contingency) stormwater sample collection or laboratory analysis completion	March 2030
Task 14. Extended Draft and Final Report deadline (as needed for contingency)	June 2030

Table 3. Budget

Expense	Est. Hours	Cost
SFEI Labor		
Project Management (Year 1, 2, 3)	110	$26,400
Study Design and Prep (Y1)	110	$22,000
Stormwater sample collection (Y1, 2)	280	$50,400
Sample Processing (Y1, 2)	80	$12,800
Data management (Y2, 3)	45	$9,500

Analysis and Reporting (Y3)	240	$48,000
Final Report (Y3)	80	$16,000
Subcontracts		
TWP and MP Particle Analysis College of Charleston		$47,500
TWP Mass Analysis Norwegian Institute of Water Research		$11,100
Direct Costs		
Equipment and Supplies	--	$2,500
Travel for sampling	--	$1,000
Shipping	--	$3,000
GRAND TOTAL		**$250,200**

References

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SPLWG Special Study Proposal: 2027 SPLWG Strategy and Program Management

Summary

The Sources, Pathways, and Loadings Workgroup (SPLWG) includes an integrated monitoring and modeling team that collects, analyzes, models, interprets, and synthesizes data on pollutant sources, pathways, and loadings to the Bay Area. This work supports water quality regulation and management. The RMP SPLWG team includes both modelers and water quality monitoring experts and has historically focused on PCB and mercury transport to the Bay. More recently, the team has expanded its support to other workgroups by addressing additional contaminants, including contaminants of emerging concern, microplastics, and sediment.

The purpose of this proposed funding is to support the SPLWG program management capacity to ensure effective coordination and implementation of this integrated program, including coordinating regular internal SPL team meetings; organizing three to four external update meetings annually with the Water Board and BAMSC; updating the Multi-Year Plan; and participating in meetings to coordinate with other focus area leads on ongoing projects as well as the development of future proposals. The Strategy and Program Management funds also allow staff to respond to external requests for data and products, stay abreast of other local, state, and federal monitoring programs that work in the Bay Area, and identify opportunities to leverage through collaboration with external partners.

Proposed by Alicia Gilbreath and Matthew Heberger
Estimated Project Cost $80k
Oversight Group(s) SPLWG
Time Sensitive? Yes. This funding is needed annually for the strategic coordination of the workgroup.

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
Provide consistent, efficient communication among RMP program staff internally and with external BAMSC and Water Board representatives to ensure high-quality planning and implementation of projects that address management questions.	All SPLWG Management Questions

Background

The Sources, Pathways, and Loadings Workgroup (SPLWG) is a collaborative group comprising staff from the San Francisco Estuary Institute Clean Water Program, representatives from the countywide stormwater programs (collectively known as the Bay Area Municipal Stormwater Collaborative, or BAMSC), staff from the San Francisco Bay Regional Water Quality Control Board, and external scientific advisors. The SPLWG was established in the late 1990s to help the region better quantify pollutant loads to the San Francisco Bay from air, stormwater, wastewater, and Central Valley rivers, explore sources leading to these loadings, integrate monitoring and modeling efforts based on management questions of the other Workgroups, and support regulatory and policy needs. The group initially focused on PCBs, mercury, and other legacy, largely hydrophobic contaminants, but its scope has expanded over time to address emerging contaminants, microplastics, and sediment management questions.

In 2009, the San Francisco Bay Regional Water Quality Control Board issued the first Municipal Regional Stormwater Permit (MRP) (SFRWQCB 2009) that included new provisions to address data gaps and advance implementation of PCB and Hg, Cu, trash, PBDE, legacy pesticides, and selenium control measures to protect water quality in the Bay. In parallel, the SPLWG developed a set of priority management questions that continue to guide stormwater-related activities across the region. That same year, the need for dedicated program management funding was recognized to support coordination, communication, and progress toward addressing these priority questions.

Since 2009, the SPLWG has received ongoing program management funding, beginning with a modest allocation that has increased over time in response to rising costs and an expanding scope of work. The group has grown from three staff in 2009 to six dedicated RMP staff today, with plans to expand further this summer to support this component of the RMP.

Approach

RMP staff will manage the SPLWG program and over $1 million in projects annually, and work with other workgroups to maximize efficient, collaborative efforts within the RMP. Tasks include:

- Frequent internal SPLWG team and RMP senior leadership meetings
- External meetings with BAMSC and the Water Board, 3-4 times per year
- Updating the Multi-Year Plan in September of each year
- Preparing proposals for the SPLWG May meeting
- Attending key additional meetings, including external and internal with other workgroups within the RMP
- Responding to external questions and requests for data or products
- Interacting with staff and other researchers who lead other local, state and federal monitoring programs

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. Facilitate/participate in 3-4 RMP/BAMSC/WB meetings	Spring, Summer, Fall 2027
Task 2. Update Multi-Year Plan	November 2027
Task 3. Coordination meetings, proposal development, responding to requests for information	Year-round

Table 3. Budget

Expense	Est. Hours	Cost
Labor		
Task 1. Program and leadership meetings	160	$30k
Task 2. Meetings with BAMSC and the Water Board	60	$11k
Task 3. MYP Update	32	$6k
Task 4. Additional key internal and external meetings & response to requests	120	$25k
Subcontracts		
McKee Environmental		$8k
GRAND TOTAL		**$80k**

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. http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/index.shtml

SPLWG 2027 Special Study Proposal: Develop discharge rating curves at existing stage monitoring stations

Summary

This proposal covers fieldwork and analysis to develop discharge rating curves for rivers and streams draining to the Bay at locations of existing stage-only gages operated by local agencies. By leveraging existing stage measurement infrastructure, we will be able to cost-effectively develop continuous records of streamflow at up to four new locations around the Bay and improve the current rating curves at three other locations.

Streamflow data are foundational to understanding the transport of pollutants to the Bay. They are also used to calibrate the San Francisco Bay Watershed Dynamic Model (WDM) and the Regional Watershed Spreadsheet model (RWSM), which, in turn, are being developed to predict concentrations and loads of sediment, PCBs, mercury, and future pollutants of interest to the Bay. Calibrating observations across multiple locations is essential in the Bay Area, where diverse topography and microclimates can lead to substantial spatial variability in hydrologic conditions and model performance. Staff have identified seven gages in San Mateo, Marin, and Contra Costa counties that will fill in critical data gaps and help improve the calibration of the WDM and RWSM.

Proposed by Sasha Mariniuk, Alicia Gilbreath, Matthew Héberger

Estimated Project Cost $100,000 in Water Year 2027 (WY27); $65,000 in WY 2028, and $75,000 in WY 2029; $240,000 over 3 years

Oversight Group(s) SPLWG

Time Sensitive? Yes, early release of funds is requested for staff to prepare to collect discharge measurements during large storms in WY27.

Table 1. Study objectives and applicable management questions.

Study Objective	Management Question
Estimate discharge at stage-gaging locations to enable more accurate estimation of pollutant loads.	MQ1: What are the sources, pathways, and loadings of pollutants and sediment to the Bay?
Develop a time series of historical discharge at previously ungaged locations to improve load estimates and effectively rank and prioritize source areas.	MQ2: Which are the priority sources and pathways of pollutants that adversely impact or potentially adversely impact the Bay's environmental quality?

Background

Local agencies, including cities, counties, water suppliers, and flood control districts, operate a number of stage gages, collecting real-time observations of water-surface elevation, typically every 15 minutes or hourly. These gauges have often been in place for years or decades to provide residents and engineers with flood warnings about the risk to personal safety and infrastructure. This information can also be used by the RMP to estimate streamflow (or discharge, measured in m^3/s or cubic feet per second, cfs) by establishing a relationship between recorded stage and discharge. To create a rating curve, one must take velocity measurements at a range of flows. These are then used, along with the geometry of the channel cross-section, to compute instantaneous flow which can be plotted against instantaneous stage. This is often done using a semi-log scale, and a curve that fits the points is used to estimate flow during unmeasured stages. To be useful, a rating curve should be based on measurements across a wide range of flow conditions, as extrapolation to flows beyond the greatest field measured flow is not recommended (Kennedy, 1984).

Streamflow measurements provide essential information for evaluating the fate and transport of aquatic pollutants. Streamflows are also vital for the calibration and verification of watershed models, which are at the heart of the RMP strategy for evaluating loads of sediment, legacy pollutants such as PCBs and mercury, and emerging contaminants. The Watershed Dynamic Model (WDM) is currently calibrated using flow observations, mostly from USGS gages. But there are large data gaps in San Mateo, Marin, Contra Costa, and Solano counties, making gages in these areas ideal candidates for rating curve development (Figure 1).

In accordance with a proposal to the SPLWG in 2024 (*Discharge rating curves at county-operated stage monitoring stations*) that funded work for the 2025 RMP Workplan, staff created a short list of gages where development of a discharge rating curve is feasible and in areas of interest. For each site, we contacted county employees to collect historic gage data and provide a preliminary overview of the project. All counties contacted (San Mateo, Marin, and Contra Costa) shared the historic data and are open to future collaboration. Developing rating curves at these locations is less costly and effectively leverages investments by local agencies, as they have already installed stage-measurement and telecommunications devices. The seven proposed sites are listed under Figure 1 and in Tables 2 & 4. The creeks proposed for rating include Atherton and Belmont on the Peninsula, Arroyo Corte Madera del Presidio in Marin, and Alhambra, Pinole, Rodeo, and Walnut in northern Contra Costa County. These locations are subject to change if superior site alternatives become available. To remain within budget, a new site would be swapped with a proposed site rather than added.

At the SPLWG meeting on May 15, 2026, the workgroup's science advisors suggested that staff investigate the drainage basins of the proposed gaging sites. Specifically, are there differences between the proposed sites compared to the existing gages currently used for WDM calibration? The answer to this question is provided below in two new tables and a figure.

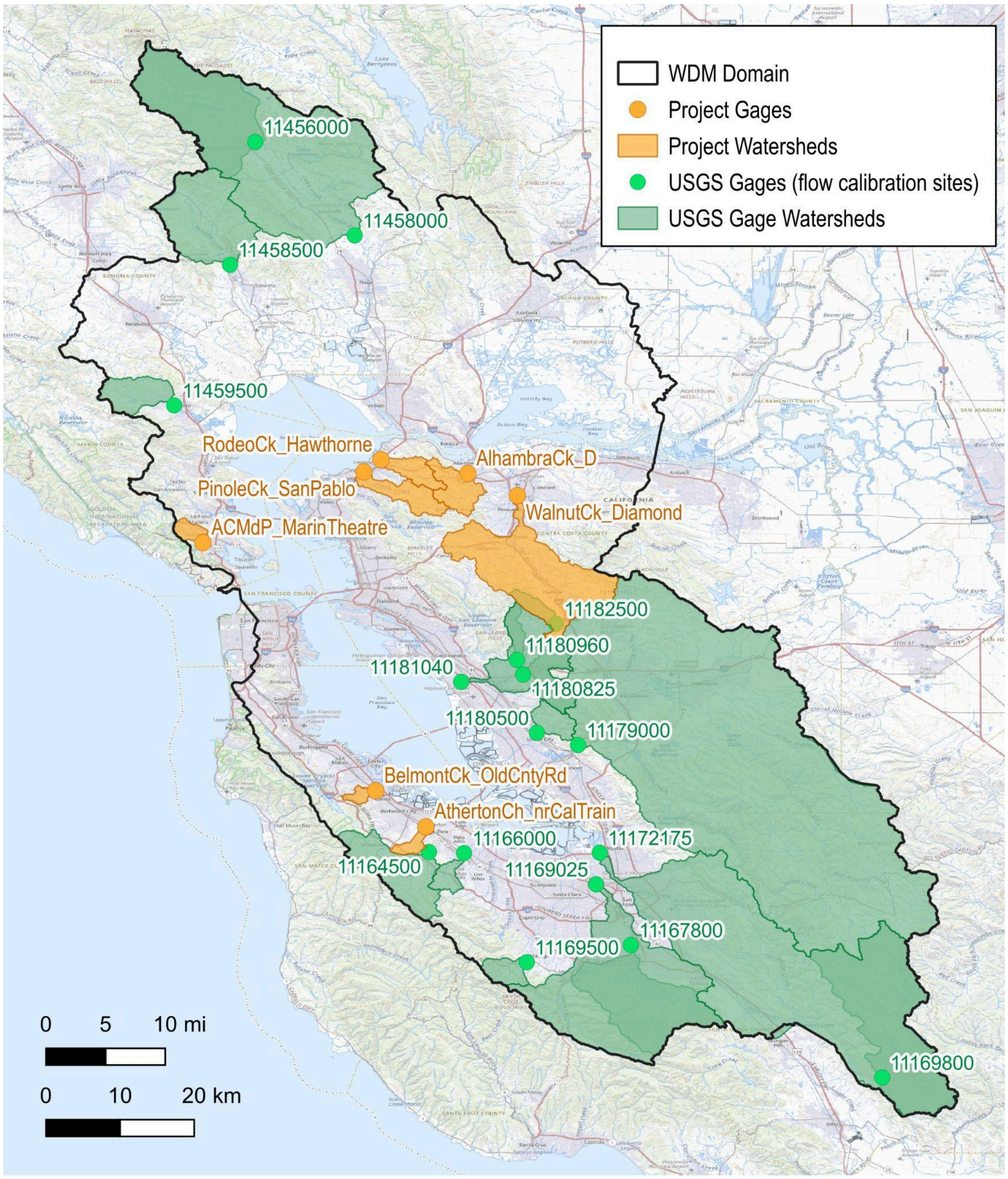

Figure 1. Proposed locations for rating curve development, and USGS streamgages currently used for calibration of the San Francisco Bay Watershed Dynamic Model.

Table 2 shows selected attributes of each site's catchment or drainage area. This includes the drainage area, precipitation, runoff, population density, and imperviousness of each gage's watershed area. Information on the rainfall and runoff was created with the latest version of the Regional Watershed Spreadsheet Model (RWSM). **Table 3** and **Figure 2** compare the differences between the proposed sites and current sites.

Our analysis shows that the catchments of the proposed gaging sites have some distinctive characteristics. On average, the proposed catchments are smaller, receive less rainfall annually, have a greater population density, and have a greater impervious surface fraction. In other words, the new sites will help us characterize land areas with a different rainfall-runoff response. Therefore, we are confident that these sites will provide us with valuable new information for calibrating and validating our watershed model.

Table 2. Proposed and Current Site Characteristics

Gaging Station	Drainage Area (km^2)	Avg Precip (mm/year)	Runoff (million m^3/year)	Population Density (people/km^2)	Impervious Fraction (%)	# of PCB Sources	Source Property Area (km^2)
Proposed Gages for Rating Curve Development							
BelmontCk_OldCntyRd	7.5	490	1.3	2,200	36	0	0
ACMdP_MarinTheatre	12	970	6	700	8	0	0
WalnutCk_Diamond	230	500	46	780	21	0	0
AlhambraCk_D	39	510	7	150	6	0	0
PinoleCk_SanPablo	37	490	6.7	300	7	0	0
RodeoCk_Hawthorne	25	450	4.6	210	6	0	0
AthertonCh_nrCalTrain	12	440	1.3	900	29	0	0
Current USGS Flow Gages used for WDM Calibration							
11164500 San Francisquito Creek at Stanford U	97	670	15	110	6	1	1.6
11166000 Matadero Creek at Palo Alto	17	450	2.2	300	19	0	0
11167800 Guadalupe R above Almaden Expressway	170	600	27	650	14	0	0
11169025 Guadalupe R above Hwy 101 at San Jose	390	620	68	1,100	22	0	0
11169500 Saratoga Creek at Saratoga	23	1000	5.8	36	2	0	0
11169800 Coyote Creek near Gilroy	280	460	36	0.02	0.1	0	0
11172175 Coyote Creek above Hwy 237 at Milpitas	820	430	98	440	8	4	0.07
11179000 Alameda Creek near Niles, CA	1,600	410	220	210	6	0	0
11180500 Dry Creek at Union City CA	25	510	4.1	110	2	0	0
11180825 San Lorenzo Creek above Don Castro Res.	42	580	8.0	120	3	0	0

Gaging Station	Drainage Area (km²)	Avg Precip (mm/year)	Runoff (million m³/year)	Population Density (people/km²)	Impervious Fraction (%)	# of PCB Sources	Source Property Area (km²)
11180960 Cull Creek above Cull Creek Reservoir	15	570	2.8	17	1.2	0	0
11181040 San Lorenzo Creek at San Lorenzo CA	120	540	22	750	14	0	0
11182500 San Ramon Creek at San Ramon CA	15	580	3.3	36	2.2	0	0
11456000 Napa River near St Helena CA	200	930	88	64	2.8	0	0
11458000 Napa River near Napa CA	570	850	230	38	2.1	0	0
11458500 Sonoma Creek at Agua Caliente CA	150	860	77	45	2.4	0	0
11459500 Novato Creek at Novato CA	47	930	14	190	4.6	0	0

Table 3. Characteristics of the catchment areas for the set of 17 current gages, and the 7 proposed gages, showing the mean for 5 characteristics over the set of basins. Values shown are the average or mean of the characteristic over the gaged catchment areas.

Basin Characteristic	Current gages, n=17	Proposed gages, *n*=7
Drainage Area (km²)	270	52
Precipitation (mm)	650	550
Runoff Vol. (million m³)	54	10
Population Density (people/km²)	250	730
Impervious Fraction (%)	6.5	16

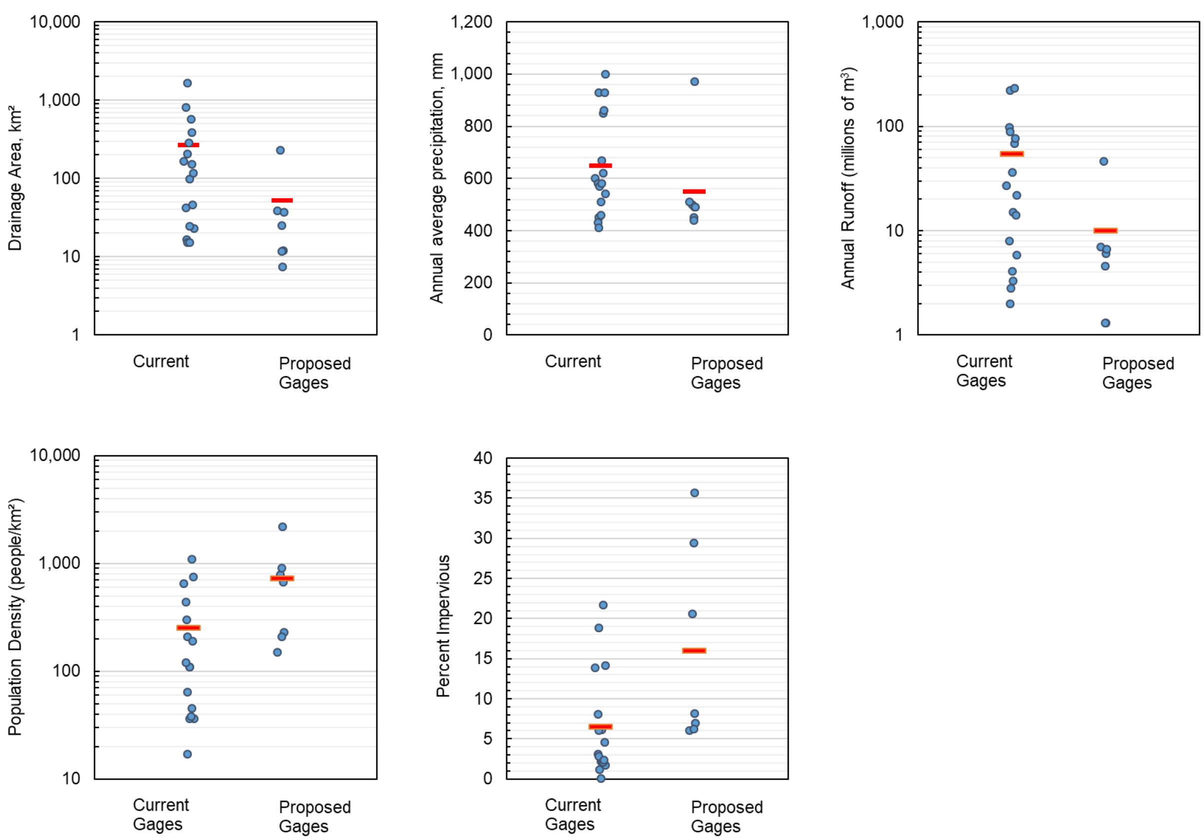

Figure 2. Comparison of the catchment characteristics for the set of 17 current gages and the 7 proposed gages.

Approach

Multi-year Overview

This proposal requests $100,000 to launch the first year of a three-year monitoring effort. Over three years, a total of $240,000 is requested to develop discharge rating curves at the proposed sites. The first-year cost is greater than subsequent years due to upfront equipment purchases and the staff time dedicated to learning new sampling methods. By April 2030, staff will produce a technical report outlining the findings of the discharge rating curves and develop an electronic data package for the modeling team and public release. Data collection may be subcontracted if internal staff capacity is limited during wet seasons, which could reduce overall costs by eliminating the need for equipment purchases and staff training.

Task 1: Equipment Learning, Standard Operating Procedure Development, and Training

Acoustic doppler current profilers (ADCPs) are increasingly used when collecting discharge measurements at gaging stations, particularly in scenarios where streams are not wadeable. Compared to other discharge measurement methods, ADCPs enable quicker and safer data collection while producing full channel profiles rather than a series of point measurements, and have the added advantage that they can be deployed without needing an overhead structure such as a road bridge. SFEI has purchased one ADCP unit in early 2026, and this project includes a budget for the RMP to purchase a second unit. When developing a rating curve, it is most efficient to collect discharge measurements during large storm events to capture the full range of flows. Having two units will enable two sites to be monitored simultaneously during large storms.

Task 1 covers the staff time required to learn and operate the equipment and the dissemination of information to other field staff. As a deliverable, staff will produce a standard operating procedure (SOP) outlining how to use and maintain ADCP units. The methodologies outlined in the document will provide long-term utility to any project that will use the equipment. Additionally, an informal video outlining ADCP operation will be recorded to train field staff.

Task 2: Season Preparation

Task 2 covers the administrative duties required to collect field measurements in Water Year 2027. These duties include selecting sites, obtaining permits, purchasing equipment, and field sheet development.

Task 3: Storm Monitoring

To develop a functional discharge rating curve at each site, streamflow measurements will be collected through the duration of two to three large storm events over the majority of the discharge range. To qualify for sampling, a storm event must meet or exceed a two-year return interval, which, although varying between sites, is equivalent to roughly two inches of rain in a 24-hour period. Some sites of interest already have partial or out-of-date rating curves. At these sites, a single storm event would suffice to supplement data gaps or validate the existing curve. Table 4 lists the sites of interest and the current status of an existing rating curve.

Task 3 covers storm watching, preparation, sampling, and data handling during four monitoring events in WY27. A monitoring event entails two field staff members collecting discharge measurements throughout a storm. It is possible and likely that monitoring at multiple sites will occur during the same storm.

Table 4. Proposed sites for discharge rating curve development where existing flow gages are present, and current status of rating curves at each site.

Sites of Interest for Supporting Model Calibration	Gage Owner	Existing Rating Curve Notes	Other RMP interests
Alhambra Ck @ D St	Contra Costa County Flood Control District	No existing discharge rating curves	
Pinole Ck @ San Pablo Ave Bridge	Contra Costa County Flood Control District	SFEI developed a rating curve in the Pinole Creek watershed in 2004. Monitoring at this site can help determine the validity of the existing rating curve.	SedWG - high sediment yields
Rodeo Ck @ Hawthorne Dr	Contra Costa County Flood Control District	No existing discharge rating curves.	
Walnut Ck @ Diamond Blvd Bridge	Contra Costa County Flood Control District	USGS developed a rating curve in 2021 that lacks measurements at high flows. Collecting measurements during high flows will decrease the uncertainty of loads during peak flows.	SedWG - high sediment yields; PCB and Hg data collected during one storm in WY 2011
Arroyo Corte Madera @ La Goma St	County of Marin	The County of Marin provided SFEI with two differing rating curves. Monitoring once at this site would be valuable to determine which of the two is correct.	
Belmont Creek @ Old County Road	San Mateo County	SFEI developed a rating curve in 2023 containing some small data gaps. Monitoring once at these sites could fill those data gaps.	PCB and Hg data collected during one storm in WY 2011
Atherton Channel @ CalTrain	San Mateo County	No existing discharge rating curves.	

Table 5. Proposed deliverables and timeline.

Deliverable	Due Date
Task 1. Standard Operating Procedure for ADCP Discharge Monitoring (due this year with the requested funding)	May 2027
Task 2. Report (due at the end of the three-year monitoring effort)	April 2030
Task 3. Data package provided to the modeling team (due at the end of the three-year monitoring effort)	April 2030

Table 6. Budget for each Water Year (2027-2029) (with early release requested annually).

	Budget per Water Year (in thousands)		
	WY 2027	**WY 2028**	**WY 2029**
Labor Costs			
Task 1. Equipment learning, SOP development and training	$10		
Task 2. Season Preparation	$7	$6	$6
Task 3. Storm Monitoring	$34	$51	$17
Task 4. Project Management	$7	$7	$7.75
Task 5. Data Management and Analysis			$24
Task 6. Report			$20
Direct Costs			
Equipment	$40		
Travel	$0.50	$1	$0.25
Permits	$2		
Total per year	**$100**	**$65**	**$75**
Total for project			**$240**

References

Kennedy, E. J. (1984). *Discharge Ratings at Gaging Stations*. In Techniques of Water-Resources Investigations: Vol. Book 3, Chapter A10. US Geological Survey. https://pubs.usgs.gov/twri/twri3-a10/pdf/twri_3-A10_b.pdf

McKee, L.J., Gilbreath, A.N., Gluchowski, D.C., Hunt, J.A., and Yee, D., 2015. *Quality Assurance Methods for Continuous Rainfall, Run-off, and Turbidity Data*. Contribution No. 739. San Francisco Estuary Institute, Richmond, CA. http://www.sfei.org/sites/default/files/739.pdf

SPLWG 2027 Tier 1 Special Study Proposal: Stormwater Monitoring Systems Improvements

Summary

This proposal aims to enhance and sustain the foundational systems of the stormwater monitoring program, encompassing training, data storage, and sample management. As the scope of monitoring increases, strong systems underpinning the program become increasingly necessary for efficiency and success. The proposed work will formalize internal communications, centralize site information using ArcGIS, and implement dedicated "stormwater office hours" to promote efficient pre-storm preparation and ensure long-term operational effectiveness.

Proposed by Jennifer Dougherty and Alicia Gilbreath
Estimated Project Cost $60k per year over 3 years for $180k total
Oversight Group(s) SPLWG
Time Sensitivity: The project is time sensitive to efficiently address the needs of the stormwater monitoring program. Early release of funds is requested to facilitate prompt implementation prior to the start of the new Water Year in Fall 2026.

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
Improve and maintain underlying systems (training, website, data storage, QA/QC, metadata and sample management) of the stormwater monitoring program.	Primarily, MQ1: What are the sources, pathways, and loadings of pollutants and sediment to the Bay?

Background

The RMP stormwater monitoring program encounters multiple logistical challenges that impede operational efficiency. Coordination for QA/QC planning requires extensive communication, and essential site information is frequently siloed or inaccessible. Additionally, as the program expands, responsibilities such as sample handling and laboratory coordination are often assigned to a single individual without formal integration into project planning. Standardizing these processes is essential to reducing workload stress for team leads and to enhancing long-term operational performance.

Approach

The funding will focus on the following key improvements:

- System Standardization
- Centralized Information
- Enhanced Coordination
- Field Readiness

The improvements are structured to continue the transition of the stormwater monitoring program from an informal, distributed framework to a standardized and scalable system. The six tasks outlined below address existing bottlenecks in coordination, data accessibility, and field operations.

Task 1: QA/QC Planning and Form Automation

To reduce the prolonged communication currently required for seasonal planning, a standardized digital form will be developed. This tool will enable the number and type of quality control samples needed to be tabulated and automatically calculated, allowing principal investigators and data managers to efficiently review compliance and finalize sampling plans.

Task 2: Stormwater Internal Coordination

To distribute tasks more evenly and reduce stress on team leads, regular coordination meetings will be implemented. We have learned from recent experiences that this will need one-hour weekly meetings from August through April and half-hour weekly meetings during May-July. Regular coordination across workgroups and staff will help maintain team efficiency and readiness throughout the year.

Task 3: Field Checklists and Integrated Mapping

Mobile-accessible Google Forms will be improved to support pre-storm equipment and supply lists, ensuring nothing is forgotten during vehicle loading and post-storm unloading of samples and supplies, and to facilitate debriefing after each event. These forms will be integrated with maps and a visual slide deck that details the setup for each monitoring site. This system enables any team member to deploy equipment using a mobile device, regardless of familiarity with the specific site.

Task 4: Centralized Site Information Database

The stormwater program will improve site reconnaissance and record keeping by integrating the use of ESRI's ArcGIS Survey123. This platform centralizes site photographs, sampling event histories, and associated data, thereby facilitating information sharing, consistency, inclusivity, and accessibility as the monitoring program expands its site visit database.

Task 5: Formalized Sample and Equipment Management

This task establishes the role of a Field Sample Coordinator, responsible for labeling, quality-control tracking, and laboratory coordination. These responsibilities are currently assigned to a single individual without formal project planning. The task also allocates a budget for tracking the routine repair, maintenance, and replacement of essential equipment such as samplers, batteries, and sensors to support all ongoing projects. Any direct costs for the repair, maintenance and replacement of essential equipment would be covered by existing RMP funding (Task 51: Lab/Field Equipment Purchases and Maintenance Funds).

Task 6: Additional Tasks As Identified and Needed

Contingency budget for when identified tasks require more time than estimated, or to complete additional time-sensitive and necessary tasks to improve the stormwater program's systems and management.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. QA/QC Planning Form	July 2027
Task 2. Sites Information Database	August 2027
Annual Summary of Plan for the Upcoming Year	May 2027

Table 3. Budget

Expense	Est. Hours	Cost ($)
Labor		
Task 1. QA/QC Planning & Forms	12	2,000
Task 2. Stormwater Office Hours (5 staff members, 44 hrs ea.)	220	33,000
Task 3. Checklists & Integrated Maps	7	1000
Task 4. Site Information Database	40	7,000
Task 5. Formalized Sample and Equipment Management	40	7,000
Task 6. Critical Additional Tasks as Needed	70	10,000
GRAND TOTAL		**$60,000**

SPLWG 2027 Special Study Proposal: Stormwater Monitoring at Fixed Stations

Summary

This project will implement stormwater monitoring at the first pilot station in the Fixed Monitoring Station Network (FMSN), a collaborative effort to generate high-quality, publicly accessible interannual time series data on stormwater flow and pollutant concentrations entering San Francisco Bay from local watersheds. Led by SFEI in partnership with the Bay Area Municipal Stormwater Collaborative (BAMSC), and supported by the U.S. Environmental Protection Agency (EPA) and local stormwater agencies, the FMSN is being designed to address priority management questions related to contaminant sources and trends, and to support watershed modeling efforts used to estimate loads and evaluate linkages and impacts to the Bay.

At fixed stations throughout the Bay Area, the vision is to collect samples for chemical analysis and pair them with continuous turbidity and stage measurements, as well as discrete velocity measurements. Together, these data will be used to develop rating curves to estimate discharge, suspended sediment, and contaminant loads. This kind of intensive dataset will provide the foundation for model calibration and verification and, when paired with historical datasets, will help assess long-term trends in contaminant concentrations.

Fixed station planning, construction, and outfitting with equipment and instrumentation is already funded collaboratively by SFEI and BAMSC, utilizing grant funding from the EPA and local stormwater agencies; the RMP's EPA grant is called Tracking Bay Health. This special study proposal requests funding to conduct sampling and chemical analysis at the first pilot fixed monitoring station during Water Year 2027 for a core suite of contaminants (PCBs, mercury, suspended sediment, total metals, and total organic carbon). The proposed study design follows the previously recommended RMP stormwater sampling framework, which was initially developed to estimate annual PCB and mercury loads (Melwani et al., 2010; Melwani et al., 2018). The approach involves sampling four storm events per year, with four discrete samples collected at different times across the hydrograph for each event to capture a broad range of conditions. Targeted events include the first flush of the season, a large storm event, an additional storm earlier in the wet season, and a later-season storm. However, the analyte list

remains flexible, allowing contaminants to be added to or removed from the core suite, and the sampling design (e.g., discrete versus grab samples) may be refined as needed to address analyte-specific data needs.

All data will be quality assured, publicly released, and used to inform future station implementation and regional monitoring efforts.

Proposed by Alicia Gilbreath and Lester McKee

Estimated Project Cost $144k in 2027 for sampling first station; additional $500k requested over 2028 and 2029 for sampling at the remaining three stations and synthesizing data.

Oversight Group(s) SPLWG

Time Sensitive? Yes, to prepare for and begin sampling at the beginning of Water Year 2027 (which starts October 1, 2026); early release of funds requested.

Table 1. Study objectives and applicable management questions.

Study Objective	Management Question
Measure pollutant concentrations and loads at select fixed stations.	MQ1: What are the sources, pathways, and loadings of pollutants and sediment to the Bay?
Collect data at sites over an extended period (many years to decades) that is suitable for model calibration to measure trends over time and in relation to management interventions in those watersheds. Watersheds for study will be prioritized in part based on known and anticipated management controls.	MQ4: Are levels of individual pollutants or pollutant classes changing over time in the sources, pathways, and loadings? What factors or management interventions have contributed to the change?

Background

The Fixed Monitoring Station Network (FMSN) is a collaborative, Bay Area-wide effort to plan and build a network of fixed monitoring stations designed to generate robust, quality-assured, and publicly accessible long-term time series of stormwater flow and pollutant concentrations. These data will address the highest-priority information and management needs identified by water quality managers as they continue to evolve.

The concept of fixed station monitoring has been implemented three times in the past (late 1980s and early 1990s to support management and permit conditions of the time; WYs 2002-2010 to support the PCB and Hg TMDLs and Conceptual Model and Impairment Assessments for Dioxins/Furans, OC Pesticides, PAHs, and PBDEs; and 2012-2014 to support PCB and Hg loads verification and Reasonable Assurance Analysis model development). Now, stormwater stakeholders are again moving forward with fixed-station monitoring, funded by the U.S. Environmental Protection Agency (EPA) to the RMP and the Bay Area Municipal Stormwater Collaborative (BAMSC), with contributions from county stormwater agencies. Current needs include observing PCB trends in stormwater, learning about the sources, pathways, and loadings of emerging contaminants and microplastics, and continuing to improve estimates of suspended sediment loads to support wetland restoration and to model the fate and recovery trajectories of pollutants in the Bay. Station locations will be collaboratively selected and planned; construction will be led by stormwater permittees; and the network will be jointly managed by the RMP and BAMSC.

Most, if not all, fixed monitoring stations will include permanent infrastructure to support both automated and manual collection of surface water samples for laboratory analysis using contaminant-specific methods. Stations will include sensors to collect ancillary data such as flow and turbidity, and may also include a rain gauge and weather station, which collect information important for modeling and data interpretation. Atmospheric dry deposition sampling may be a component of some or all of the stations.

The primary goals guiding the design of the FMSN are:

- Long-Term Trends: Establish contaminant concentration and loading trends from local watersheds to the Bay.
- Continuous Datasets: Capture multi-contaminant samples and real-time data on flow, turbidity, and rainfall during storms.
- Regional Representation: Provide a representative view of the region’s diverse watersheds.
- Data Interpretation: Inform storm-driven variability analysis and examine statistical relationships with landscape features.

- Modeling Support: Provide high-quality data for robust watershed model calibration and predictive analysis.
- Leverage and integrate with existing monitoring programs: establish and nurture relationships with the California Department of Pesticide Regulation, Surface Water Ambient Monitoring Program SPoT, and others.

Previously awarded EPA funding ($150,000) has supported the RMP's participation in a collaborative process with BAMSC and the Water Board to develop the network vision, advance pilot site selection, and begin planning station design and instrumentation. An additional $1 million has also been provided by EPA to support continuation of this effort, with the goal of installing and operating four fixed stations over the next three years. Utilizing those funds over the next 1-3 years, the RMP will continue to collaborate with BAMSC and the Water Board to select the remaining initial three sites, conduct research to inform network design, hold meetings with science advisors and local stakeholders, and purchase shared instrumentation for the network and train staff on how to use it.

The initial set of stations will likely emphasize monitoring to address key questions related to PCBs while incorporating as many considerations as possible for other pollutants. While current funding supports implementing four stations, the network will be designed to expand to an optimal number of stations as additional resources become available. Expanding the number of stations will strengthen datasets for watershed model calibration and improve regional representation, enhancing the ability to evaluate sources, pathways, and loadings across a broader range of contaminants.

Approach

The proposed work plan will implement monitoring at the first pilot station during Water Year 2027. The monitoring design is informed by a 2010 RMP study (Melwani et al., 2010; 2018) that evaluated optimal sampling strategies for estimating loads and detecting long-term trends in sediment-associated contaminants (e.g., PCBs and mercury). That study found that the most accurate and least biased approach among those evaluated was to use turbidity-surrogate regression to estimate continuous contaminant loads, based on 16 discrete samples collected annually across a broad range of turbidity conditions. It also emphasized the importance of capturing a range of flow conditions including both the first flush of the season and one of the largest storm events of the year. This sampling design was followed during the WY 2012-2014 loads monitoring work at 6 fixed stations (Gilbreath et al., 2015). To apply turbidity surrogate regression, measure flow, and to automate sampling, fixed equipment must be installed.

Consistent with these established methods, the proposed monitoring approach includes:

- **Storm sampling frequency and distribution:**
  Sampling four storm events per year, with four discrete samples collected during each event to span the range of turbidity conditions. This is typically achieved by sampling during the early rising limb, late rising limb, peak flow, and the falling limb of the hydrograph.
- **Storm selection criteria:**
  - One first-of-season flush event (forecast ≥0.5 inches of rainfall over 6 hours or 0.75 inches over 12 hours)
  - One of the three largest storm events of the year
  - Two additional storm events distributed across the wet season (same forecast criteria as for first flush)
- **Analyte suite:**
  - Collection of a core set of “no-regrets” contaminants:
    - PCBs
    - Mercury (Hg)
    - Suspended sediment concentration (SSC)
    - Total metals
    - Total organic carbon (TOC)
  - CECs (funded through the ECWG; coordination with the ECWG proposal "Multi-year Monitoring of Contaminants of Emerging Concern in Stormwater")
  - Microplastics and tire-related chemicals (funded through the MPWG)
- **Analyte suite (additional options to be discussed - not yet budgeted)**:
  - Cu (dissolved) and hardness
  - Sediment bedload (funded through the SedWG)
- **Flow measurement and discharge estimation**
  Fixed stations will continuously measure stage (water level). Estimation of discharge will require development of a stage–discharge relationship (rating curve), which defines the relationship between water level and flow at a given location. To develop this relationship, velocity measurements will be collected across a range of flow conditions. These measurements are combined with corresponding stage data to calculate discharge, and the resulting dataset is

used to establish a rating curve that can be applied to the continuous stage record.

The data will be managed by SFEI's data services team, and QA'd in accordance with the most recent RMP Quality Assurance Project Plan. The QA'd analytical laboratory data will be made publicly available by uploading it to CEDEN. A short technical report will be written annually during the first 2-3 years as additional sites are sampled, and a larger report will be written at the end of the 4-year grant period synthesizing the results of monitoring at the four stations. Progress each year will be presented annually at the SPLWG meeting in the spring. Once all sites have been sampled and reported, we will determine the recommended sampling frequency going forward.

Table 2. Proposed deliverables and timeline

Deliverables*	Due Date
1. Sample collection during four storm events at one site	May 2027
2. Presentation at SPLWG 2027	May 2027
3. Data management and QA analysis	October 2027
4. Draft and final technical report	February 2028
5. Data uploaded to CEDEN	April 2028

*If four storm events are not sampled due to a dry year or otherwise, sampling will continue into WY 2028 and deliverable due dates will be delayed by one year.

Table 3. Budget for WY 2027 (sampling at first fixed station). Subsequent sampling efforts in this project have the same tasks with increased budget annually due to rising salaries.

Expense	Est. Hours	Cost
Labor		
Task 1. Season, site, and sampling prep	72	$12K
Task 2. Stormwater Sampling	220	$37k
Task 3. Data QA	150	$25k
Task 4. Data Report	105	$18k
Task 5. Project Management	75	$13k
Subcontracts		
Lab Analysis - contractors TBD		$36k
Direct Costs		
Supplies	-	$0.5k
Travel	-	$0.5k
Shipping	-	$2k
Total		**$144k**

References

Gilbreath, A.N., Hunt, J.A., Wu, J., Kim, P.S., and McKee, L.J., 2015. Pollutants of concern (POC) loads monitoring progress report, water years (WYs) 2012, 2013, and 2014. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 741. San Francisco Estuary Institute, Richmond, California. http://www.sfei.org/sites/default/files/biblio_files/FINAL_WY2014_POC%20loads%20progress%20report.pdf

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https://www.sfei.org/documents/statistical-methods-development-and-sampling-design-optimization-support-trends-analysis

SPLWG 2027 Special Study Proposal: Small Automated Sampler Continued Improvements

Summary

The project aims to enhance the performance, usability, and consistency of the SFEI small automated sampler system through targeted refinements in hardware, software, operations, and QA/QC. This implements needed updates identified during Water Year 2026 field deployments. Building on previous RMP-funded development, the proposed work moves beyond initial system creation to making the systems more reliable and efficient.

Planned improvements include strengthening hardware components and power systems, enhancing user interface and configuration functionality, refining software logic for sampling control, and standardizing operational and QA/QC procedures. A sampler engineering review planned for this summer may result in some modification to the details of planned improvements described here. Our goals are to reduce equipment failures, streamline deployment and maintenance workflows, and improve the consistency in data collection across sites and events. The project is designed to advance stormwater monitoring objectives by increasing the reliability and repeatability of automated sampling devices.

Proposed by Jennifer Dougherty, Alicia Gilbreath, Don Yee, Kayli Paterson
Estimated Project Cost $60k
Oversight Group(s) SPLWG
Time Sensitivity: Yes. Improvements are required before the upcoming wet season to address known system limitations and to support ongoing stormwater monitoring efforts, early release of funds requested.

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
Improve the reliability and functionality of the small automated sampler system	SPLWG MQ1: What are the sources, pathways, and loadings of pollutants and sediment to the Bay? ECWG MQ2: What are the sources, pathways, loadings, and processes leading to the presence of individual CECs or groups of CECs in the Bay?

Background

SFEI has developed and deployed a small automated sampler to support stormwater monitoring, with a particular focus on PFAS. Previous RMP-funded initiatives (2024-$90k, 2025-$40k, 2026-$30k) focused on system design, testing, and initial deployment, including hardware configuration, control systems, and sampling functionality.

Field deployments indicate that, although the system currently supports stormwater monitoring objectives (20 samples collected and sent to labs in WY26), several recurring challenges impact performance and efficiency. These challenges include hardware reliability issues such as power and connections, limitations in user interface and configuration workflows, inconsistencies in operational procedures, and variability in QA/QC implementation.

As deployment expands across additional sites and events, these challenges increase field workload, introduce potential variability in data collection, and increase the likelihood of collection failure. The proposed work will address these limitations and transition us from the development phase into a robust deployment phase, where equipment is more stable, consistent, and operationally efficient, resulting in reliable data collection.

Approach

The proposed project will implement targeted improvements to the small automated sampler system to address issues and limitations identified during recent field deployments. Efforts are organized into three primary areas: hardware, software and user interface, and operations. The proposed improvements for WY 2027 will be tested in the field and refined based on performance and usability outcomes.

Hardware improvements have been identified to increase system reliability and reduce failure points observed in field use. These enhancements are expected to include refining power systems and electrical connections, improving the robustness and consistency of key components, and resolving integration issues that affect performance during deployment. Modifications will be evaluated through further repeated field testing to ensure more stable operation under typical stormwater monitoring conditions.

In parallel with hardware improvements, the identified software and user interface enhancements will address limitations in system configuration and control that affect usability and consistency. Our updates in WY 2027 will focus on improving configuration workflows, simplifying user interactions, and refining the logic governing sampling behavior. These changes are expected to reduce setup errors, enhance operational clarity, and support more consistent implementation across users and sites.

Operational improvements will further standardize deployment, maintenance, and retrieval procedures, reducing variability and field workload. Existing workflows will be further reviewed and refined based on field experience to improve efficiency and ensure consistent application across teams. This process includes clarifying roles, optimizing task sequencing, and documenting best practices for routine use and maintenance.

The effectiveness of implemented improvements will be evaluated through two to three field deployment in Water Year 2027. The software for the small automated sampler will be released as open-source on GitHub. Updates to the setup and construction manual and operations manual will be posted on GitHub.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Setup and Construction Manual, to be posted on GitHub	May 2027
Operation Manual, to be posted on GitHub	May 2027

Table 3. Budget

Expense	Est. Hours	Cost
Labor		
Hardware Improvements	16	$4,500
Software & UI Improvements	130	$28,400
Operational Improvements	68	$15,100
Project Management		$9,000
Direct Costs		
Equipment	--	$3,000
GRAND TOTAL		**$60,000**

SPLWG 2027 Special Study Proposal: Improved Watershed Delineation to Support Modeling, Data Interpretation, and Site Selection

Summary

Watershed boundary delineation is a fundamental task for understanding the sources and pathways of pollutants to a given point, such as a monitoring location or a river reach in a watershed model. Our current approach to watershed delineation uses automated methods, which have been widely used for decades, but only for non-urban areas. These methods break down in urban areas, where flow pathways are heavily influenced by urban drainage infrastructure. In urban areas, we perform watershed delineation manually to take into account streets, curbs, storm drains, etc. This takes more time and can be subjective – each analyst may produce a slightly different result. This project proposes developing a robust and efficient tool in ESRI's ArcGIS software to improve delineation accuracy and reduce manual effort. The tool will integrate subsurface storm drain network data with high-resolution lidar elevation data to identify the full contributing land area draining to a selected point.

The project will include a targeted literature review to inform the approach, the development of an ArcGIS-based tool, the acquisition of up to 10 municipal storm drain datasets, and the delineation of watershed boundaries for 30–40 priority locations. These improvements provided by the delineation tool will help to support a better understanding of pollutant sources and pathways, including for both contaminants of emerging concern (e.g., PFAS) and legacy contaminants such as PCBs and mercury, and will strengthen watershed modeling efforts. In addition, the tool will be made publicly available on SFEI's website, and project outcomes will be presented to the SPLWG in 2027.

Proposed by Alicia Gilbreath, Matt Heberger, Pete Kauhanen

Estimated Project Cost $75K

Oversight Group(s) SPLWG

Time Sensitive? No

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
Improve watershed delineations to better interpret monitoring data and better parameterize watershed models.	MQ1: What are the sources, pathways, and loadings of pollutants and sediment to the Bay?
Improve watershed delineations to more accurately identify potential sources in each watershed.	MQ2: Which are the priority sources and pathways of pollutants that adversely impact or potentially adversely impact the Bay's environmental quality?

Background

A watershed boundary is delineated by identifying the highest elevations (ridges and drainage divides) surrounding a drainage area and tracing the line that separates where precipitation flows in different directions. Delineating the contributing drainage area to a given location is fundamental for selecting monitoring sites, designing appropriate sampling strategies, and interpreting monitoring results. Both the modeling and monitoring programs within the RMP's Sources, Pathways, and Loadings Workgroup routinely perform watershed delineation.

While the concept of a watershed boundary is theoretically straightforward, delineation in urban environments is considerably more complex due to the presence of subsurface storm drain networks—some analysts refer to these drainage areas as "sewersheds." In these settings, surface elevation data alone are insufficient, as stormwater may be conveyed through underground infrastructure in directions that differ from surface flow paths. Incorporating storm drain network data is therefore essential but introduces additional challenges, including acquiring data from multiple municipalities, varying data formats, quality, year of dataset generation, and completeness, cross-jurisdictional drainage systems, uncertain or poorly documented flow directions, and circuitous or non-intuitive routing within the network.

Currently, watershed delineation can be performed reliably and efficiently in non-urbanized areas using digital elevation models and automated tools. In contrast, delineation within urban drainage systems remains a largely manual, labor-intensive process with inherent uncertainty. Accurately characterizing the landscape contributing to a given discharge point – information critical to both the monitoring and modeling efforts within SPLWG – requires accurate geospatial data describing catchment areas. The proposed project aims to advance these methods, improving delineation accuracy in urban environments. These improvements will benefit interpreting stormwater monitoring data, estimating pollutant loads to the Bay, identifying sources, and improving other aspects of watershed modeling – where subbasins serve as the fundamental unit of computation – in urban catchments. The tool is intended for ongoing use beyond the project period, supporting urban watershed delineation needs into the foreseeable future.

Approach

Urban watersheds can be more accurately delineated by leveraging the existing elevation and stormwater network GIS information. Terrestrial lidar is available for all urban areas across the nine counties of the Bay Area. Lidar, or Light Detection and Ranging, is an active remote sensing technology that uses laser pulses to measure distances, creating precise, high-resolution 3D maps of the environment. While some Bay Area lidar data is more than 5 years old, expected changes in the topography and slope of urban surfaces are limited. Topography alone is insufficient to describe the contributing surface areas for stormwater sampling and portions of urban stormwater networks.

Municipal stormwater infrastructure GIS data is necessary to describe how water is drained from the urban surface and routed towards sampling locations. Stormwater networks and inlet GIS data generally exist for most municipalities within the Bay Area, but vary in format, fields, completeness, and accessibility. Over time, the general availability, quality, and recency of this data have been improved by municipalities. This data availability, paired with improvements in geospatial automation and processing, makes larger-scale delineation of urban contributing areas more feasible.

This effort will produce a geospatial tool that can ingest both public urban-regional lidar elevation data and compiled local municipal stormwater infrastructure GIS data (stormwater networks and inlets) to produce accurate and consistent delineation of the contributing area for stormwater sampling locations. We propose to conduct a brief literature review to learn more about existing software and approaches to urban watershed delineation. For example, we plan to further investigate the USGS web app for “storm-drain aware” watershed delineation for the urban area around St. Louis[1] and explore what aspects may be applicable to the Bay Area.

The general approach involves:

[1] Missouri St. Louis StreamStats: https://www.usgs.gov/streamstats/missouri-st-louis-streamstats

- Select the relevant portion of the stormwater drainage network that drains towards a specific sampling location.
- For the storm drains in that selected network, identify all the inlets to the network.
- Identify all inlets outside but surrounding the network.
- Using "hydro-conditioned" lidar elevation data, identify the contributing area draining to each inlet.
- Convert the contributing area to a polygon for display and analysis in GIS software.
- QA the resulting polygon boundary for approximate accuracy relative to previous delineations. If different, review the boundary delineation again to verify accuracy. Additionally, send watershed boundary delineations to BAMSC representatives to review.

This analysis will be standardized in a geospatial tool for ArcGIS Pro (developed with the Python programming language) that can be run at any sampling location where spatial data for the stormwater network and inlets are available. For simple, non-circular, one-way storm drain networks, we will likely be able to automate the entire process for a given sampling point. However, due to the variability and complexity of Bay Area stormwater infrastructure and the GIS data quality, we will likely need to prepare the input data manually for some areas. The tool will be developed to account for both scenarios.

Compiling stormwater infrastructure data can be easy in some areas (e.g., when it is publicly available online), but in others, it can be difficult to acquire and may require working directly with municipal staff. The complexity of municipal stormwater networks also varies across the Bay Area. The proposed budget here assumes we will acquire and process up to 10 municipal stormwater network datasets and delineate an estimated 30 to 40 sampling points. The resulting geospatial tool will be packaged in an ESRI-compatible format and made publicly available via the SFEI website or GitHub, along with a user guide on preparing the data and running the tool to produce urban watershed delineations at any given point.

Initial processing steps for Sunnyvale East Channel were conducted to prototype this approach. Sunnyvale has a particularly complex stormwater network, containing occasional loops and overlapping pipes. This makes delineating urban watersheds more difficult than in natural terrain, where the flow network is unidirectional and dendritic (tree-like). Figures 1 through 3 show the basic steps in the delineation. The methods used here make use of a digital elevation model (DEM) to determine overland flow paths, and the storm drain network to determine flow patterns in conduits.

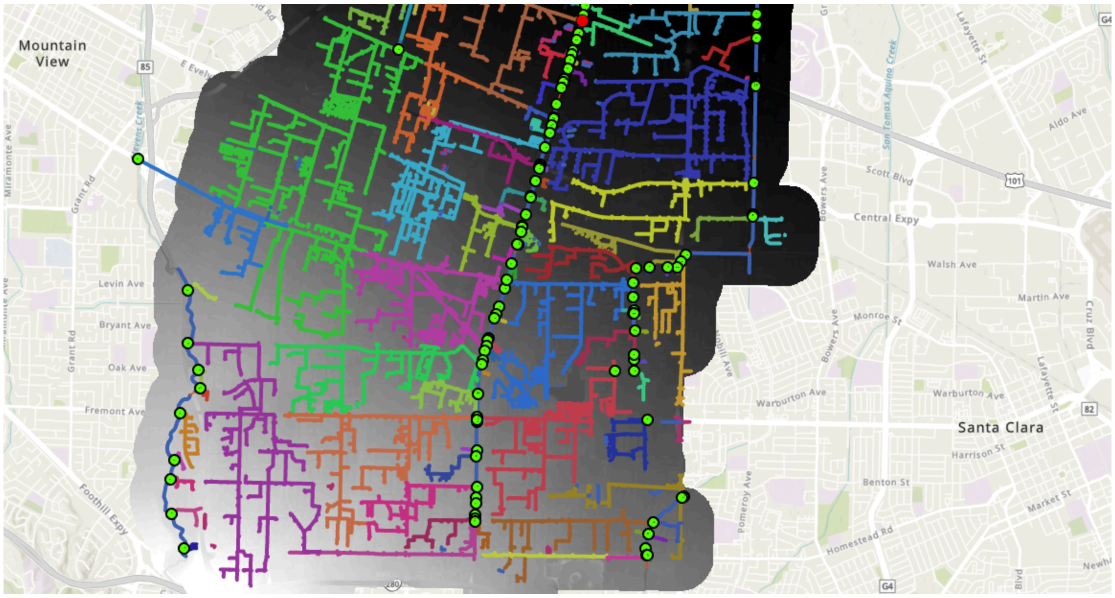

Figure 1. Sunnyvale stormwater network. The colors of the pipes and channels correspond to the downstream outfall location. Green points represent outfalls.

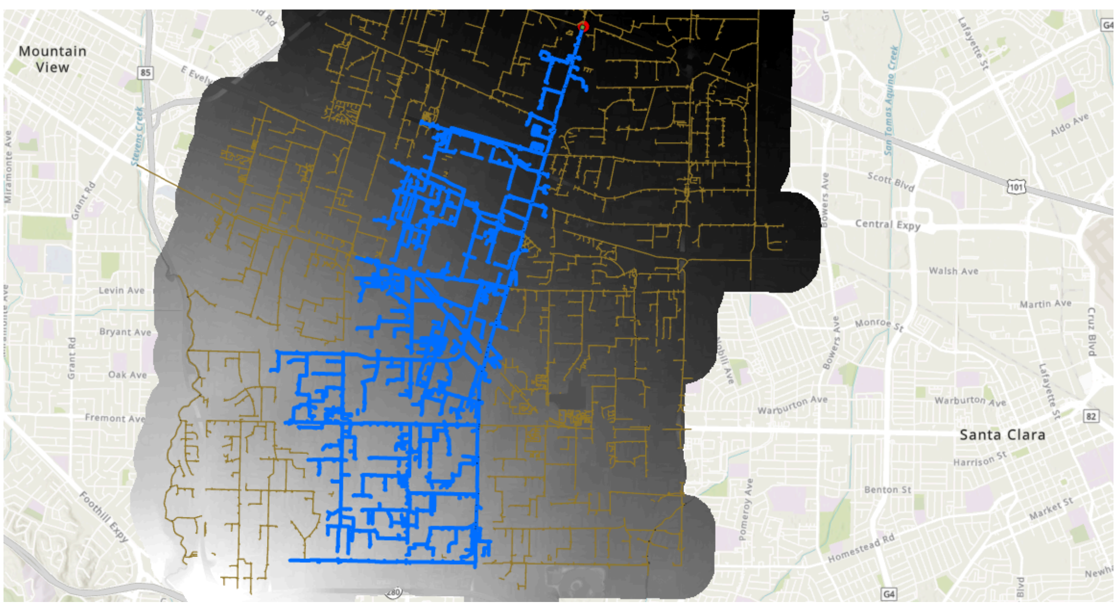

Figure 2. The upstream stormwater drainage network (in blue) for a sampling point (red dot at the top-middle of the screenshot) in Sunnyvale.

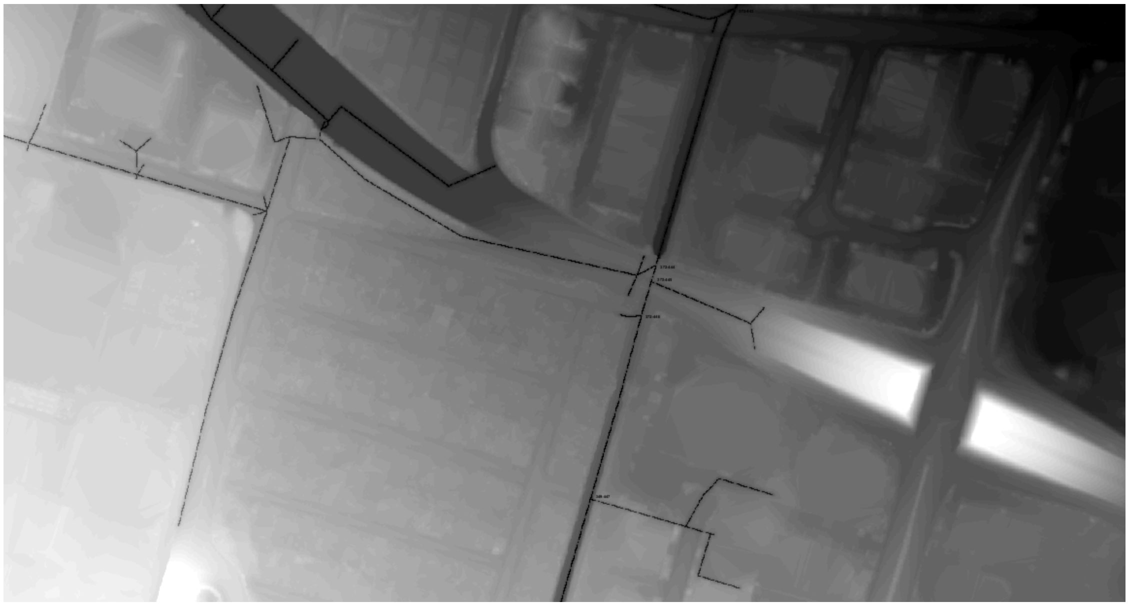

Figure 3. Hydro-conditioned elevation data for Sunnyvale, where stormwater networks have been 'burned in' to the Digital Elevation Model. Artificially lowering the elevation of pipes and culverts, ensuring accurate tracing of flow direction.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 1. 30-40 watersheds delineated using new tool	March 2028
Task 2. Draft toolbox and user guide for review by stakeholders and science advisors Final ESRI tool and user guide packaged and published on website	 March 2028 June 2028
Task 3. Presentation at SPLWG 2027	April or May 2028

Table 3. Budget

Expense	Est. Hours	Cost
Labor		
Task 1. Literature review	25	$4,000
Task 2. ESRI tool development	90	$16,000
Task 3. Secure stormwater data from up to 10 municipalities	90	$16,000
Task 4. Watershed delineation and QA	160	$28,000
Task 5. Project management and contingency	60	$11,000
GRAND TOTAL	**425**	**$75,000**

Watershed Modeling Workplan for 2027: Watershed Dynamic Model Enhancements and Applications

Summary

For 2026 to 2030, watershed modeling for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) is being funded by the Tracking Bay Health (TBH) grant from the USEPA. The RMP's Sources, Pathways, and Loadings Workgroup (SPLWG) and Technical Review Committee (TRC) will continue to play an important role in implementing and overseeing the RMP's watershed modeling program.

Since 2020, the RMP has been developing the Watershed Dynamic Model (WDM), a regional watershed and water quality model for the Bay. Recently, the RMP developed an *Integrated Watershed-Bay Modeling Strategy* (Heberger and McKee 2026), containing a multi-year plan for watershed modeling. A variety of model enhancements and applications were outlined to support priority management information needs. While the document laid out a vision and roadmap for watershed modeling, these are expected to be subjected to further review and refinement, as priorities continue to evolve. Therefore, we will adopt an "agile" or adaptive approach to project management. Here, we outline the proposed plan for completing watershed modeling tasks in 2027 in consultation with RMP stakeholders and advisors.

Under this proposed plan, the WDM will be used to provide updated regional-scale pollutant load estimates under various management scenarios at the Bay and Priority Margin Unit scales. Priority projects include continued model enhancements related to channel geometry and land use. We also plan to create a more refined watershed model to support analysis of Priority Margin Units such as San Leandro Bay. Because of the importance of sediment as both a resource and a delivery mechanism for pollutants, we will continue to refine modeling of erosion and sediment transport, particularly as it relates to grain size, and incorporate more local data.

Proposed by Matthew Heberger, Pedro Avellaneda, and Lester McKee, SFEI

Estimated Project Cost $580k in 2027 ($2.5 million through 2030)

In 2027: $450k for SFEI labor, $115 for contractor(s), and $15K for direct expenses.

Oversight Group(s) SPL WG, PCB WG, Microplastics WG

Time Sensitive? Yes, particularly components related to PCB loading and control strategies, and providing inputs for the in-Bay hydrodynamic model.

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
By updating meteorological forcing, land use data, and calculating urban/non-urban mass balances, this work directly addresses what the sources, pathways, and loadings of contaminants are to the Bay.	**SPL MQ3:** What are the management actions that could be implemented in the region to address pollutant pathways and sources, and where would they have the greatest benefit?
The "what-if" load reduction scenarios and PMU feasibility studies respond to questions regarding the effects of management actions on pollutant loads.	**SPL MQ3c**: What are the effects of management actions on loads from the most important sources, pathways, and processes?
Simulation of PMU-scale recovery and control measure feasibility addresses the rates of recovery for contaminated sites and the impact of focused management in these watersheds.	**PCB MQ1**: What are the rates of recovery of the Bay, its segments, and in-Bay contaminated sites from PCB contamination? **PCB MQ1A**: What would be the impact of focused management of PMU watersheds?
Enhancements to sediment modeling and the provision of boundary conditions respond to the need to quantify sediment fluxes and budgets for both sand and mud.	**SED MQ3**: What are the sources, sinks, pathways, and loadings of sediment and sediment-bound contaminants to and within the Bay and subembayments?
Exploring land use change and redevelopment scenarios addresses how watershed loads will shift in relation to environmental changes.	**SED MQ3.1:** How will watershed load to the Bay change in relation to changing climate, vegetation cover, and land use?

Background

To address complex water quality challenges in the Bay, the RMP has transitioned toward a coupled watershed modeling and monitoring approach designed to optimize efficiency and produce timely answers to critical management questions (McKee et al., 2025). Coupling a dynamic watershed model with an in-Bay model allows us to simulate how pollutants move from land surfaces and through the water and sediment of the Bay, ultimately accumulating in aquatic life (Heberger and McKee 2026; Jones et al., 2026). Since 2020, the RMP has worked to enhance watershed modeling capacity to provide: 1) information on pollutant concentrations and loads, and 2) reliable boundary conditions for in-Bay models.

A primary driver for this integrated approach is the need for science-based regulatory decisions, specifically concerning the scheduled updates for the Mercury (Hg) and Polychlorinated Biphenyls (PCBs) Total Maximum Daily Loads (TMDLs) in 2028 and 2030, respectively. For legacy pollutants like PCBs, which are highly localized due to historical industrial contamination, modeling is essential to explore the feasibility of load reductions at both local and regional scales. Furthermore, detailed modeling of Priority Margin Units (PMUs), such as San Leandro Bay and Redwood Creek, is required to explore rates of recovery in sediment and fish tissue, providing water quality managers with the information necessary to evaluate the effectiveness of remediation actions.

Accurate modeling of fine sediment transport from watersheds that drain to the Bay is a high priority, as many priority pollutants are predominantly sediment-bound. But watershed sediment modeling also directly supports marsh restoration and shoreline climate resilience efforts, also a priority for the RMP Sediment Workgroup and the Wetlands Regional Monitoring Program. By integrating watershed dynamic models with in-Bay sediment transport simulations, the RMP can also assess the impacts of climate change and sea level rise on the long-term health and resilience of the Baylands and mudflats.

Under the Tracking Bay Health (TBH) grant from the USEPA, the RMP has earmarked $2.5 million for watershed modeling through 2031. To be conservative, we are budgeting for labor and contracts through 2030, to allow extra time only if needed for producing contract deliverables. Table 2 summarizes planned expenses through 2030.

Table 2. Planned expenditures for watershed modeling, by category for 2027 to 2030, the duration of the EPA Tracking Bay Health grant.

Category	**2027**	**2028**	**2029**	**2030**	**Total**
SFEI Labor	450	479	510	543	1,982
Subcontracts	115	120	130	135	500
Comp. Hardware & Software	15	1	1	1	18
Total	**580**	**600**	**641**	**679**	**2,500**

Approach

Building upon foundational recalibrations of hydrology and sediment physics conducted in 2025 and 2026, the work to be completed in 2027 focuses on enhancing model precision, integrating modeling platforms, and applying these tools to address critical management questions for the Bay. The following sections outline our technical approach for the tasks scheduled for 2027.

Subcontracts - While much of the work will be completed in-house by SFEI staff scientists, we do not have the capacity to complete all of the proposed tasks described below. We plan to contract with a consultant with expertise in HSPF or LSPC[1] modeling and applications, specifically with respect to modeling the impacts of stormwater best management practice (BMPs) and green stormwater infrastructure (GSI) using models such as SWMM or SUSTAIN. SFEI is planning to issue a Request for Qualifications (RFQ) covering a variety of modeling disciplines, including watershed modeling, in the summer of 2026. Once contractor(s) are selected based on their qualifications, we will determine which tasks are appropriate to contract out. We have budgeted for $500,000 for subcontracts from 2027 to 2030, or $125,000 per year, or 20% of the total budget. This allows us to build up SFEI's capacity for watershed modeling, while bringing in outside help to provide technical assistance and for specialized modeling tasks.

[1] The WDM is an application of LSPC, the Loading Simulation Program in C++. This model, a descendant of the well-known HSPF model, has been widely used across the United States in many water quality investigations and TMDL analyses.

Investing in computational resources - The proposed 2027 budget includes the purchase of computer hardware and software, so that staff can efficiently run watershed models and visualize and interpret their output. This includes the purchase of three capable desktop computers and software subscriptions such as PyCharm, an integrated development environment for Python, and Zotero, a reference management system.

Table 3. Proposed watershed modeling tasks in 2027.

Task		Budget (x $1000)	
1. Model configuration and calibration			
	A. Update meteorological forcing datasets	50	
	B. Update channel geometry river reach F-tables	25	
	C. WDM/RWSM: Update and improve land use input data	60	
	D. Enhancements to sediment modeling	65	
			200
2. Watershed modeling applications			
	A. RWSM: Align HRUs with WDM and recalibrate RWSM	40	
	B. PCB TMDL Bay recovery: PMUs: Explore control measure feasibility through varied simulations by control measure type, scale, and pacing	100	
	C. Microplastics: Annual average discharge and load at the HRU scale	50	
	D. Provide boundary condition for in-Bay model: Daily flows by near-field subwatershed, three sediment size classes	50	
			240
3. Reporting and management			
	A. Reporting	85	
	B. Administration, stakeholder engagement, and project management	55	
			140
Total			**580**

1. Model configuration and calibration

To provide reliable inputs for sediment and pollutant transport, we will finalize the modernization of the WDM meteorological and hydraulic frameworks. This work is a continuation of work that was begun in 2026 and will allow us to go deeper and add more details to the model where there is a clear benefit to doing so.

A. Update meteorological forcing datasets

In 2026, we made important updates to the precipitation forcing data for the model, which resulted in improved model fit to observed discharges. Nevertheless, challenges remain due to the relatively sparse coverage of rain gages and the extreme spatial heterogeneity of rainfall in the Bay Area, where a distance of only 10 miles can result in a 20-inch difference in annual rainfall. This complexity is driven by the region's rugged topography and its position at the edge of the Pacific Ocean. Orographic effects are strong and there are a number of rain shadows, creating numerous distinct microclimates.

In 2027, we propose to contract with researchers at the University of Nebraska at Lincoln (UNL) to produce a new, state-of-the-art precipitation dataset for the Bay Area. Further, precipitation in the Bay Area is defined by extreme spatial heterogeneity. A separate proposal is attached, along with the CV for the principal investigator, Dr. Tirthankar Roy. Dr. Roy and PhD candidate Chitresh Anand have a strong background in precipitation science and have developed novel methods for imputation (or filling in of missing data) that will allow us to make greater use of local rain gage data. Deliverables include a new gridded hourly precipitation dataset over the Bay Area, and the code necessary to repeat the analysis, for example to extend the record with new observations. We will incorporate this new data into the model and anticipate that its increased spatial and temporal fidelity will increase our model’s skill for predicting discharge, sediment, and pollutant concentrations.

B. Refine channel geometry F-Tables

This is also a continuation of work begun in 2026. Accurate channel hydraulics are essential for calculating the bed shear stresses that drive sediment scour and deposition. We will continue working to replace idealized trapezoidal channel cross-section representations with custom volume-outflow relationships (F-Tables) for critical reaches. This process involves collating locally measured cross-sections from SFEI and consultant field studies, HEC-RAS models from FEMA flood studies, and lidar-based topography. In 2027, we will also expand this effort to investigate the behaviors and operating rules of Bay Area reservoirs. There are currently 15 reservoirs represented in the model in a simplistic way. Improved simulation of reservoirs should help to improve model simulation in our large watersheds, including Alameda Creek, Coyote Creek, Guadalupe River, and select smaller ones (San Leandro Creek, San Lorenzo Creek, Novato Creek, and San Francisquito Creek). In 2027, we will further refine F-Tables and Reservoir representations to support improved model calibration.

C. Update and improve land use data

Accurate pollutant loading is highly dependent on the spatial distribution of human activities described by land cover and land use. We will conduct a quality assessment of the MTC 2020 land use dataset and begin making necessary refinements and/or seek an alternative land use/land cover (LU/LC) dataset for modeling. We may also investigate whether an update is needed to our estimates of directly connected impervious area (DCIA), which is used to partition land areas into either pervious or impervious categories. The distinction between pervious and impervious land areas is important for modeling, as the model uses different algorithms for predicting runoff and pollutant loading.

D. Enhancements to sediment modeling

The algorithms of the LSPC model are largely empirical: model parameters are set by tuning them to achieve the best fit between model predictions and observations. Calibration will prioritize optimizing the model for simulating urban stormwater flows and loads from Bay Area watersheds. Further along in the modeling work plan, there may also be scenarios where the model is optimized for other purposes.

During the recalibration of the model in the past year, we received many valuable suggestions from our advisors, internal colleagues, and stakeholders that we did not have time to implement. For example, we can and should expand beyond the current 17 USGS streamgages used for hydrology calibration, to include gages operated by local agencies such as water suppliers and flood control districts. In addition, future rounds of sediment recalibration can and should include several RMP monitoring stations where continuous turbidity-surrogate SSC observations are available. In 2027, selected additional higher priority data sets will be utilized.

This task also includes a subtask to redraw a number of the watershed model's subbasin boundaries. This is a continuation of work planned as part of the current 2026 workplan. Current work is focused on adding land area along the Bay shoreline that was previously excluded, and modifying the drainage basins around reservoirs to be consistent with standard modeling procedures. In 2027, we plan to add several new subwatershed boundary nodes to support the use of new calibration locations. In general, it is desirable for subbasins outlets to coincide with the location of monitoring stations. In the last two years, we have identified additional monitoring locations for both flow and sediment. As more calibration sites are added and uses for the model beyond Hg and PCBs are identified, there will be a continued need for refining the subwatershed structure. In 2027, we will strategically add model notes to support improved calibration.

We will refine the simulation of three sediment size classes: clay (≤0.03125 mm), silt (0.03125–0.0625 mm), and sand (>0.0625 mm). This involves incorporating local data from watershed reports and USGS particle size observations to ensure realistic Sediment Delivery Ratios (SDR) and in-stream transport dynamics.

By integrating these refined watershed outputs with advancing in-Bay models, SFEI will provide the science-based framework necessary for the 2030 PCB TMDL review, in-Bay modeling of sediment and contaminants.

2. Watershed modeling applications

These tasks directly support the upcoming TMDL updates and provide the boundary conditions necessary for in-Bay fate modeling.

A. RWSM and WDM Alignment

To ensure regional consistency, we will align the Hydrologic Response Units (HRUs) of the Regional Watershed Spreadsheet Model (RWSM) with those of the WDM. This allows the RWSM to leverage the WDM's advanced rainfall-runoff calculations for annual average loading estimates, particularly for pollutants like microplastics (MPs) where monitoring data are sparse. Furthermore, this makes the outputs of the two models more readily intercomparable. In environmental modeling, it is often valuable to approach the same problem with different tools. In this case, using both a simple and a more sophisticated model to estimate pollutant loads will help us to "bookend" the results and provide an additional check on the results.

B. PMU Control Measure Feasibility: For Priority Margin Units (PMUs)

An important component of our 2027 workplan is the application of these models to evaluate specific regulatory and restoration strategies. We will use tools such as SWMM or SUSTAIN to explore how large-scale management actions—including Green Stormwater Infrastructure (GSI) implementation, urban redevelopment, and land use changes—impact Bay water quality. These models will forecast daily and annual load reductions under various climate and development futures that can be used as experimental “possible future scenario” boundary conditions for the in-Bay model to explore the likelihood of recovery.

We will simulate the pacing and scale of various control measures (e.g., source area soil removal, enhanced street sweeping) as boundary conditions for in-Bay model simulations to determine their impact on PCB recovery trajectories in sediment and fish tissue.

C. Microplastics modeling

We will calculate annual average flow volumes for specific HRUs to generate the first robust loading estimates for microplastics. This task provides the "order-of-magnitude" estimates needed to prioritize regional monitoring and source control efforts.

D. Provide boundary conditions for the In-Bay Model

The WDM output serves as the input for the in-Bay hydrodynamic and water quality model. We will work with the Bay modeling team to provide time series of flow, sediment, and pollutant concentration time series for near-field subwatersheds. These outputs serve as the critical boundary conditions for high-resolution Bay models, such as the San Leandro Bay (SLB) recovery simulations.

3. Reporting and management

A. Reporting

Planned deliverables include an annual watershed modeling report, presentations to the SPL Workgroup, and updates to the model website. The temporary online portal has been successful so far for sharing model outputs and data with stakeholders and advisors. In 2026, this will move to a permanent home on the SFEI website and continue to be updated and enhanced. Our goal is to make the WDM a community model, accessible to all, with all the files and documentation necessary for a quick start to watershed modeling. The online portal will need to be enhanced to address the goals that stakeholders endorsed in the *Integrated Watershed-Bay Modeling Strategy* (Heberger and McKee 2026).

B. Administration, stakeholder engagement, and project management

We plan to host quarterly model update meetings to present our latest findings to interested stakeholders and science advisors. Two such meetings have been held so far in 2026, and they have been a critical forum for technical staff to present draft results and receive feedback and input. These quarterly updates will help support our goal of making the RMP's watershed modeling transparent and scientifically defensible. Additionally, this task supports project management, the RFQ process, contracting, and management.

Table 4. Proposed deliverables and timeline

Deliverable	Due Date
1. Annual watershed modeling report	March 2028
2. Presentation to the SPL Workgroup	April 2028
3. Update to the WDM web page and model dashboard	May 2028

References

Heberger, M., & McKee, L. (2026). *Integrated Watershed-Bay Modeling Strategy* (Contribution No. 1224). San Francisco Estuary Institute. https://www.sfei.org/documents/integrated-watershed-bay-modeling-strategy

Jones, C. A., Davis, J., & Yee, D. (2022; 2026). Strategy for In-Bay Fate Modeling to Support Contaminant and Sediment Management in San Francisco Bay (Contribution No. 1090; p. 45). San Francisco Estuary Institute. https://www.sfei.org/documents/strategy-bay-fatemodeling-support-contaminant-and-sediment-management-san-francisco-bay

McKee, LJ., Moran, K.D., and Davis, J.A., 2025. Integrated Watershed Modeling and Monitoring Framework to Support the Regional Monitoring Program. Regional Monitoring Program for Water Quality in San Francisco Bay (RMP). SFEI Contribution No. 1099. Richmond, CA. https://www.sfei.org/documents/integrated-watershed-modeling-and-monitoring-framework-support-regional-monitoring

SedWG Strategy Funding (2027)

The RMP Sediment Workgroup (SedWG) provides technical oversight and stakeholder guidance on RMP studies addressing questions about sediment delivery, sediment transport, dredging, and beneficial reuse of sediment. The SedWG's work focuses on addressing 5 Management Questions:

1. What are acceptable levels of chemicals in sediment for placement in the Bay, baylands, or restoration projects?
2. Are there effects on fish, benthic species, and submerged habitats from dredging or placement of sediment?
3. What are the sources, sinks, pathways and loadings of sediment and sediment-bound contaminants to and within the Bay and subembayments?
4. How much sediment is passively reaching tidal marshes and restoration projects and how could the amounts be increased by management actions?
5. What are the concentrations of suspended sediment in the Estuary and its segments?

There is an increasing focus on managing sediment in the Bay and surrounding watershed to ensure there is enough sediment in the near-future to restore thousands of acres of baylands, and enough sediment in the long-term to maintain healthy baylands under a rising sea level. The SedWG funds many efforts focused on Bay sediment science and management and there is a growing need for additional coordination with RMP partners and stakeholders, as well as with other RMP Workgroups (e.g., Sources, Pathways, and Loadings Workgroup) to ensure that the SedWG's efforts are providing key information for improving sediment management and leveraging other efforts.

The Strategy funds will be used by SFEI staff to coordinate internally and with external partners, help finalize the Management Questions 1 and 2 Workplan, onboard a new advisor who will focus on Management Questions 1 and 2, and begin the 5-year update to the Sediment Monitoring and Modeling Workplan.

Estimated Cost: $25,000
Oversight Group: SedWG
Proposed by: Scott Dusterhoff
Time Sensitive: Yes

Conceptual Understanding of Sediment Transport Processes in South Bay and Lower South Bay

Summary

McKnight et al. (2023) and McKee et al. (2025) are recently completed Bay-wide assessments of sediment transport processes in San Francisco Bay. These reports recommended refining our understanding of the dynamic sediment transport and depositional processes in individual subembayments. The RMP approved funds to develop subembayment-specific conceptual understandings for Suisun Bay and San Pablo Bay (to be completed in 2026) and for Central Bay (to be completed in 2027).

This project will follow these ongoing efforts by developing a conceptual understanding of sediment processes in South Bay and Lower South Bay. This effort will focus on gathering the best available data to evaluate sediment loading into each subembayment, updating our understanding of the processes driving sediment movement within the open Bay environment, and identifying the processes and mechanisms that affect sediment transport along the Bay margin. Similar to the ongoing efforts, the synthesis report will be:

1) a centralized place for summarizing existing information related to the supply, transport, and fate of sediment;
2) spatially explicit, describing processes at the reach and marsh scale, where data allow;
3) easily accessible and digestible, with specific recommendations to address key knowledge gaps.

Proposed by Kyle Stark, Emma Sevier, and Scott Dusterhoff (SFEI)
Estimated Project Cost $186,800, with the possibility of funding over multiple years
Oversight Group(s) Sediment Workgroup
Time Sensitive? No

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
Develop an updated conceptual model describing sediment transport in South Bay and Lower South Bay.	3. What are the sources, sinks, pathways, and loadings of sediment and sediment-bound contaminants to and within the Bay and subembayments? ● SQ3.3: What are the main sediment transport processes and pathways within subembayments, including from deep Bay channels to marsh edges?
Spatially explicit locations of accretion and erosion hotspots within South Bay and Lower South Bay.	4. How much sediment is passively reaching tidal marshes and restoration projects and how could the amounts be increased by management actions? ● SQ4.4: What are the accretion/erosion rates and fluxes between individual marshes, mudflats, and shallow subtidal shoals (locally and regionally)? ● SQ4.2: What actions can we undertake to increase deposition rates in restoration sites?

Background

Effective management of sediment resources in San Francisco Bay (the Bay) is critical for enhancing shoreline resilience, informing dredging practices, and identifying opportunities for the beneficial reuse of sediment. These management efforts can be more effective with an improved understanding of the Bay's overall sediment budget and complex transport processes. Recent efforts, such as McKnight et al. (2023) and McKee et al. (2025), have focused on a Bay-wide assessment of these processes. The Bay RMP has approved funds to develop subembayment-specific conceptual understandings for Suisun Bay and San Pablo Bay (to be completed in 2026) and for Central Bay (to be completed in 2027), providing detailed, subembayment-specific information in a unified framework of the best available science to directly address RMP management and science questions.

This study will produce a detailed conceptual understanding of sediment transport processes within the South and Lower South Bay subembayments of San Francisco Bay. The effort is designed to follow the two previously-funded subembayment-specific proposals, completing a multi-year effort to identify and describe major sediment transport processes within the Bay. The proposed special study will directly address science Questions 3.3, 4.2, and 4.4 (Table 1), which were identified as a high priority through the Workgroup's Bay Sediment Modeling and Monitoring Workplan (SMMWP; McKee et al. 2023). In addition to the previously-funded embayment-specific conceptual understandings, this work will also build on other previous efforts from the Bay RMP Sediment Workgroup studies, including the Special Study on Bulk Density (McKnight et al. 2020), the Conceptual Understanding of Fine Sediment Transport in San Francisco Bay (McKnight et al. 2023), Continuous Suspended Sediment and Wave Monitoring in South and Lower South San Francisco Bay (Volaric et al. 2025), and Shoreline Change in San Francisco Bay (Braud 2026, *in development)*.

Sediment transport processes around South Bay and Lower South Bay subembayments are the subject of many reports and studies (e.g., Nowacki et al. 2025, Fregoso et al. 2024, Volaric et al. 2025, McKnight et al. 2023, McKee et al. 2025, Schoellhamer et al. 2018). A brief review of this research reveals several key data gaps and areas of further investigation:

- Sediment flux between Central Bay and South Bay
- Anthropogenic impacts (e.g. South Bay Salt Ponds, borrow pits) affecting sediment bathymetric change
- Suspended sediment concentration monitoring for shallow margin shoal and slough habitats
- Suspended sediment flux through the Dumbarton Bridge
- Temporal and spatial variability in sediment delivery between wet and dry years
- Seasonal variability in sediment transport and net import between summer and winter conditions

Evaluating these data gaps, along with others identified through a literature review (Task 1 of this proposal), provides an opportunity to improve the effectiveness of sediment management within South Bay and Lower South Bay, aid in the development of numerical models of sediment movement, and guide the next set of Sediment Workgroup special studies.

Approach

This proposal is divided into four tasks, designed to be completed over two years. The majority of Task 1 is anticipated to be completed in year one (2027) while the majority of Task 2 is anticipated to be completed in year two (2028). Tasks 3 and 4 are approximately divided equally across both years (see Table 3 for a detailed breakdown of labor and costs). The proposal is planned with flexibility in mind; funding could be split over the two year project period or mostly funded in the first year of the project.

Task 1. Literature Review and Subembayment Analysis

This task focuses on gathering information related to sediment dynamics in the South and Lower South Bay subembayments. The task will build on information gathered during the development of previous conceptual models and is divided into three main areas of focus. Bay-wide conceptual models and budgets (e.g., McKee et al 2025 and McKnight et al. 2023) form the basis of understanding the main processes governing transport. Numerical modeling (e.g., Anchor QEA 2023) and site-specific monitoring (e.g., Nowacki et al. 2025) inform how unique conditions of the South Bay may affect sediment transport processes of shorter time periods and more specific spatial areas. Additional analysis will focus on the Bay margin and intertidal areas, where new methods (Braud 2026, *in development*) provide quantitative assessment of the exchange of sediment with the open Bay.

Task 2. Reporting

Results of the study will be compiled into a technical report, to be completed in 2028. This report will be presented to the RMP Sediment Workgroup, Technical Review Committee, and Steering Committee for review and acceptance. The report will be divided into three focus areas that improve our understanding of sediment transport processes into a usable conceptual understanding for a wide range of Bay RMP stakeholders**.**

1. Gather the best available data to evaluate sediment loading into each subembayment to establish a subembayment-specific sediment budget at various time scales.
2. Synthesize our understanding of the processes driving sediment movement within the open Bay environment.
3. Identify the processes and mechanisms that affect sediment transport along the Bay margin.

The report will be spatially explicit, and generally have a more enhanced focus than other, Bay-wide evaluations of sediment transport processes. Other focus areas may be added, based on the advisor input received in Task 3.

Task 3. Scientific Communication and Technical Advising

This task includes funds to develop a series of presentations and provide a project update at the 2027 and 2028 RMP Sediment Workgroup meetings. This task will also include funds to convene an advisory team. This group will be convened to advise the literature and data gathering efforts associated with the South and Lower South Bay subembayments.

Task 4. Project Management and Internal Coordination

This task includes funds for project management, including the development of a workplan, regular team meetings, and other management tasks. Project closeout funds are also included in this task, which include archiving these findings to SFEI's server to be available to support future studies from other workgroups and stakeholders.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 2. **Draft Conceptual Model Report**	June 2028
Task 2. **Final Conceptual Model Report**	October 2028
Task 3. **2027 Sediment Workgroup presentation**	May 2027
Task 3. **2028 Sediment Workgroup presentation**	May 2028

Table 3. Budget

Expense	Est. Hours	Cost*
Labor		
Task 1. **Literature Review and Subembayment Analysis**	385	$62,850
Task 2. **Reporting**	420	$85,000
Task 3 **Scientific Communication and Technical Advising**	55	$10,150
Task 4 **PM and Coordination**	90	$18,000
Direct Expenses		
Advisor stipends		$2,500
Subcontractors		
McKee Environmental		$8,300
GRAND TOTAL	**950**	**$186,800**

* Total project cost. Effort can be distributed across the two-year project timeline, as funding allows.

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Evaluating sediment dispersal and benthic community recovery three years after a shallow-water sediment placement in South San Francisco Bay

Summary

This study evaluates the long-term physical and ecological effects and recovery of benthic communities following shallow-water placement of dredged sediment in South San Francisco Bay. Rising sea levels and declining sediment supply threaten tidal marsh resilience, prompting interest in nature-based solutions such as strategic sediment placement to sustain mudflats and marshes that can help protect shoreline infrastructure. In 2023, the U.S. Army Corps of Engineers placed 73,000 cubic meters of dredged sediment offshore of Eden Landing Ecological Reserve, creating a series of morphologic features, or mounds, on the Bay floor that were finer, less dense, and contained less shell material than the surrounding native sediment. Repeat bathymetric surveys by the U.S. Geological Survey showed that about 31,000 cubic meters—roughly 42%—of the placed dredged sediment remained in the placement area after one year. Biological monitoring documented reduced invertebrate densities, shifts in community composition, and potential decreases in prey energy available to benthic predators during that same period. The proposed work will assess physical changes to the Bay floor as well as structural and functional recovery three years post-placement using a Before-After-Control-Impact design. Sampling will include a multi-beam bathymetry survey of the placement area, benthic coring, sediment characterization, and continuous water-quality monitoring in reference and treatment areas. Laboratory analyses will characterize Bay floor physical properties, identify taxa, and measure prey energy density. We will evaluate how dredged sediment deposit thickness, time since placement, and distance from the placement location influence community structure and trophic support for benthic predators. Our results will improve understanding of sediment dispersal rates and recovery trajectories to inform management decisions regarding the frequency, magnitude, and spatial extent of future sediment placement projects aimed at enhancing marsh resilience while minimizing ecological impacts.

Proposed by Susan De La Cruz, Laurie Hall, Stacy Moskal, USGS Western Ecological Research Center, San Francisco Bay Estuary Field Station, 350 N. Akron Rd., Moffett Field, CA 94035-0158; Email: sdelacruz@usgs.gov
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Estimated Project Cost $154,538 (WERC $90,986; PCMSC $63,552)

Oversight Group(s) RMP Technical Review Committee (TRC); RMP Sediment Workgroup

Time Sensitive? Yes. We plan to evaluate the biological community in winter 2027, the same season in which the Eden Landing pilot strategic placement occurred, to enable comparison to community conditions immediately before placement. Early release of funds requested to allow for sampling in January and February of 2027.

Table 1. Study objectives and applicable management questions

Study Objective	Management Question
Evaluate the temporal effects of sediment placement on the benthic community and foraging resources for demersal predators	MQ 2a: What are the short- and long-term impacts and benefits of direct or indirect placement of dredged sediment on aquatic species and habitats? (SQ 2a.2) How do frequency, magnitude, and spatial extent of direct or indirect sediment placement affect species and habitat recovery? (SQ 2a.4) Which sediment placement methods minimize impacts and maximize benefits for existing wetlands?
Evaluate the performance of sediment placement project to enhance the sediment supply to mudflats and marshes. Quantify the rates of dispersal from the placement site and impacts of the project on sediment properties.	MQ4: How much sediment is passively reaching tidal marshes and restoration projects, and how could the amounts be increased by management actions? ● SQ4.4: What are the accretion/erosion rates and fluxes between individual marshes, mudflats, and shallow subtidal shoals (locally and regionally) in relation to wave exposure, local sediment supply and other factors, and how is it expected to change with deeper water and other factors associated with sea level rise?

Background

Tidal salt marshes support wildlife and protect infrastructure across the San Francisco Bay (hereafter "Bay") landscape, where there are extensive plans to restore this important habitat over the coming years. However, the combination of accelerating sea-level rise (SLR) and declining sediment supply in the Bay threatens the success of planned restorations and the persistence of marsh habitats overall (Schoellhamer 2011, Buffington et al. 2021). Marshes in the Bay rely on sediment delivery from shallow subtidal areas, intertidal mudflats, and creeks to build elevation and support vegetation and wildlife, yet over 60% of sediment dredged in SFB is removed from the system and disposed of in deep areas of the Bay or offshore (DMMO, 2022). Nature-based solutions, including placement of dredged sediment in shallow water can enhance sediment supplies to sustain tidal mudflats and marshes to help build SLR resilience and facilitate restoration. These types of projects have been successful in other parts of the world but are novel in the Bay. Several key management questions revolve around how the temporal and seasonal variability of physical processes influence dispersal and delivery of sediment placed in the Bay shallows to mudflat and marshes. Likewise, there is uncertainty about how shallow water placements influence benthic communities and foraging resources for benthic fish and other predators in Bay, including the duration and spatial extent of any impacts.

In December 2023, the U.S. Army Corps of Engineers (USACE) initiated a pilot program to test an innovative method of strategic shallow water dredged sediment placement to promote mudflat and tidal marsh sedimentation. A total of 73,000 cubic meters of sediment was dredged from the Port of Redwood City and placed in a subtidal location in South San Francisco Bay, offshore of Eden Landing Ecological Reserve (Fig. 1). Physical monitoring by the U.S. Geological Survey Pacific Coastal and Marine Science Center (PCMSC) revealed that the placement of dredged sediment created a series of morphologic features, or mounds, on the Bay floor that were finer, less dense, and contained less shell material than the surrounding native sediment (Figure 2). Analysis of successive bathymetric surveys following placement suggests that the tallest mounds initially eroded rapidly followed by relatively modest rates of erosion and dispersal. One year after completion of the strategic placement project, approximately 31,000 cubic meters (42%) of dredged sediment remained within the initial placement area and the dredged sediment within the mounds maintained distinct textural properties.

The USGS Western Ecological Research Center (WERC) evaluated the response of the benthic community at the placement site using a Before-After-Control-Impact design (Fig. 1) to quantify effects of the placement on the benthos, including potential structural effects on invertebrate densities and community composition and functional effects on prey energy availability for commercially important fish species and essential fish habitat (e.g., De La Cruz et al. 2020). Additional sampling at 6 and 12 months was included to understand community recovery and the duration of effects. Preliminary results from a subset of samples suggested that invertebrate density was significantly lower immediately following the placement, community composition was modified 6 months after placement, and available prey energy for fish may be lower even 12 months after the placement (De La Cruz, unpbl. data). Here, we propose to assess morphologic and physical changes to the Bay floor as well as evaluate the structural and functional recovery of the benthic community three years post-placement to better understand the duration of sediment placement effects. Physical and biological data will be compared to those collected in previous surveys to establish the trajectory of recovery. Results will inform decisions about the frequency, magnitude, and spatial extent of future strategic placement projects in the Bay to help maximize benefits to mudflats, marshes, and infrastructure while minimizing excess mounding and unintended consequences to essential fish habitat.

Approach

The proposed work would build on previous monitoring at the sediment placement site offshore of Eden Landing Ecological Reserve (Fig. 1). Our specific objectives are to 1) quantify the rate of sediment dispersal from the placement area, and 2) evaluate the temporal effects of sediment placement on the benthic community and foraging resources for predators. To accomplish this, we will perform a multi-beam bathymetric survey and collect and analyze sediment samples for grain size and bulk density (Task 1), sample the benthos at both a reference and placement area using established methodology (Task 2), then process samples at our in-house Trophic Ecology

Laboratory (Task 3), and use the resulting data to characterize the recovery trajectory and evaluate implications for essential fish habitat (Task 4).

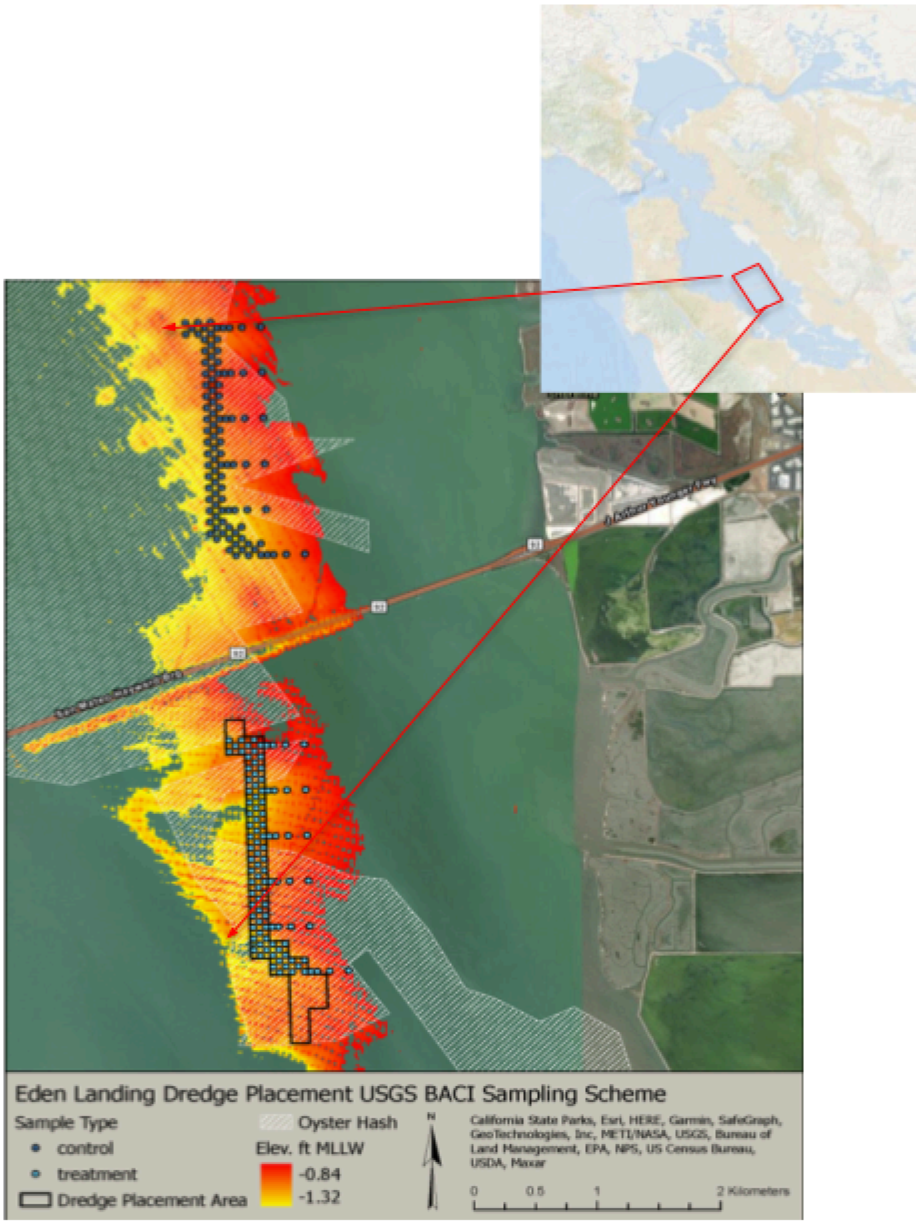

Figure 1. Map of dredge sediment placement area (outlined) and reference area in South San Francisco Bay, CA. Dark blue points are sampling locations within the reference area, light blue points represent sampling locations in the placement area.

Task 1. Multi-beam bathymetry survey and physical sediment properties

A bathymetric survey will be performed using a Norbit i67 multi-beam echosounder and 400 kHz transducer. An Applanix POS-MV (Position and Orientation System for Marine Vessels) will be used to position the vessel and account for vessel motion such as heave, pitch, and roll. Water depths from the echosounder will be computed based on profiles of sound velocity collected with a YSI Castaway CTD during the mapping mission. Survey vessel positions will be post-processed using Applanix PosPac software and Caris HIPS software will be used to filter spurious soundings and generate continuous surfaces with 0.5 m horizontal resolution for comparison with previous bathymetric surveys. Erosion of the mounds and volumetric change will be calculated by differencing the bathymetric surface derived from data collected in 2027 with previous survey data.

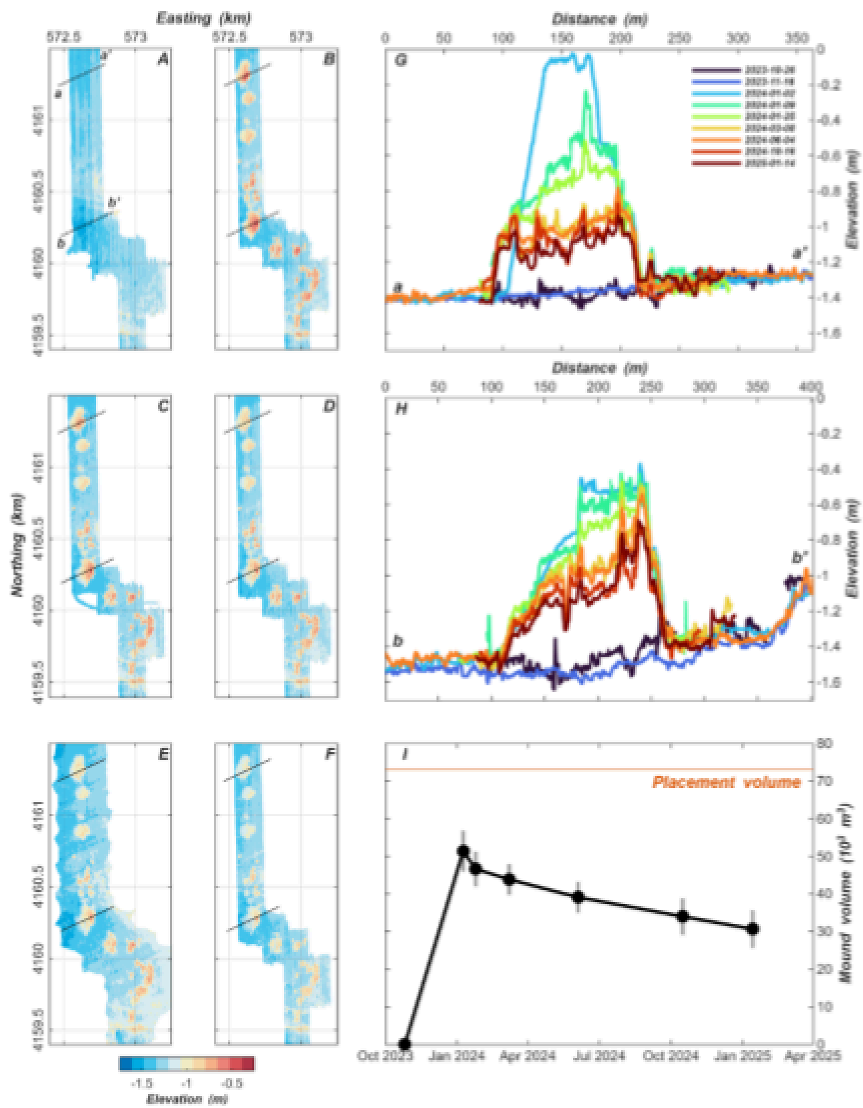

Figure 2. Maps of nearshore bathymetry from surveys performed on: A, October 26, 2023 (pre-placement), B, January 8, 2024, C, January 25, 2024, D, March 8, 2024, E, June, 4, 2024, and, F, January 14, 2025. Changes in bathymetry for two example profiles are shown in G and H. The locations of the profiles are provided in A. Time series of total measured dredged sediment volume relative to the initial placement volume is shown in I. After Lacy et al. (In prep).

Bed sediment will be sampled with push cores at five previously established sites within the placement area: three sites will be in regions where depositional mounds were observed during previous surveys, and two sites will be located outside of mound areas. At each site, three replicate cores will be collected, and the upper 6 cm of each core will

be sectioned vertically at 1-2 cm intervals. All sections will be analyzed for bulk density, and a subset of sections will be selected and analyzed for grain size (total = 100) in the PCMSC sediment lab following standard lab protocols. The sediment properties at each site will be compared with previous sampling dates to determine how sediment grain size and density have evolved within and outside the mound areas over time.

Task 2: Sample benthic prey resources at placement and reference areas

To assess the impact of the
shallow-water placement of dredged material on the benthos, we are using a Before-After-Control-Impact (BACI, McAtee et al. 2020) framework that allows us to distinguish the impact of dredged material placement from environmental or seasonal changes. The reference area (Fig. 1) was selected to match the sediment characteristics, elevation, and benthic community composition of the placement area. Our sampling design incorporates benthic coring at the center points of 50-m^2 grids that encompass the placement and reference areas to ensure complete sampling of these zones, as well as perpendicular transects extending from the placement area to shore (Fig. 1). The addition of perpendicular transects allows us to analyze impacts to the benthos as distance from sediment source increases. The number of cores taken during each sampling event is based on previous power analyses run on benthic core data from both the Dumbarton shoals and the Central Bay (De La Cruz et al. 2020) to identify the minimum sample size needed to determine a 50% reduction in invertebrate density with 80% power (Steidl et al. 1997; Quinn & Keough 2002; Di Stefano 2003).

During January 2027 (three years post-placement), we will collect two cores (10 x 10 cm) at each sampling location (placement area N=101, reference area N=101; Figs. 1 and 3). Cores will be separated into shallow (0-5 cm) and deep (5-10 cm) increments to measure invertebrate distribution at different depths in the sediment. One core will be processed for invertebrates and the other sent to an external laboratory to determine sediment grain size and chemical composition (organic matter, sediment pH), which are often important drivers of invertebrate density and biomass. Water quality can also influence invertebrate communities, and we will take continuous measurements to differentiate effects of water quality from those of the sediment placement. To quantify water level (m), temperature (°C), and salinity (PSU) we will install Solinst LTC loggers in both the placement and reference areas two months prior to sampling. Each logger will be placed in a fixed location, suspended approximately 15 cm from the sediment surface to collect data at 15-minute intervals. Loggers will be retrieved after benthic sampling has occurred.

Task 3: Process benthic samples to evaluate community structure and function

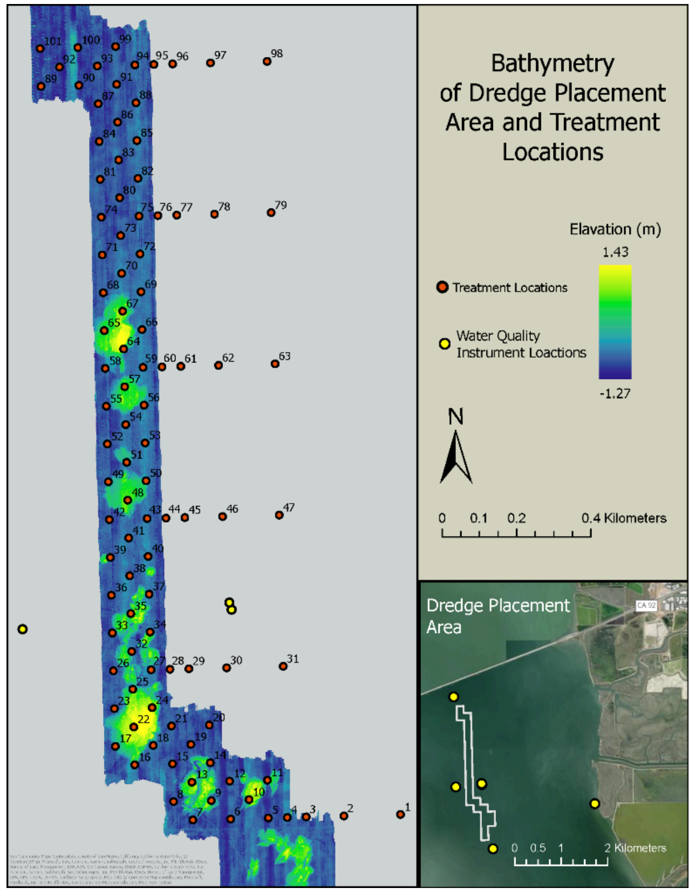

Figure 3. Map of dredge sediment placement area in South San Francisco Bay, CA. including initial post placement bathymetry and numbered benthic sampling locations.

Sediment cores will be processed within 1-6 days of sampling. Cores will be rinsed through a 500 µm sieve, and fauna retained by the sieve will be preserved in a 70% ethanol with 1% rose bengal dye. Macroinvertebrates will be enumerated and sorted into size classes based on the foraging ecology of target fish consumers in the study area. Target fish species may include those managed by the Pacific Groundfish, Pacific Salmon, and Coastal Pelagic Federal Fishery Management Plans, as well as those listed under the California State or Federal Endangered Species Act (ESA; 16 U.S.C. §1531–1544) as threatened or endangered, such as leopard shark (*Triakis semifasciata*), big skate (*Raja binoculata*), English sole (*Parophrys vetulus*), starry flounder (*Platichthys stellatus)*, brown rockfish (*Sebastes auriculatus*), green sturgeon (*Acipenser medirostris*; threatened species under Federal ESA), northern anchovy (*Engraulis mordax*), longfin smelt (*Spirinchus thaleichthys,* threatened under California ESA, SFB population endangered under Federal ESA), and Pacific sardine (*Sardinops sagax*). In addition, Dungeness crab (*Cancer magister*), California halibut (*Paralichthys californicus*), and white sturgeon (*Acipenser transmontanus*) may be included because they are substantial contributors to the California State fishery. Taxa from all samples will be identified to a broad taxonomic level (class, order); however, macroinvertebrates in a subset of randomly selected samples from the placement and reference areas will be identified to the lowest possible taxonomic level (family, genus, species) to evaluate structural benthic recovery. We will calculate dry weight biomass and energy density of available prey using established conversion factors (i.e., Brey et al. 1988) or via direct measurement in a semi-micro calorimeter (Parr model 6725), as needed.

Task 4: Data analyses

We will use a combination of structural and functional metrics to assess sediment placement effects on the benthic community and benthic fish three years after placement. Structural metrics such as the taxonomic composition and density of organisms at a site are often used to assess benthic recovery after dredging or dredged material placement (Van Der Veer et al. 1985, Bolam et al. 2014, 2021). We will use the modified Benthic Resources Assessment Technique (MBRAT) as a functional metric. This approach allows us to evaluate the impacted site in terms of trophic support for bottom feeding fishes (Lunz & Kendall 1982) by integrating information on fish foraging ecology and prey profitability to estimate the energy that is available to particular fish feeding guilds. The MBRAT is based on SFBE benthic fish foraging ecology and diet information and has been used previously for studies of dredged sites in the Bay (De La Cruz et al. 2020). We will assess the effects of treatment (placement versus reference area; dredged sediment deposit thickness based on repeat bathymetric surveys), time-since-placement, and distance to the nearest placement area separately on three response variables: (1) density (a structural measure), (2) dry biomass, and (3) energy content (a functional measure) of macroinvertebrates using generalized linear mixed models (GLMMs) or generalized additive mixed-effects models (GAMMs). Results will enable managers to visualize the recovery trajectory of structural and functional metrics and inform future sediment placement projects.

Task 4. Presentations and Reporting

Our findings will be presented to the RMP Sediment Workgroup and at either the Bay-Delta Science Conference or the State of the Estuary Conference. A draft and final USGS Open-File Report or Journal article will be provided to summarize findings of the study. All relevant data will be made publicly available in USGS data releases.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Task 1 and 2. Multi-beam bathymetry survey and benthic community sampling	January 2027
Task 3. Benthic sample processing	February 2027 – December 2027
Task 4. Presentation to RMP Sediment Workgroup	January 2028
Task 4. Conference Presentation	Fall 2028
Task 4. Draft journal article or USGS Open-File Report	Sept 2028
Task 4. Final journal article or USGS Open File Report	January 2029

Table 3. Budget

Expense	Est. Hours	Cost
Labor		
Task 1. Multi-beam survey	220	$21,420
Task 2. Benthic sampling	200	$9,412
Task 3. Sample processing	690	$33,102
Task 4. Data analyses and presentation	200	$17,750
Task 5. Reporting	80	$7,200
Direct Costs		
Supplies	--	$975
Vehicles and Boats	--	$4,762

Sediment Lab	--	$5,700
Total Costs		**$100,321**
Indirect Costs		
USGS WERC and PCMSC OH	**--**	$54,217
GRAND TOTAL		**$154,538**

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Special study proposal: Developing a Workplan for Monitoring Suspended-Sediment Flux at the Golden Gate

Sediment exchange at the ocean boundary is one of the least-constrained components of San Francisco Bay's sediment budget. Prior Golden Gate suspended-sediment flux monitoring campaigns (Erikson et al., 2013, Downing-Kunz et al., 2021) show tidally and spatially variable suspended-sediment fluxes at a subset of oceanographic and hydrographic conditions. This underscores the need for repeated observations to constrain spring–neap cycles, contrasting hydrologic seasons, and decadal variability. Previous campaigns demonstrated the value, and limitation, of combining ADCP discharge with calibrated acoustic backscatter and discrete SSC sampling for flux estimation, and highlighted how observations can be extended by models (e.g., Anchor QEA, 2011) to evaluate longer time periods. Here we propose to develop a workplan for a study to extend the existing suspended-sediment flux datasets at the Golden Gate and provide additional field observations data suitable for hydrodynamic model assimilation and validation. This work directly addresses RMP SedWG MQ 3.3 ("What is the flux of sediment through the Golden Gate…?").

This proposal provides salary and limited operational expenses to cover workplan writing, communication, collaboration, and limited field testing of the proposed work. This includes time for coordination with other technical specialists and stakeholders including modelers, marine technicians, boat captains, and operational personnel. Engagement with the Nutrient Management Strategy program to include nutrient flux measurements as part of this study will also be explored. Funding is also sought for pilot tests to evaluate methods in the field at the Golden Gate, test a tow-yo system, evaluate instrument deployment approaches, and conduct several reconnaissance transects to determine operational feasibility. Instrument calibration or sensor preparation could also be performed using these funds.

Workplan development will lead to a vetted study that is scientifically justified and logistically feasible and which outlines the monitoring objectives, observational strategies, seasonal and tidal timing, specifics of logistics and operations, budget limitations, and deliverables of the study. In developing the workplan, we will engage the RMP SedWG via a series of meetings and communications to ensure the SedWG can provide ample input on the final workplan. The workplan will be completed by March 2027 and will provide the foundation of a proposal to do the flux monitoring that will be presented at the May 2027 SedWG meeting.

Estimated Cost: $42,000
Oversight Group: RMP Sediment Workgroup
Proposed By: Daniel Nowacki (USGS PCMSC), David Hart (USGS CAWSC)
Time Sensitive: No

Proposed deliverables and timeline

Deliverable	Due date
Draft workplan	1/2027
Final workplan	2/2027
Final presented at spring 2027 SedWG meeting	3/2027

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Sediment accretion in San Francisco Bay wetland restorations Phase II

Summary
Tidal wetlands can be both sinks and sources of sediments, but the primary drivers controlling sediment dynamics within restoration projects are not well understood, nor is the degree to which the volume of sediment deposited in restored wetlands influences San Francisco Bay (SFB) sediment budgets. In Phase I of this study (funded by the RMP Sediment Workgroup in 2024), we surveyed five wetland restorations to determine accretion rates and calculate sediment volume accumulated. Preliminary results from that study illustrate that sediment accretion in restorations is site-specific and depends on sediment availability (location within SFB and sediment source), vegetation colonization rate, configuration, size, and age. Using our lessons learned from Phase I we plan to expand our project to a larger scale using newly available remote sensed products. Our objective for this project is to estimate sediment volumes and accretion rates received wetland restorations. Wetland restoration study sites will include those identified in the Project Tracker Tidal Wetland Restoration Map (PTTWRM) 2025 database. Alos, discussions will occur with RMP, WRMP, and other land managers (i.e.,USFWS) to further refine study sites. Final products will include, raster-based elevation time series datasets and summarized estimates for sediment volume and accretion that can help managers better understand restoration trajectories, adaptive management, and SFB sediment budgets.

Proposed by: Karen Thorne[1], Michelle D'Aguillo[1], Alex Braud[2]
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[2]SFEI, alexb@sfei.org

Estimated Project Cost: $120K
Oversight Group(s): RMP Technical Review Committee (TRP)
Time Sensitive? No

Background

Wetland restorations have been a priority in San Francisco Bay (SFB) for decades, with over 100,000 acres planned and 78,000 acres acquired or restored as of 2021 (San Francisco Bay Restoration Authority 2021). These large investments in wetland restorations create habitat for fish and wildlife, increase recreation opportunities, improve shoreline flood protection, and increase carbon storage. Many wetland restorations require large volumes of sediment to achieve the appropriate elevations to support wetland vegetation (Liu et al. 2021). Subsided lands in SFB require a considerable amount of sediment to increase elevations, and there are concerns related to the supply available (Dusterhoff et al., 2021). In contrast, existing wetlands can erode or ‘drown’ with sea level rise, releasing sediment back into the estuary that can be deposited on adjacent mudflats and wetlands (Kirwan and Megonigal 2013).

The initial elevation, configuration, and size of a restored area determines the tidal prism, which is a primary driver for sediment deposition and accretion rates. Accretion rates are also determined by available suspended sediment concentrations and above and below ground biomass (e.g., Morris et al. 2002). In general, more severely compacted and subsided restorations will accrete at faster rates post-restoration, compared to sites restored at higher elevations (D’Aguillo et al. *in review*). Despite these known relationships, the accretion and re-vegetation timescales for many wetland restorations in the SFB are difficult to predict for restoration engineers and planners, and many sites have failed to accrete and re-vegetate on expected time scales (e.g., Sonoma Baylands, Grays Marsh, and Nevada Parcel). A more thorough synthesis of the scale and magnitude of variation in sediment volumes and accretion rates across SFB can enable managers to plan, adapt, and prioritize future restorations, sediment management strategies, and enhancements.

In Phase I of this study (funded by the RMP Sediment Workgroup in 2024), we surveyed five wetland restorations to determine accretion rates and calculate sediment volume accumulated. Preliminary results illustrated that accumulated sediment volumes in restorations is site-specific and depends on location within SFB, initial elevation, and restoration age. One substantial finding was that estimating accretion rates using remote sensing tools (e.g., lidar) provided the most reliable, effective, and comparable method to investigate differences in sedimentation rates across sites. This finding enables the possibility of scaling a study of accretion rates from individual sites to a estuary-wide scale, strengthening the ability to make interpretations about drivers and predictors.

With the recent 2025 estuary-wide acquisition of lidar collected below Mean Sea Level (MSL), sponsored by the San Francisco Estuary Wetlands Regional Monitoring Program (WRMP), an opportunity to collectively evaluate elevation change in comparison to the bay-wide low-tide lidar collection in 2010 is presented. In addition, both datasets have accounted for positive vegetation bias found in densely vegetated tidal marshes (LEAN-corrected 2010 (Buffington and Thorne, USGS) and 2025 vegetation-correction (in progress, SFEI)). Also, recent advancements have demonstrated the utility of pairing satellite imagery with water level data to estimate the elevation of unvegetated intertidal areas, enabling the ability to create elevation time series that estimate the spatial variability of accretion across active restoration sites (Bishop-Taylor et al. (2019), Braud (in progress)). Importantly, these methods are not time-dependent, allowing for retroactive analyses that fill critical data gaps before, between, or after lidar collections, dating back to 1984 with the launch of Landsat. These remotely sensed products have provided an opportunity for the RMP to expand site specific data to estuary-wide analysis for wetland restoration sediment accumulation (accretion and volume estimates).

Study Questions and Applicable RMP Management Questions

The proposed work aims to address the following questions at a landscape scale:

1. What are the accretion rates in wetland restorations?
2. What is the volume and mass of sediment entering wetland restorations?
3. How do accretion rates vary across sub-embayments and other factors?

This project addresses San Francisco Bay Regional Monitoring Program (RMP) Sediment Workgroup Management question 4 (Table 1). It also informs the *Flux on shoals and into wetlands* priority identified in the Sediment Workgroup's Sediment Monitoring and Modeling Strategy (McKee et al. 2020). This data and related synthesis can be leveraged and further incorporated into the Sediment Conceptual Model (McKnight et al. 2022, Stark et al. (in progress)). Lastly, as the RMP advances its sediment transport modeling capabilities, this data can serve as useful validation data for parameterization and tuning within hydrologically complex restoration sites.

Table 1. RMP Sediment Workgroup management questions and associated study questions

Management question	Study question	Example information application
MQ4: How much sediment is passively reaching tidal marshes and restoration projects, and how could the amounts be increased by management actions?	1,2,3,4	• Understanding magnitude of sediment sink produced by (or conversely magnitude of sediment supply required by) marsh restoration • Prioritizing restoration sites • Predicting marsh evolution • Providing information to restoration planners on consequences of prior engineering decisions

Approach

Our approach is to utilize remote sensing tools such as lidar and satellite imagery to evaluate variation in accretion rates, volume and mass estimates, and restoration progress at a landscape scale across SFB.

Task 1 Site Selection and Coordination

Our goal is to maximize the full extent of the 2025 lidar, but narrowing of the sites may need to be done based on quality of the data and time. Therefore, site selection will be done in consultation with RMP Sediment Workgroup, WRMP Technical Advisory Committee, South Bay Salt Ponds, and others. All projects characterized as restorations in the PTTWRM database will also be considered. Final site selection is subject to review of existing Lidar and remote sensed data quality. Sites will be included in our study if they fit the following criteria:

- Were restored via passive sediment supply (i.e., no placement of fill)
- Have at least 50% area coverage in 2010 LEAN Lidar
- Restoration site is greater than 5 contiguous acres
- Restoration breach date is post-1984
- 2025 WRMP lidar quality is appropriate (i.e., hydroflattened)

Task 2: Estimate elevation change, accretion and volume of sediments

a. *Estimate accretion in primarily vegetated areas of restorations:*

For all selected sites, we will estimate elevation change over an interval of 15 years, by comparing elevations derived from the 2010 LEAN-corrected lidar to the 2025 WRMP lidar. These starting datasets were chosen because they provide a correction for upward bias due to vegetation on the marsh plain (2010 lidar - correction completed; 2025 LIDAR - correction expected by end of 2026) and they offer landscape-scale baywide coverage, facilitating direct comparisons across dozens of sites. Portions of the lidar-derived DEMs that have been hydroflattened due to water interference will be removed from the analysis. An annualized accretion rate for each pixel unit (1 - 5 square meters) with available overlapping lidar data will be estimated for each restoration site by calculating the difference between the two resulting DEMs and dividing by the difference between 15 years.

Additional lidar collections that overlap with selected restoration sites will be compiled to create additional data points that will either expand or refine the time series used to calculate annualized accretion rates. Public datasets found on USGS's National Map, NOAA's Data Access Viewer will be prioritized, followed by site-specific collections. This will allow for increased temporal coverage, including South Bay in 2004 and Alameda/Santa Clara counties in 2006 as well as increased temporal density with county/regional collections between 2018 and 2021. These data sets will be flagged with a higher level of uncertainty due to lack of vegetation-correction. Work performed by Buffington et al. (2016) found the original 2010 lidar-derived DEM's had a mean initial lidar vertical error of 22.8 cm (SD=12.0) and root-mean squared error (RMSE) was 25.8 cm in vegetated tidal marshes. After LEAN correction, mean bias was 0 cm (SD=0.07) and RMSE was 7.4 cm. It should be noted that these errors were calculated within mature tidal marshes and the quality of lidar have increased since 2010, suggesting the quality of lidar collections in actively evolving restored sites with sparse vegetation may have less positive bias.

b. *Estimate accretion in primarily unvegetated areas of restorations:*

Second, pairing satellite imagery time series with local water level estimates, we will apply a version of the Digital Earth Australia (DEA, Bishop-Taylor et al. 2019) method to derive continuous elevation estimates across the unvegetated intertidal zone at restoration sites, at the resolution of the satellite imagery and dating back to 1984. Work by Alex Braud (in progress) has demonstrated validated outputs with accuracies in the 10-20 cm range, providing a crucial resource for characterizing the spatial distribution of elevation and sediment accretion variability over time.

Additional bathymetric collections that overlap with selected restoration sites will be compiled to create additional data points that will either expand or refine the time series and extent used to calculate annualized accretion rates. Public datasets found on NOAA's Bathymetric Data Viewer or NOAA's fetchez will be prioritized, followed by site-specific collections.

c. Exploration of addition uses from elevation change estimates

Bulk Density Variability - Bulk density is required for converting elevation-derived accretion volumes to sediment mass. This task will identify localized (if available) or regional estimates of sediment bulk density by compiling available measurements from existing soil core datasets and information (e.g., McGill and Lacy 2025). As an exploratory component, we will investigate the potential of remote sensing sources as a spatially continuous proxy for surface bulk density. This includes the potential of last-return lidar intensity over unvegetated intertidal surfaces, leveraging the sensitivity of intensity values to surface moisture and sediment texture. Feasibility will be evaluated against available core observations. These exploratory analysis will demonstrate the value added to estuary-wide lidar collection, which is a priority for the WRMP and funders.

Task 3. Data synthesis and interpretation

a. Time series elevation data product compilation

Based on available elevation data compiled in Task 2 (lidar, satellite-derived, and supplemental bathymetric collections), site-specific year-based elevation datasets will be assembled for each selected restoration site. Each dataset will integrate available elevation layers harmonized to a common vertical datum (i.e. NAVD88, Relative Tidal Elevation) and spatial resolution, with source-specific uncertainty estimates assigned to each data layer to reflect differences in collection method and native resolution. These datasets will provide a reusable, version-controlled data product suitable for future monitoring. The combined spatial approaches will allow the quantification of restoration progress and create estimates of accretion and sedimentation. Information will be used to estimate sediment storage (volume and mass estimates) of restorations to inform SFB-wide sediment budgets and conceptual models.

b. Site-scale statistics and landscape-scale synthesis

The accretion rates and sediment bulk density estimates determined in Task 2 will be converted to volume and mass of sediment entering each restoration during the time interval as a function of site size. Summary statistics describing elevation change, accretion rate, and sediment volume will be calculated for each restoration site and summarized up to various landscape scales (i.e. sub-embayment) and typologies (bay vs. riverine). Variation in accretion rates will be visualized as a function of sub-embayment, and a baseline linear model will be run to test how location within the bay influences rates of sedimentation. These results will include site identifiers cross-referenced to the PTTWRM dataset, enabling users to merge the datasets for further exploration.

Task 4. Presentations and reporting

a. Results of the study will be presented to the RMP Technical Review or Steering Committee and either the Bay-Delta Science Conference, the State of the Estuary Conference, or a regional conference. We will also keep the RMP SWG and WRMP Technical Advisory Committee informed of progress during routine meetings.

b. The final report will be a draft paper for submission to a peer-reviewed journal with open access, to be completed in early 2028. The paper will investigate how much accretion and sediment volume has occurred in wetland restorations in the SFB since breach and how this varies with sub-embayment and other covariates. The draft paper will be provided to the RMP Sediment Workgroup and TRC for review before submission to the journal.

c. All site-level elevation data products, accretion rate and volume estimates, and summary statistics will be shared through the WRMP Data Portal in coordination with WRMP staff, ensuring outputs are accessible to the broader restoration, management, and monitoring community.

Proposed deliverables and timeline

Based on 12-month project: Jan 2027 to Feb 2028. Data will be published as data releases within six months after analysis is completed. Manuscript will be submitted to a journal that allows open-access.

Table 2. Proposed deliverables and timeline

Deliverable	Due Date
Data release: Elevation time series, volume and accretion estimates as spatial and tabular data	January 2028
Report (draft paper)	February 2028
Progress presentation to RMP	Spring 2027
Final presentation to the RMP	Spring 2028
Presentation to local (Bay Delta Science or State of the Estuary Conference) or regional conference	2028

Table 3. Budget

		UCD	SFEI
Task 1	Site Selection	$ 5,635	$ 6,400
Task 2	Spatial analysis	$ 16,905	$ 38,400
Task 3	Data Synthesis	$ 5,635	$ 12,800
Task 4	Presentations/Reporting	$ 22,734	$ 6,400
	Subtotal	$ 50,909	$ 64,000
	Indirect (10% for UCD)	$ 5,091	$ -
	Total	**$ 56,000**	**$ 64,000**
	Grand total		**$ 120,000**

Task 1-3 includes salary and fringe benefits for D’Aguillo at UC Davis and Braud at SFEI. Task 4 includes salary for Thorne, conference registration costs, and open access journal fees. Indirect is assumed to be 10% for UC Davis Center for Watershed Sciences. Task 1 (80 hrs for D’Aguillo, 40 hrs for Braud), Task 2 (240 hrs for D’Aguillo, 240 hrs for Braud), Task 3 (80 hours for D’Aguillo, 80 hours for Braud), and Task 4 (80 hrs for Thorne, 40 hrs for Braud). Indirect and fringe is included in Tasks and budget for SFEI.

In-kind and leveraged contributions:

The 2025 estuary-wide lidar acquisition, coordinated by SFEI through the WRMP represents a substantial leveraged contribution to this project. The collection was completed at a cost of $778,000, including $323,000 in WRMP funds (via the San Francisco Bay Restoration Authority), with an additional $455,000 contributed through a five-organization coalition including the Delta Stewardship Council, California Department of Water Resources, South Bay Salt Pond Restoration Project, and Valley Water. Critically for this study, the SFB portion of collection was tide-controlled, meaning acquisition occurred when water levels were below Mean Sea Level (MSL), providing additional consistent coverage of wetland plain elevation and restoration progress. This dataset is available to the proposed project at no additional cost, representing a significant in-kind contribution.

Future directions

Aggregating a baseline dataset that synthesizes variation in accretion rates and volume estimates on a landscape scale in the SFB will enable the possibility of addressing more robust questions in future years (YR2 & YR3), including:

1. How do the accretion rate values generated using remote sensing tools compare to field data?
2. How does variation in accretion rates relate to predictors including restoration age, starting elevation, inundation frequency, and vegetation (NDVI)?
3. Will sediment accretion in restorations be adequate to create and support emergent tidal vegetated habitat?
4. Is there enough sediment to meet wetland restoration goals in SFB?
5. How can future restorations be engineered and/or planned to enable optimal delivery of sediment?

Approach: Leverage existing data on sediment accumulation rates, which may include Surface Elevation Table-Marker Horizons (SET-MHs, > 10 yrs) measurements of elevation change and deposition (Thorne et al. 2023, Thorne 2025), sediment pad deposition data (Buffington et al. 2020, Thorne and Bristow 2023, Thorne and Bristow

2025, Buffington et al. 2026), sediment cores (Buffington and Thorne 2025, Holmquist et al. 2026), and other analysis (D’Aguillo et al. 2025) to conduct a meta-analysis to estimate site-specific accretion rates and sediment volumes across SFB. These rates will be used to calculate sediment volumes deposited over the measurement period for each wetland location. Importantly, this field data can be used to validate Phase II remote sensing products proposed here.

To evaluate drivers for sediment accretion at the site-scale, accretion rate estimates produced will be synthesized into a single index to represent both vegetated and unvegetated areas. Linear models will be executed to test how variation in accretion rates are related to available information on restoration age, sub-embayment, initial elevation, initial inundation frequency, size of breach, distance from nearest sediment source. These results will be synthesized to infer how restoration attributes, including decisions made by engineers and planners, may influence sediment movement in the SFBE, and how future restorations can consider these dynamics. The products and inferences made as part of this project can be additionally utilized for retroactive analyses that support parameterization of sediment accretion and marsh equilibrium modeling efforts.

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PCB Synthesis

Summary/Overview

The Regional Water Board (WB) will be revising the PCBs TMDL for the Bay in 2030. The WB has identified a list of information needs to be addressed by July 2028 in order to support the revised TMDL. One of the main items on the list is a synthesis of information generated on PCBs in the Bay since the last synthesis was published in 2014 (Davis et al. 2014). The WB specified the following topics to be addressed in the synthesis:

1. PCB uses in transformers
2. PCB concentrations in biota
3. Water column PCB concentrations
4. PCB concentrations in sediment
5. Total mass of PCBs in ambient sediment/coring info
6. Contaminated sites in the Bay
7. Atmospheric deposition
8. Central Valley load
9. Wastewater inputs
10. Watershed inputs
11. Buried sediment / Review of bed erosion/deposition information
12. Recovery trajectories at the PMU, segment, and whole Bay scale

The work would be done in coordination with WB staff and with close consultation with the PCBWG.

Proposed by: **Jay Davis, SFEI**
Estimated Project Cost: **$103,000**
Oversight Group(s): **PCBWG**
Time Sensitive? **Yes, to inform the upcoming PCBs TMDL revision**

Proposed Deliverables and Timeline

Deliverable	Due Date
Task 1. Draft report	April 2028
Task 2. Final report	July 2028

Budget

Item	Cost
SFEI Labor	
Project Tasks	$98,000
Project Management	$5,000
GRAND TOTAL	**$103,000**

PCBWG Water Year 2027 Stormwater Monitoring to Support PCB Watershed Modeling

Summary

This project will implement stormwater monitoring for PCBs at watersheds across the region to support calibration and verification of the Watershed Dynamic Model (WDM) PCB module. A total of 12 storm event efforts will be conducted at three to four watersheds during three to four storms per watershed. The proposed study design follows the previously recommended RMP stormwater sampling framework, which was initially developed to estimate annual PCB and mercury loads (Melwani et al., 2010; Melwani et al., 2018). The approach involves collecting composite samples during four storm events per year collected at different times across the hydrograph for each event to capture a broad range of conditions. Targeted events include the first flush of the season, a large storm event, an additional storm earlier in the wet season, and a later-season storm. The analyte list includes PCBs and suspended sediment concentration (SSC), allowing for normalization to particle concentrations and comparison of estimated particle ratios (EPCs) for PCBs to previously measured EPCs at the same sites.

The PCB TMDL Reevaluation is planned for 2030 and watershed load estimates to the Bay are fundamental for modeling recovery trajectories. The kind of intensive dataset proposed will provide for model calibration and verification and, when paired with historical datasets, will help start to assess long-term trends in contaminant concentrations.

All data will be quality assured, publicly released, and used to inform modeling and regional water quality management efforts.

Proposed by Alicia Gilbreath and Jay Davis
Estimated Project Cost $210,000
Oversight Group(s) PCBWG
Time Sensitive? Yes, to prepare for and begin sampling at the beginning of Water Year 2027 (which starts October 1, 2026); early release of funds requested.

Table 1. Study objectives and applicable management questions.

Study Objective	Management Question
Measure PCB concentrations and loads at select stations to inform regional modeling for PCBs.	MQ1: What are the rates of recovery of the Bay, its segments, and in-Bay contaminated sites from PCB contamination?

Background

Throughout the past two decades, PCBs have been intensively monitored for between two and over 10 years at nine different watershed stations around the Bay Area, plus Lower Marsh Creek in Contra Costa County, which is just outside of the SF Bay Regional Water Quality Control Board boundary. Additionally, well over 100 other sites around the Bay Area have been monitored by the RMP and county stormwater agencies during one or just a few storm events. The more intensive datasets, however, have the greatest value for calibrating and verifying models developed to estimate watershed PCB loads to the Bay region-wide, as well as for tracking trends in PCB concentrations and loads over time.

A reevaluation of the PCB TMDL is in progress and a revised Basin Plan Amendment is scheduled for 2030. The RMP is developing a watershed water quality model, the Watershed Dynamic Model (WDM), to estimate region-wide loads of PCBs and help inform the reevaluation. Additional PCB data at stations previously sampled intensively would aid WDM calibration and verification by adding more storm data to the dataset, extending the time series for each station monitored, and supporting progress towards tracking long-term trends. Such data would therefore address high-priority information needs identified by water quality managers.

Approach

The proposed work plan will implement monitoring at three to four previously intensively sampled watersheds during Water Year 2027. First, the stormwater monitoring and modeling teams will collaborate to choose the optimal sites for additional data collection. The potential sites include:

- Guadalupe at Hwy 101
- Guadalupe at Foxworthy Rd
- North Richmond Pump Station
- San Leandro Creek
- Zone 4 Line A
- Sunnyvale East Channel
- Pulgas Creek Pump Station South
- Arroyo Corte Madera del Presidio
- Walnut Creek

If station selection is timely for the planned Fixed Station Monitoring Network (FMSN), the teams will also consider future stations in the FMSN. It may be strategic to sample FMSN candidate stations or, alternatively, to sample stations where the FMSN is not planning to extend the timeseries. An initial planning phase, funded by early release funds, is the first step in making this determination. The number of selected locations (three or four) will be informed by modeling needs and logistical feasibility, and will determine the number of storms sampled at each station, up to a total of 12 storm sampling events.

The storm monitoring design is informed by the data needs of the RMP modeling team. The RMP modeling team recommends collecting PCB and SSC composite samples throughout a storm event. While discrete samples could be useful, composites are sufficient for the WDM and offer a cost savings over collecting multiple discrete samples per storm. The storm-type criteria are based on a 2010 RMP study (Melwani et al., 2010; 2018) that evaluated optimal sampling strategies for estimating loads and detecting long-term trends in sediment-associated contaminants (e.g., PCBs and mercury). This study emphasized capturing a range of flow conditions, including the season's first flush and one of the largest storm events of the year. One or two additional storms will complete the sampling at each site, depending on the final number of sites and storms selected.

Consistent with established RMP methods, the proposed monitoring details include:

- **Storm sampling frequency and distribution:** Sampling four storm events per year, with composite samples collected during each event to span the duration of the hydrograph for each event. This is typically achieved by sampling during the early rising limb, late rising limb, peak flow, and the falling limb of the hydrograph.

- **Storm selection criteria:**
    - One first-of-season flush event (forecast ≥0.5 inches of rainfall over 6 hours or 0.75 inches over 12 hours)
    - One of the three largest storm events of the year
    - One or two additional storm events distributed across the wet season (same forecast criteria as for first flush)
- **Analyte suite:**
    - Suspended sediment concentration (SSC)
    - PCBs

This project offers opportunities for cost-sharing within the RMP, as field crews can collect samples for additional analytes for little added cost. Examples include emerging contaminants, microplastics, or tire-related chemicals. The additional expense for these analytes would be covered by the budgets of other RMP workgroups. Additionally, two potential locations are planned to be monitored for flow and discharge-rating curve development.

Data management and quality assurance (QA) will be done by SFEI's data services team, in accordance with the most recent RMP Quality Assurance Project Plan (QAPP). Following QA, the lab results will be made publicly available via CEDEN. SFEI will publish a short technical report, and the datasets will be transferred to the RMP modeling team for incorporation into the WDM PCB module development. Results of this study will be presented at the PCBWG meeting in the spring of 2027.

Table 2. Proposed deliverables and timeline.

Deliverables	Due Date
1. Sample collection during 12 storm events	May 2027

2. Presentation at PCBWG 2027	May 2027
3. Data management and QA analysis	November 2027
4. Draft and final technical report	February 2028
5. Data uploaded to CEDEN	April 2028

Table 3. Budget for stormwater PCBs monitoring in Water Year 2027.

Task/Item	**Budget**
Task 1. Collaborate with modeling team to create sampling plan	$6,000
Task 2. Stormwater Monitor 12 storm monitoring events	$110,000
Task 3. Data Management and QA	$20,000
Task 4. Reporting	$20,000
Task 5. Project Management	$20,000
Shipping and Travel	$4,000
Supplies	$1,500
PCB Laboratory Analysis	$23,500
SSC Laboratory Analysis	$2,000
Permits	$3,000
Project Total	**$210,000**

References

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3.2. Monitoring

CMON.1 Ship-based Monitoring	Proposed FY27 Funds
Team: USGS, UCSC, Bend Genetics, BSA, SFEI	$600,000*

*$299,000 from RMP S&T contribution

Project Description

This project supports biweekly to monthly ship-based water quality cruises along San Francisco Bay's deep channel. Work is pursued through an ongoing collaboration with USGS aboard the R/V Peterson, continuing the USGS's long-term SFB water quality measurements. The overall program is jointly funded by USGS, the RMP, and the NMS.

Monitoring work includes:

- Vertical water column profiles using submersible water quality sensors (CTD casts) and continuous surface water measurements while underway by optical sensors plumbed into the vessel's flow-through system.
- Surface water grab samples at a subset of stations: inorganic and organic nutrients, chlorophyll-a, phytoplankton taxonomy by microscopy, molecular techniques for quantifying phytoplankton taxa (18s, 16s sequencing), dissolved harmful algae (HA) toxins using SPATT.
- In addition to the Peterson's standard flow-through sensors, a YSI EXO2 multi-parameter instrument and a SUNA nitrate sensor (matching NMS mooring sites) are incorporated into the vessel's flow-through system, enabling cross-validation among channel cruises, moored sensors, and shoal mapping.

Work in FY26

- Completed a subset of the planned cruise schedule (10 full-Bay cruises and 5 South+Central Bay cruises). Several cruises were missed due to the government shutdown and shipyard time for repairs.
- Continued SFEI staff participation on cruises to support nutrient sample collection and filtration.

Plans for FY27

- Continue the biweekly/monthly cruise program: 12 full-Bay cruises and 8 South+Central Bay cruises.
- Reinstate Station 19 to better constrain coastal nutrient fluxes and model boundary conditions.
- Add new parameters on the R/V Peterson: SUNA nitrate sensor on the CTD, pCO_2, and discrete nutrient samples from bottom water.
- Incorporate contingency event-response cruises tied to HAB events. USGS can add cruises for approximately $25,000 each and can waive costs in years where scheduled cruises were missed. Expanded October coverage is a priority HAB-risk window.

Work Products

- Datasets for nutrients, chlorophyll-a, phytoplankton community, and toxins, made publicly available through the USGS website.
- Results summarized in NMS Multi-year Report; data used across NMS program areas (model calibration, synthesis, condition assessment).

Budget Justification

The total funding of $600,000 includes RMP and NMS funds. RMP funding ($299,000) supports USGS technicians who carry out the field work, analyze a subset of samples (chl-a, SPM, etc.), and manage datasets. NMS funds support: nutrient measurements including ammonium, nitrate+nitrite, reactive phosphorus, dissolved silicate, total N, and total P (Chesapeake Bay Laboratory, ~$25,000); phytoplankton taxonomy by microscopy (BSA, ~$50,000); dissolved toxin measurements (UCSC, ~$25,000); molecular techniques (18s/16s amplicon sequencing, qPCR; Bend Genetics, ~$45,000); SFEI labor for fieldwork participation, inter-program coordination, and data management ($43,000). USGS in-kind programmatic funds cover ship captain, direct costs (fuel, maintenance, transportation), program management support, and remaining technician costs.

CMON.2 Moored Sensor Monitoring	**Proposed FY27 Funds**
Team: SFEI, USGS-BGC, USGS-MarFac	$710,000*

*$250,000 from RMP contribution

Project Description

This project supports the collection of high-frequency water quality data (15-min) at the SFEI-NMS network of mooring sites, distributed across the South, Lower South, Central, and (newly) San Pablo Bays. Work includes monthly maintenance trips, instrument maintenance and calibration, standard data QA/QC and management, and ongoing refinements to data management tools.

Work in FY26

- Completed installation of the Alameda and San Pablo Bay moorings and installed telemetry at the Alameda station with federal funding (EPA BayInsight and NOAA MERHAB grants).
- Continued high-frequency sensor measurements at 15 stations (13 full stations with multi-parameter instruments, 2 oxygen-focused sites).
- Continued monthly calibration and servicing of water quality instruments.
- Completed transition from in-house Python code to Aquarius Informatics software for moored sensor QA/QC, enabling faster, more accurate processing across the network.
- Published moored sensor data to the Environmental Data Initiative (EDI) with DOIs, making the data citeable.
- Retired the two oxygen-focused sites in February to reallocate resources.
- Mentored two Watershed Steward Program (WSP) corpsmembers who assisted with field and lab work.

Plans for FY27

- Continue water quality measurements at all existing stations, including maintenance trips at 3–4 week intervals.
- Continue telemetry build-out, with Dumbarton and San Pablo Bay as near-term targets.
- Continue Aquarius-based QA/QC operations and data dashboard integration (EMON.5).
- Pursue funding continuity beyond 2028, when BayInsight and MERHAB support expires. The "Turning the Tide" EPA grant application is designed to bridge this gap (submitted in March 2026).
- Pursue permits from landowners and applicable regulatory agencies for all moored sensor monitoring stations, including payment of applicable fees (i.e. State Lands Commission, Army Corps of Engineers, others).
- Recruit and mentor two new WSP corpsmembers.

Work Products

- Curated 15-minute dataset of water quality parameters from ~15 stations (T, S, DO, chl, turbidity, fDOM).

- Curated 15-minute nitrate dataset from three stations.
- Updated QA/QC scripts and documentation, maintained and versioned on GitHub.
- Moored Sensor Program update reports (semi-annually).

Budget Justification

The Moored Sensor Program costs for FY27 funds include:

- Field support: boat support and field/deployment logistics from USGS-Pacific Marine Facility (MARFAC) and USGS-Water Science Center (WSC), and WSC contributions to instrument troubleshooting and discrete sample collection/processing ($263,000).
- Analysis of discrete samples ($8,000).
- SFEI labor for field and laboratory work, fieldwork planning, documentation, and overall project management ($300,000).
- Data processing and QA/QC, review, and report-outs ($64,000), and Aquarius software ($13,000).
- Direct expenses, including instrument and sensor repair/factory-calibration/replacement, reagents, equipment, permitting costs,and other direct expenses ($30,000).
- Support for the WSP corpsmembers ($33,000)

RMP funding ($250,000) and NMS funds ($450,000) together support the Moored Sensor Program.

Deliverables - completed!

- ☻ TBH Semi-Annual Progress Report Submitted
- ☻ NB Se Spring Sturgeon Muscle Plug Sampling
- ☻ Mercury Analysis and Data Management of Archived 2023 Bay Sediment Samples
- ☻ Small Microplastic Particles in Bay Water Study Design and Sampling
- ☻ Workgroup Meetings and Science Update Presentations
- ☻ Wet Season 2026 Stormwater Sample Collections Completed
- ☻ Tire Rubber Marker Analysis - Study Design
- ☻ Stormwater CECs Monitoring Approach Report

Deliverables – Overdue...

- 2023 S&T Dry Season Water Cruise - Data Management
- 2023 S&T Nearfield and Margins sediment & prey fish - Data Mgmt
- 2022-2024 S&T Wet Season Water Pilot Study - Data Management
- 2023 S&T Bay Sediment - Data Management
- 2025 SW CECs Add-On - Data Management & CEDEN Upload
- PFAS Stormwater depth monitoring pilot - Data management
- S&T Wet Season Water Pilot Report - Final draft
- Suspended Sediment Flux at Richmond-San Rafael Bridge
- STLS WY21 POC Recon Monit - Advanced Data Analysis Update & Final Report

Deliverables – delayed

- PFAS NMR Analysis in SW - sample collection
- PCBs in Sediment and Fish SS/RC - Draft Report
- OPEs, BPs, and Other Plastic Additives in Wastewater
- Monitoring of Sediment Deposition in SLB Intertidal Areas - Draft Report

Deliverables due before next TRC meeting (September 16, 2026)

- Mercury Synthesis Report
- PFAS Synthesis and Strategy - Draft Report

Requesting Review Comments

- Investigating HABs in SF Bay - Draft Technical Report

Coming Soon for review - Watch your inbox

- Mercury Synthesis - First Draft

Bay RMP Deliverables Stoplight Report_new

Report for June 2026 TRC

	Project	Task	Deliverable	Assigned To	Due Date	Old Due Date	Days overdue	Due Date Extended (external delay)	Due Date Extended (internal delay)	# of extensions	Status	Comments
1	Bay RMP (2023)	D. 2023 Dry season Bay Water Cruise Data Mgmt	Process and upload dry season Bay water cruise data	Adam Wong	03/31/25	01/31/24	860			4		6/4 - All done except DOC/POC still working its way thru QA, has an issue with ALS being worked out 1/18/26 - Finalized Data Verifying in Dev - AW 3/17 - BP, OPE, DOC/POC still need to be done.
2	Bay RMP (2023)	H. Nearfield and margins sediment & prey fish data mgmt.	Process and upload sampling data	Adam Wong	03/31/25	02/28/24	832			3		6/4 - Some sediment data still being worked through QA review. BP, PFAS data - QA review complete. Preyfish PFAS and PCBs QA review complete, verifying upload. 1/18/26 - Prey fish: verifying upload in dev - AW, Sediment: In QA Review/some datasets final but not yet uploaded.
3	Bay RMP (2023)	F. 2023 Wet season water data mgmt.	Process and upload wet season water sampling data	Adam Wong	04/15/25	10/31/24	586			3		6/4/26 - PFAS data still needs QA review, 6-PPDQ upload complete 12/2025 - QA Review/Final but not uploaded 3/17 - QA review complete, waiting on decision on how to present BP/OPE data.
4	Bay RMP (2023)	M. Ambient Bay sediment data mgmt.	Process and upload sampling data	Adam Wong	04/30/25	02/28/24	832			4		6/4/26 - PFAS and Hg uploaded, PBDEs, TOC, grainsize and TN awaiting QA review 12/2025 - QA Review/Final but not Uploaded
5	Bay RMP (2024)	**F. WY24 Wet season water data mgmt.**	Process and upload wet season water sampling data	Adam Wong	05/15/25	10/31/24	586			4		6/4/26 - Awaiting QA review 3/17- Prelim. data sent to CECs team, data still needs to be processed
6	Bay RMP (2025)	25. PFAS SW Depth Monit. Add-On	Data Management QA/QC	Adam Wong	12/31/25							6/4/26 - PFAS uploaded, TOP data awaiting QA review 3/17 - In Don's queue for QA review 1/18/26 - Formatting, QA review
7	Bay RMP (2025)	29. SW CECs Add-On	Data uploaded to CEDEN	Adam Wong	12/31/25							6/4 - PFAS uploaded, Hg, QD review complete. PCBs, TOP, USC, DOC/POC awaiting QA review. 3/18/26 - PCBs in QA review, metals and POC/DOC still in formatting
8	Tracking Bay Health / USEPA	I. Wet Season water 3-year pilot report	Final Report posted to website and submitted to USEPA	Martin Trinh	03/31/26	07/31/25	313			3		3/18 - In Amy's court for final review and posting, should be completed by end of March 12/2/25 - Finalization in progress 10/28 - Draft out for external review, requesting comments by 11/7/25. **This report is the EPA deliverable for this task; to be included in October 2026 semi-annual progress report.
9	Tracking Bay Health / USEPA	505. PFAS NMR Analysis in WW, SW, and Bay Matrices	Lab analysis & reporting, decision on request to proceed with yr 2	Rebecca Sutton	03/31/26	07/31/25	313			2		6/4 - No updated timeline yet, prioritizing QACs over NMR. 3/18 - Results from the lab were not as expected, have asked the lab to rerun the samples 1/18/26 - Not all samples have been reported, interpretation to inform decision making is underway.
10	Tracking Bay Health / USEPA	513. Mapping Mudflat Morphodynamics	Analysis	Alex Braud	03/31/26	04/30/25	405			1		
11	Tracking Bay Health / USEPA	505. PFAS NMR Analysis in WW, SW, and Bay Matrices	Field Sampling - SW	Rebecca Sutton	04/01/26							4/7 - In discussions with analytical partners to see if they can accommodate another sampling season to increase sample count
12	Bay RMP (2023)	Special Study: STLS WY21 POC Recon Monitoring	Final report	Alicia Gilbreath	04/15/26	06/30/25	344			4		6/8/26 - Waiting on final graphics for some analyses from Lester 3/18 - Still waiting on comments from key stakeholders, expect this to be finalized in early April 2/11/26 - Waiting on review from Bonnie/BAMSC later in March, will be finalized late March or early April. 1/18/26 - Out for external review
13	Bay RMP (2022)	Special Study: STLS WY21 POC Recon Monitoring	Update data for the Advanced Data Analysis (ADA)	Lester McKee	05/31/26	06/30/23	1075			9		5/6 - Realistically, even once all data is compiled, it represents a full month of work. Alicia and Lester have limited availability right now for this work. Estimated Completion: May 31st 3/17 - BAMSC indicated they still want this deliverable completed. Anticipate it will be done by mid-April. 1/15/26 - Waiting on Alicia to have capacity to finish this, could potentially delegate to other staff, would like input on whether it is still needed. 11/6 - Delayed as Alicia was on bereavement leave
14	Bay RMP (2025)	45. Susp. Sed. Flux Measurements at Richmond-San Rafael Bridge	Data release incl. all new project data incl. ADCP transects and velocity-integrated point-SSC samples	Scott Dusterhoff	05/31/26	12/31/25	160			1		6/8 - Waiting on response from D.Hart 3/2/26 per david hart: The final batch of samples are being processed this week (yay!) by the lab. If this stays the case, that means we can get the data release and model archive summary into review by the end of March, with a publish date hopefully in late April or May.
15	Bay RMP (2025)	45. Susp. Sed. Flux Measurements at Richmond-San Rafael Bridge	Model archive summary detailing the ABS-SSC empirical model to convert ADCP transects to sed flux measurements	Scott Dusterhoff	05/31/26	12/31/25	160			1		6/8 - Waiting on response from D.Hart 3/2/26 per david hart: The final batch of samples are being processed this week (yay!) by the lab. If this stays the case, that means we can get the data release and model archive summary into review by the end of March, with a publish date hopefully in late April or May.
16	Bay RMP (2026)	2B. March TRC Meeting	Approved meeting summary posted	Michelle Azurin	06/29/26							
17	Bay RMP (2026)	2B. June TRC Meeting	Agenda package and slides posted to website	Michelle Azurin	06/29/26							
18	Bay RMP (2026)	2B. December TRC Meeting	Calendar invites sent/Event posted on website	Michelle Azurin	06/29/26							
19	Bay RMP (2026)	2F. Microplastics WG Meeting	Approved meeting summary posted	Kayli Paterson	06/29/26							
20	Bay RMP (2026)	2G. SPLWG Meeting	Approved meeting summary posted	Michelle Azurin	06/29/26							

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21	RMP SEP	31. Investigating HABs in SF Bay	Technical Report	Dave Senn	06/30/26							1/20/26 - Wrapping up a draft report this month, revisions planned for February, should be done in time for the deadline.
22	Bay RMP (2023)	Special Study: STLS Regional Model Development (WDM Phase 3)	Final modeling report and data sharing portal	Matt Heberger	06/30/26	12/30/23	892			3		6/8/26 - This is the same deliverable as 1155.20-516 6/25/25 - New workplan has been developed to address issues with the sediment module, final report delayed, data sharing portal to come sooner. 12/3/24 - Project is behind schedule, plan to complete by spring WG meeting
23	Bay RMP (2024)	I. 2024 S&T Lab Intercomp Studies	Complete contracts	Michelle Azurin	06/30/26	08/31/24	647			2		1/18/26 - This study will commence in 2026 after a review of archive samples available and determination of which samples to use. 6/23/25 - MLML is currently processing fish for analyses, contracts won't be drafted for intercomp until all analyses are complete and we can determine if archives are needed for primary reanalysis.
24	Bay RMP (2024)	40. OPEs, BP, and Other Plastic Additives in Wastewater	QA/QC and Data Management	Adam Wong	06/30/26	06/30/25	344					6/8 - Project is suffering major delays due to change in analytical partners. 1/18/26 - Analysis still pending, Da Chen contract expired in July 2025, he has not responded to inquiries about an extension. Considering shifting the contract to Jiehong 6/27/25 - Data from Da is delayed
25	Bay RMP (2024)	40. OPEs, BP, and Other Plastic Additives in Wastewater	Final Report	Rebecca Sutton	06/30/26	01/31/26	129			2		6/27/25 - Lab delays 11/25/24 - Sampling occurred later than planned due to laboratory complications, analysis delayed.
26	Bay RMP (2024)	44. Spatial variability of sediment accretion in SFB restorations	Data release: soil properties, digital elevation models, and RTK GPS data	Scott Dusterhoff	06/30/26	09/30/25	252			2		1/15/26 - Karen T. (USGS) provided an updated timeline post 2025 and gov reopening: Data releases WERC March 2026, PCMSV June 2026 8/6 - data has been collected and is being processed. Things have slowed down at USGS due to staff loss, data release delayed, tentative due date is end of the calendar year.
27	Bay RMP (2024)	44. Spatial variability of sediment accretion in SFB restorations	Report (draft manuscript)	Scott Dusterhoff	06/30/26	03/31/26	70					1/15/26 - Karen T. (USGS) provided an updated timeline post 2025 and gov reopening: Draft June 2026
28	Bay RMP (2025)	34. NTA and Target Analysis of Fibers in SW	Lab Analysis	Diana Lin	06/30/26	06/30/25	344					8/6/25 - SW samples are expected to be reported by Sept. Fiber analysis is delayed, waiting on microplastic analysis on the same samples before shipping them to TMU for analysis; estimate analysis will be done in a year.
29	Bay RMP (2026)	2I. PCB WG Meeting	Agenda package and slides posted to website	Michelle Azurin	06/30/26							6/8/26 - Meeting held on 5/8
30	Bay RMP (2026)	5. Communications	Q2 RMP eUpdate	Sierra Garcia	06/30/26	05/29/26						
31	Bay RMP (2026)	5. Communications	Updates to RMP website - Q2	Sierra Garcia	06/30/26							
32	Bay RMP (2026)	I. 2026 S&T Lab Intercomp Studies	Complete Study Design	Don Yee	06/30/26	03/15/26				1		3/18/26 - Study TBD due to lack of staff availability. Considering a Se in water comparison with BAL and USGS.
33	Bay RMP (2026)	L. Sport Fish Reporting	Draft Report	Jennifer Sun	06/30/26							
34	Bay RMP (2026)	54. Mercury Synthesis	Draft synthesis report	Jay Davis	06/30/26	04/30/26						
35	Bay RMP (2026)	55. Mercury Analysis of Archived Bay Sediment Samples	Final discussion of results (part of Mercury Synthesis)	Amy Kleckner	06/30/26							
36	Tracking Bay Health / USEPA	H. 2026 North Bay Selenium Monitoring	Sampling and Analysis Plan/ Cruise Plan	Amy Kleckner	06/30/26	04/30/26	40					6/5 - Will be finalized and posted this month.
37	Tracking Bay Health / USEPA	H. 2026 North Bay Selenium Monitoring	Complete Contracts	Beth Birmingham	06/30/26							USGS, AMS, CSUM, BAL, Caltest
38	Tracking Bay Health / USEPA	508. Shoreline Change in SFB	Shoreline Typology Data Package	Scott Dusterhoff	06/30/26	08/31/25	282			4		3/10 - Delayed until end of May. Mino is running some analyses, testing new lidar in the algorithm. The team has draft data results if needed. Team would rather publish it with a technical report on the website. The typology and metadata could be complete by the end of the month.
39	Tracking Bay Health / USEPA	513. Mapping Mudflat Morphodynamics	Review draft maps with stakeholders & modelers	Alex Braud	06/30/26	05/31/25	374			2		6/4/26 - Delayed due to competing priorities with a SedWG draft proposal
40	Tracking Bay Health / USEPA	516. WDM Model Maintenance	Update model development log	Matt Heberger	06/30/26	12/31/25	160			1		6/8/26 - This is the same deliverable as 3023 WDM pahse 3 1/18/26 - Behind schedule, estimated completion date June 2026.
41	Tracking Bay Health / USEPA	516. WDM Model Maintenance	Model Webpage to share results of PCB and Hg modeling	Matt Heberger	06/30/26	03/31/26	70					**A link to the webpage is the EPA deliverable for this task to be included in the October 2026 progress report 1/18/26 - Behind schedule, estimated completion date June 2026.
42	Bay RMP (2026)	21. Small Microplastic Particles in Bay Water Pilot	Study design and sampling plan	Diana Lin	07/30/26	04/30/26	40			1		
43	RMP SEP	28. SF Bay Sediment Transport and Fate Modeling	Technical Report	Dave Senn	07/31/26	09/05/25	277					1/19/26 - Allie K. plans to have a Whole-Bay sediment transport model framework and diagnostics by March 2026. Integral aims to have a prelim. whole-bay Hg contaminant modeling report by July 2026. 8/13/25 - Integral continues to work on the In Bay model and will be writing the report, details on a revised timeline are in development.
44	Bay RMP (2025)	24. Microplastics SW Monitoring Pilot (Year 2)	Draft technical report shared with MPWG and RMP committees	Diana Lin	07/31/26	01/31/26	129			2		11/6/25 - Will present on this at the ECWG meeting in April, report delayed due to lab delays in reporting some of the data
45	Bay RMP (2026)	**A. USGS Sacramento Support**	Contract - Continuous suspended sediment monitoring at 5 stations	Ariella Chelsky	07/31/26							
46	Bay RMP (2026)	**B. USGS Menlo Park Support**	Contract - Monthly measurements of basic water quality at 38 stations	Ariella Chelsky	07/31/26							
47	Bay RMP (2026)	26. NTA Stormwater 2026 Monitoring	Lab analysis	Rebecca Sutton	07/31/26							

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48	Bay RMP (2026)	41. Analysis of fine sediment flux and development of Github transport modeling platform	A full-bay DFlow-FM sediment transport model that incorporates waves computed with the SWAN wave model and fine sediment transport with either Delwaq or within DFlow-FM	Scott Dusterhoff	07/31/26							
49	Bay RMP (2026)	41. Analysis of fine sediment flux and development of Github transport modeling platform	A report* (and paper) outlining the model implementation and its calibration.	Scott Dusterhoff	07/31/26							
50	Tracking Bay Health / USEPA	513. Mapping Mudflat Morphodynamics	Final maps posted on website	Alex Braud	07/31/26	06/30/25	344			2		
51	Bay RMP (2024)	**Q. Marine Mammals data mgmt.**	Process and upload sampling data	Adam Wong	08/15/26	02/28/25	466					6/27/25 - Additional collections expected in 2025, delay project by a year 1/15/25 - Data expected back from AXYS mid Feb.
52	Bay RMP (2026)	1. Program Management	2026 Q2 RMP Financial Report	Michelle Azurin	08/24/26							
53	Bay RMP (2026)	2A. August SC Meeting	Agenda package and slides posted to website	Martin Trinh	08/24/26							
54	Bay RMP (2026)	5. Communications	Q3 RMP eUpdate	Sierra Garcia	08/28/26							
55	Bay RMP (2026)	54. Mercury Synthesis	Final synthesis report	Jay Davis	08/30/26	06/30/26						
56	Bay RMP (2022)	Special Study: PCBs in sediment and fish SS/RC	Draft Technical Report	Jay Davis	08/31/26	08/01/24	677			7		6/8/26 - Prioritized behind Mercury Synthesis Report 3/17/26 - Further delays due to staff capacity, anticipate final draft in May 8/15/25 - Draft delayed until end of September, prioritized ahead of sediment dep in SLB report
57	Bay RMP (2024)	N. NB Se Monitoring	Draft Report - NB Se data through 2023	Amy Kleckner	08/31/26	12/31/22	1256			7		6/4 - Amy capacity issues, delegated draft to Jen D. anticipate by end of summer. 3/18/26 - Strategy team met on 3/11 to review preliminary results, draft for review anticipated by end of April. Final draft end of May. Will not include 2010-2017 USGS data. USGS data will be included in 2026/27 report.
58	Bay RMP (2024)	39. PFAS Synthesis & Strategy	Final Report	Diana Lin	08/31/26	04/30/25	405			4		3/18 - Draft expected by end of March, will present at the ECWG meeting in April, final report expected summer 2026. 1/18/26 - This has been prioritized behind OPC Plastics Strategy and the Dryer Lint study, anticipate getting a few key chapters out maybe in January.
59	Bay RMP (2025)	24. Microplastics SW Monitoring Pilot (Year 2)	Final technical report	Diana Lin	08/31/26	02/28/26	101			2		Results from SW Depth Monitoring (PFAS) will be incorporated into the report, task 3025-025.
60	Bay RMP (2026)	2E. ECWG Meeting	Approved meeting summary posted	Michelle Azurin	08/31/26							
61	Bay RMP (2026)	4. Annual Reporting	RMP Pulse Draft	Jay Davis	08/31/26							
62	Bay RMP (2026)	4. Annual Reporting	2026 Annual Meeting Agenda	Jay Davis	08/31/26							
63	Bay RMP (2026)	5. Communications	RMP Presentation to BACWA	Amy Kleckner	08/31/26							
64	Bay RMP (2026)	5. Communications	RMP Presentation to BPC	Amy Kleckner	08/31/26							
65	Bay RMP (2026)	J. 2026 Sample Archive	Short-term RMP sample archive purging	Sasha Mariniuk	08/31/26	06/30/26				1		
66	Bay RMP (2026)	L. Sport Fish Reporting	Final Report	Jennifer Sun	08/31/26							
67	Bay RMP (2026)	38. Newly Identified Tire and Vehicle contaminants in Bay and SW	Field collection of samples	Rebecca Sutton	08/31/26							
68	Bay RMP (2026)	50. Stormwater CECs Monitoring 2029	GitHub code upload	Rebecca Sutton	08/31/26							
69	Tracking Bay Health / USEPA	C. 2025 NTA	Lab Analysis	Rebecca Sutton	08/31/26							Tom Young UC Davis
70	Tracking Bay Health / USEPA	J. 2026 Wet Season Water	Collect samples and send to labs for analysis	Jennifer Dougherty	08/31/26							Wet season sampling complete, dry season will be done in August
71	Tracking Bay Health / USEPA	505. PFAS NMR Analysis in WW, SW, and Bay Matrices	Field Sampling - WW	Rebecca Sutton	08/31/26							
72	Tracking Bay Health / USEPA	508. Shoreline Change in SFB	Recent Past Shoreline Data Package	Scott Dusterhoff	08/31/26	12/31/25	160			2		2/10/26 - Due date extended to align with final deliverable due date. 11/6/25 - This is on pause until typology is complete. $4k of this budget is to rent software and likely won't be spent until next year - needs to be timed so people aren't on vacay when it's purchased.
73	Tracking Bay Health / USEPA	513. Mapping Mudflat Morphodynamics	Draft Technical Report shared with WG and RMP committees	Alex Braud	08/31/26	07/31/25	313			3		
74	Tracking Bay Health / USEPA	523. PCB Analysis of Archived SFB Sediment Samples	Laboratory Analysis	Amy Kleckner	08/31/26	01/31/26	129			2		6/4 - Will complete this summer. 3/18/26 - Delays in contracting due to staff capacity issues.
75	RMP SEP	34. PCBWG SLB OPTICS Study	Draft technical report	Jay Davis	09/01/26							
76	Bay RMP (2026)	2A. April SC Meeting	Approved meeting summary posted	Martin Trinh	09/01/26							
77	Bay RMP (2026)	2B. September TRC Meeting	Agenda package and slides posted to website	Martin Trinh	09/21/26							

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78	Bay RMP (2026)	4. Annual Reporting	RMP Pulse Final and send to printer	Jay Davis	09/21/26							
79	Bay RMP (2026)	2B. June TRC Meeting	Approved meeting summary posted	Michelle Azurin	09/28/26							
80	RMP SEP	32. Temporal variability in sediment delivery to a North and Central SF Bay Salt Marsh	Draft manuscript	Melissa Foley	09/30/26	04/01/25				4		1/18/26 - JL: Behind schedule due to gov shutdown and JL retirement plans, Sam and JL will submit the manuscript by Sept 2026 JL committed to completing this project post retirement. 7/23 - Latest update from JL stated that it is looking more like the end of the year for the manuscript
81	RMP SEP	35. Sediment Dynamics in a NB Fluvially Influenced Salt Marsh	Data releases: 1) salt marsh and Petaluma River time series data, 2) deposition and accretion	Scott Dusterhoff	09/30/26							
82	Bay RMP (2023)	3. QA and Data Services	QA Summary Report for 2023 S&T Activities	Don Yee	09/30/26	09/30/24	617			3		8/6/25 - Several 2023 data sets still needing to be processed.
83	Bay RMP (2023)	PFAS and NTA in Marine Mammals (year 1 of 2)	Task 6. Final manuscript(s)	Rebecca Sutton	09/30/26	09/30/25	252					6/27/25 - Continuing collections thru 2025, delay reporting for a year.
84	Bay RMP (2024)	**M. 2024 Sport Fish data mgmt.**	Process and upload sampling data	Adam Wong	09/30/26	11/01/24	585			1		6/23/25 - Samples still with MLML for processing, results data not expected until late 2025. 9/2/24 - Sampling expected to continue through Sept., processing by MLML scheduled for Mar 2025.
85	Bay RMP (2025)	I. 2025 S&T Lab Intercomp Studies	Presentation to the TRC on findings from 2025 IC studies.	Don Yee	09/30/26	03/31/26	70			2		2025 IC - BPs & OPEs in Bay water, AXYS and ALS 3/18 - Just recieved lab results this month, still in review, plan to present in June 1/18/26 - Still waiting on lab results from ALS.
86	Bay RMP (2026)	2I. PCB WG Meeting	Approved meeting summary posted	Michelle Azurin	09/30/26							
87	Bay RMP (2026)	5. Communications	RMP Presentation to BAMSC	Amy Kleckner	09/30/26							
88	Bay RMP (2026)	5. Communications	RMP Presentation to LTMS	Amy Kleckner	09/30/26							
89	Bay RMP (2026)	5. Communications	RMP Presentation to WSPA	Amy Kleckner	09/30/26							
90	Bay RMP (2026)	5. Communications	Updates to RMP website - Q3	Sierra Garcia	09/30/26							
91	Bay RMP (2026)	50. Stormwater CECs Monitoring 2029	Presentation to SST	Rebecca Sutton	09/30/26							
92	Tracking Bay Health / USEPA	D. 2025 Aquatic Toxicity	Report posted to website?, sent to EPA as deliverable?	Amy Kleckner	09/30/26	04/30/26	40					6/5 - Posted to the website, needs to have EPA acknowledgement added before attaching to next SAPR in October. 3/18 - Results to be presented to the TRC in March, will post field report to website after.
93	Tracking Bay Health / USEPA	H. 2026 North Bay Selenium Monitoring	Sample collection - clams and water (dry season)	Amy Kleckner	09/30/26							
94	Tracking Bay Health / USEPA	502. QACs in Bay water and SW	Lab Analysis	Rebecca Sutton	09/30/26							
95	Tracking Bay Health / USEPA	504. Tire rubber marker analysis	Collect samples	Diana Lin	09/30/26	09/30/25	252			1		7/23/25 - Requested extension from USEPA, project delayed by a year.
96	Tracking Bay Health / USEPA	509. Int. Mon. and Model. to support PCBs and Hg Loads (Year 2 of 3)	Draft Final Report shared with WG and RMP committees	Alicia Gilbreath	09/30/26	12/31/25	160					6/24/25 - Per Matt the draft will be ready in 9/2026, deadline to be extended. Related to 3024-030: Int. Monit. & Model. for PCBs & Hg Phase 1 **This report is the EPA deliverable for this task (to be included in October 2026 semi-annual progress report)
97	Tracking Bay Health / USEPA	519. Co-benefits of nitrogen treatment tech on CECs	Draft Report	Rebecca Sutton	09/30/26	06/30/26	-21					
98	Tracking Bay Health / USEPA	523. PCB Analysis of Archived SFB Sediment Samples	Data management	Adam Wong	09/30/26	06/30/26	-21					
99	Tracking Bay Health / USEPA	508. Shoreline Change in SFB	Final Technical report posted to the website	Scott Dusterhoff	10/01/26	05/31/26	9					This report is the EPA deliverable for this task (to be included in October 2026 semi-annual progress report) 1/14/26 - EPA approved request to extend due date
100	Tracking Bay Health / USEPA	511. GIS Improvements to Support Modeling, Data Interpretation, and Site Selection	Detailed workplan for future GIS data acquisition and/or development	Matt Heberger	10/01/26	05/31/26	9					May be included in the 25 SW CEC modeling and data analysis report (3025-050-task 3) and/or WDM report. Also could be done early for CECs modeling workplan. **This report is the EPA deliverable for this task (to be included in October 2026 semi-annual progress report) 1/14/26 - EPA approved request to extend due date to October 2026
101	Tracking Bay Health / USEPA	512. Develop discharge rating curves	Detailed workplan for future rating curve development	Matt Heberger	10/01/26	05/31/26	9					**This report is the EPA deliverable for this task (to be included in October 2026 semi-annual progress report) 1/14/26 - EPA approved request to extend due date to October 2026
102	Tracking Bay Health / USEPA	513. Mapping Mudflat Morphodynamics	Final Technical Report posted on website	Alex Braud	10/01/26	08/31/25	282			3		**This report is the EPA deliverable for this task (to be included in October 2026 semi-annual progress report) 1/14/26 - EPA approved request to extend due date to October 2026
103	Bay RMP (2026)	4. Annual Reporting	Annual Meeting	Amy Kleckner	10/14/26							
104	Bay RMP (2026)	26. NTA Stormwater 2026 Monitoring	Spreadsheet of tentatively identified compounds, and publicly accessible baseline spectra for future NTA comparisons	Rebecca Sutton	10/30/26							
105	RMP SEP	36. Sediment Conceptual Models for San Pablo Bay and Suisun Bay	Draft report to SedWG	Scott Dusterhoff	10/31/26	04/01/26						SD comment (1/22/25) - we can not starting the effort in earnest until July 2025 (RB2 is aware) so we need to push back deliverable dates

	Project	Task	Deliverable	Assigned To	Due Date	Old Due Date	Days overdue	Due Date Extended (external delay)	Due Date Extended (internal delay)	# of extensions	Status	Comments
106	Bay RMP (2023)	Special Study: PCBs in sediment and fish SS/RC (Year 2)	Final Technical Report	Jay Davis	10/31/26	11/30/24	556		🚩	5		6/8 - Prioritized behind Mercury Synthesis 3/17/26 - Further delays due to staff capacity, anticipate final draft in May 6/23/25 - Draft delayed until August, final in November 12/3/24 - Don will have the data QA'd by mid Feb 2025, reporting tentatively in Spring 2025.7/25/24 - Waiting on DS
107	Bay RMP (2024)	N. NB Se Monitoring	Final Report - NB Se data through 2023	Amy Kleckner	10/31/26	02/28/23	1197	🚩	🚩	5		3/18/26 - Strategy team met on 3/11 to review preliminary results, draft for review anticipated by end of April. Final draft end of May. Will not include 2010-2017 USGS data. USGS data will be included in 2026/27 report.
108	Bay RMP (2024)	21. Monitoring of Sediment Deposition in SLB Intertidal Areas	Draft Report	Don Yee	10/31/26	02/28/25			🚩	4		6/8/26 - Prioritized behind Mercury Synthesis & PCBs in Sed and Fish reports 3/17 - Delayed due to staff capacity issues. Prioritized behind the draft technical report for PCBs in sediment and fish SS/RC. Anticipate having a draft done by early May, so can get feedback at the WG meeting, and final draft done by end of June. 8/15/25 - Prioritized behind the PCBs in fish and sediment SS/RC draft report 5/22 - Presented at CW Team meeting, draft expected by end of summer.
109	Bay RMP (2025)	50. Stormwater CECs Monitoring & Modeling 2025	Task 3. Draft Technical Report	Pedro Avellaneda	10/31/26	10/31/25	221					10/2/25 - Memo shared with SC on 8/11/25 states this project will e delayed a year 7/24/25 - will be delayed until CECs modeling workplan (3024-050) is completed, considering a plan to rescope as a report on implementation of the workplan. Timeline TBD. **This report is the EPA deliverable for task 510
110	Bay RMP (2026)	5. Communications	RMP Presentation at RB2 Meeting	Amy Kleckner	10/31/26							
111	Bay RMP (2026)	21. Small Microplastic Particles in Bay Water Pilot	Early pilot sample collection and analysis	Diana Lin	10/31/26	07/31/26	-52		🚩	1		
112	Bay RMP (2026)	48. Richmond Harbor Conceptual Model Report	Draft report	Jay Davis	10/31/26	05/31/26	9		🚩	1		
113	Tracking Bay Health / USEPA	Meeting agenda's & summaries included in SAPR	April 2026-September 2026	Amy Kleckner	10/31/26							
114	Tracking Bay Health / USEPA	G. 2025 CTR Reporting	Draft Report shared with TRC	Don Yee	10/31/26	06/30/26	-21		🚩	1		
115	Tracking Bay Health / USEPA	**M. 2024 Bird Egg Reporting**	Draft and Final Report (posted on website and submitted to USEPA)	Jay Davis	10/31/26							Include in a Pulse or RMP Update?
116	Tracking Bay Health / USEPA	501. Plastic Additives in Bay Water, Archived Sed, and SW	Lab Analysis	Rebecca Sutton	10/31/26							
117	Bay RMP (2026)	1. Program Management	2026 Q3 RMP Financial Report	Michelle Azurin	11/02/26							
118	Bay RMP (2026)	2A. November MYP/SC Meeting	Agenda package and slides posted to website	Martin Trinh	11/16/26							
119	Bay RMP (2026)	2A. August SC Meeting	Approved meeting summary posted	Martin Trinh	11/23/26							
120	Bay RMP (2026)	5. Communications	Q4 RMP eUpdate	Sierra Garcia	11/27/26							
121	Bay RMP (2025)	3. QA and Data Services	QA Summary Report for 2025 S&T Activities	Don Yee	11/30/26							
122	Bay RMP (2026)	39. Carbendazim, Isothiazolinones, and other Biocides in wastewater and stormwater	Draft Manuscript/Technical Report	Miguel Mendez	11/30/26							
123	Bay RMP (2026)	21. Small Microplastic Particles in Bay Water Pilot	Sample collection	Diana Lin	11/30/26	08/31/26	-83		🚩	1		
124	Tracking Bay Health / USEPA	519. Co-benefits of nitrogen treatment tech on CECs	Final Report	Rebecca Sutton	11/30/26	08/31/26	-83					**This report is the EPA deliverable for this task to be included in the April 2027 progress report
125	Tracking Bay Health / USEPA	523. PCB Analysis of Archived SFB Sediment Samples	Upload to CEDEN	Adam Wong	11/30/26	08/31/26	-83					**A link to this data is the EPA deliverable for this task to be included in the April 2027 progress report
126	Bay RMP (2026)	2B. December TRC Meeting	Agenda package and slides posted to website	Michelle Azurin	12/07/26							
127	Bay RMP (2025)	50. Stormwater CECs Monitoring & Modeling 2025	Task 3.Final Technical Report	Pedro Avellaneda	12/15/26	12/12/25	179					This deliverable will also cover TBH task 510. **This report is the EPA deliverable for task 510 1/14/26 - EPA approved request to extend due date to September 2029
128	Bay RMP (2026)	2B. September TRC Meeting	Approved meeting summary posted	Martin Trinh	12/28/26							
129	RMP SEP	34. PCBWG SLB OPTICS Study	Final technical report	Jay Davis	12/31/26							
130	Bay RMP (2023)	Special Study: Sediment Flux Richmond Bridge	Data release including ADCP transects and velocity-integrated point SSC-samples	Scott Dusterhoff	12/31/26	05/11/23	1125	🚩		2		8/6 - Updated timeline included in the latest TAA 6/25/25 - David Hart indicated at the SedWG meeting that the data would be collected in 2025, data release date TBD 9/15/23 - Per David Hart at USGS: work will not move forward in WY24, but do expect it to happen in WY25 as part of a larger project with the possibility of increased funding from other groups.

	Project	Task	Deliverable	Assigned To	Due Date	Old Due Date	Days overdue	Due Date Extended (external delay)	Due Date Extended (internal delay)	# of extensions	Status	Comments
131	Bay RMP (2023)	Special Study: Sediment Flux Richmond Bridge	Model archive summary detailing the ABS-SSC empirical model to convert ADCP transects to sediment flux measurements	Scott Dusterhoff	12/31/26							
132	Bay RMP (2024)	3. QA and Data Services	QA Summary Report for 2024 S&T Activities	Don Yee	12/31/26	03/31/25	435			1		1/13 - Data not expected from labs for sport fish and bird eggs until Oct 2025, Summary report delayed until 2026.
133	Bay RMP (2024)	**H. 2024 Bird Egg Data Mgmt**	Processing and upload bird egg data	Adam Wong	12/31/26	12/31/24	525			2		1/18/26 - Waiting on final data submission from lab 10/29/24 - Samples to be analyzed spring 2025
134	Bay RMP (2024)	L. 2024 Sport Fish Monitoring	Sport Fish Report	Jay Davis	12/31/26	12/31/25	160			1		Martin Trinh will be drafting this report 1/18/26 - Sample analysis ongoing with AXYS
135	Bay RMP (2024)	50. Stormwater CECs Monitoring & Modeling 2024	Draft/Final CECs modeling workplan & report	Pedro Avellaneda	12/31/26	10/31/25	221					10/2/25 - It has been recommended that this report come after the pilot implementation report due end of 2026. Timeline TBD 7/24/25 - This was proposed as a chapter in the CECs Approach Report and will instead be a stand alone report.
136	Bay RMP (2024)	44. Spatial variability of sediment accretion in SFB restorations	Presentation to RMP	Scott Dusterhoff	12/31/26	09/30/26	-113					1/18/26 - Will present preliminary findings at May SedWG meeting.
137	Bay RMP (2024)	21. Monitoring of Sediment Deposition in SLB Intertidal Areas	Final Report and data upload	Don Yee	12/31/26	04/30/25				3		6/8/26 - Prioritized behind Mercury Synthesis & PCBs in Sed and Fish reports 1/18/26 - Prioritized behind the PCBs in fish and sediment SS/RC report
138	Bay RMP (2026)	1. Program Management	RMP Participation Letters for BACWA and WSPA Agencies	Amy Kleckner	12/31/26							
139	Bay RMP (2026)	1. Program Management	Honoraria Payments to Science Advisors	Amy Kleckner	12/31/26							
140	Bay RMP (2026)	3. QA and Data Services	2026-27 QAPP Update (TBH/RMP)	Don Yee	12/31/26	04/30/26						3/18 - Holding off on this deliverable until the 2027 special studies are determined.
141	Bay RMP (2026)	3. QA and Data Services	Online Data Access CD3: TRC update at December Meeting of what has been accomplished in 2026	Cristina Grosso	12/31/26							
142	Bay RMP (2026)	3. QA and Data Services	Informatics Update: TRC presentation	Adam Wong	12/31/26							
143	Bay RMP (2026)	3. QA and Data Services	DMMO Database Support: TRC Update at December meeting of what has been accomplished in 2026	Cristina Grosso	12/31/26							
144	Bay RMP (2026)	5. Communications	Updates to RMP website - Q4	Sierra Garcia	12/31/26							
145	Bay RMP (2026)	I. 2026 S&T Lab Intercomp Studies	Complete contracts	Michelle Azurin	12/31/26							
146	Bay RMP (2026)	J. 2026 Sample Archive	Archive database updated	michaelw@sfei.org	12/31/26							
147	Bay RMP (2026)	50. Stormwater CECs Monitoring 2028	Data uploaded to CEDEN	Rebecca Sutton	12/31/26							
148	Bay RMP (2026)	41. Analysis of fine sediment flux and development of Github transport modeling platform	A report outlining the errors and possible improvements to methods to compute the sediment flux from field observations.	Scott Dusterhoff	12/31/26							
149	Bay RMP (2026)	48. Richmond Harbor Conceptual Model Report	Final report	Jay Davis	12/31/26	08/31/26	-83			1		
150	Tracking Bay Health / USEPA	**F. 2025 Dry Season Water Cruise Data Management**	Process and upload dry season Bay water cruise data	Adam Wong	12/31/26							
151	Tracking Bay Health / USEPA	G. 2025 CTR Reporting	Final Report posted to the website and submitted to USEPA	Don Yee	12/31/26							
152	Tracking Bay Health / USEPA	J. 2026 Wet Season Water	Presentation of Field reports and prelim results to TRC, discussion to determine recommendations for future sampling design	Jennifer Dougherty	12/31/26							
153	Tracking Bay Health / USEPA	502. QACs in Bay water and SW	Data Management and QA/QC	Adam Wong	12/31/26							
154	Tracking Bay Health / USEPA	505. PFAS NMR Analysis in WW, SW, and Bay Matrices	Lab Analysis complete	Rebecca Sutton	12/31/26							
155	Tracking Bay Health / USEPA	515. Fixed Station Monitoring Network	List of proposed monitoring locations, agreement on pilot site location	Lester McKee	12/31/26	05/31/25	374					7/10 - Alicia and Lester to lead and coordinate with BAMSC and STLS 6/23/25 - Waiting on availability of any future TBH funding. Will soon proceed with development of a phased workplan. Timeline and SFEI lead TBD.
156	Bay RMP (2026)	1. Program Management	2027 Multi-Year Plan Update	Amy Kleckner	01/25/27							
157	Bay RMP (2026)	1. Program Management	2027 Detailed Workplan and Budget	Amy Kleckner	01/25/27							
158	Bay RMP (2026)	1. Program Management	2026 Q4 RMP Financial Report	Michelle Azurin	01/25/27							

	Project	Task	Deliverable	Assigned To	Due Date	Old Due Date	Days overdue	Due Date Extended (external delay)	Due Date Extended (internal delay)	# of extensions	Status	Comments
159	Bay RMP (2026)	2A. November MYP/SC Meeting	Approved meeting summary posted	Martin Trinh	01/25/27							
160	RMP SEP	36. Sediment Conceptual Models for San Pablo Bay and Suisun Bay	Final Report	Scott Dusterhoff	01/31/27	08/01/26						SD comment (1/22/25) - we can not starting the effort in earnest until July 2025 (RB2 is aware) so we need to push back deliverable dates
161	Bay RMP (2026)	39. Carbendazim, Isothiazolinones, and other Biocides in wastewater and stormwater	Final Manuscript/Technical Report	Miguel Mendez	01/31/27							
162	Tracking Bay Health / USEPA	520. Modeling dispersal of dredged sediment placement	Data release containing model input files	Scott Dusterhoff	01/31/27							
163	Bay RMP (2026)	38. Newly Identified Tire and Vehicle contaminants in Bay and SW	Laboratory analysis	Rebecca Sutton	02/28/27							
164	Bay RMP (2026)	50. Stormwater CECs Monitoring 2029	Section for the "Stormwater CECs Modeling and Data Analysis" draft report (SPLWG project)	Rebecca Sutton	02/28/27							Not clear if this is related to 3025-50 Task 3 and TBH task 510 or is a proposed report that didn't get approval for 2026 funding. 3025-50 Task 3 & TBH task 510 draft due date = 10/2026, final 12/2026
165	Tracking Bay Health / USEPA	C. 2025 NTA	Draft manuscript	Rebecca Sutton	02/28/27							
166	Tracking Bay Health / USEPA	H. 2026 North Bay Selenium Monitoring	Sample collection - clams and water (wet season)	Amy Kleckner	02/28/27							
167	Tracking Bay Health / USEPA	501. Plastic Additives in Bay Water, Archived Sed, and SW	Data Management and QA/QC	Adam Wong	02/28/27							
168	Tracking Bay Health / USEPA	504. Tire rubber marker analysis	Lab Analysis	Diana Lin	02/28/27	02/28/26	101			1		7/23/25 - Requested extension from USEPA, project delayed by a year.
169	RMP SEP	37. Microplastics in San Francisco Bay Sport Fish	Report	Diana Lin	03/01/27							
170	Bay RMP (2024)	I. 2024 S&T Lab Intercomp Studies	Presentation to the TRC on findings from IC studies.	Don Yee	03/01/27	03/01/25	465	🚩		1		2024 IC - PFAS in tissue AXYS & Eurofins 1/13 - Still TBD if there will be adequate fish tissue for PFAS comparison study, will be delayed until 2027.
171	Bay RMP (2026)	2B. December TRC Meeting	Approved meeting summary posted	Michelle Azurin	03/29/27							
172	Bay RMP (2025)	34. NTA and Target Analysis of Fibers in SW	Draft Report shared with ECWG, MPWG, and RMP committees	Diana Lin	03/31/27	03/31/26	70	🚩	🚩			1/18/26 - Toronto MU is waiting on receipt of the lint samples, TAT is ~6 mo.
173	Bay RMP (2026)	I. 2026 S&T Lab Intercomp Studies	Presentation to the TRC on findings from 2026 IC studies.	Don Yee	03/31/27							
174	Tracking Bay Health / USEPA	522. Enhancement and Recalibration of WDM	Draft modeling technical report	Matt Heberger	03/31/27							
175	Bay RMP (2024)	40. OPEs, BP, and Other Plastic Additives in Wastewater	Presentation at ECWG	Rebecca Sutton	04/30/27	04/30/26	40					6/4 - Project is suffering major delays due to change in analytical partners. A brief update at ECWG in 2026 and hopefully a presentation of results next year
176	Bay RMP (2025)	34. NTA and Target Analysis of Fibers in SW	Presentation at ECWG	Diana Lin	04/30/27	04/30/26	40	🚩	🚩			
177	Bay RMP (2025)	31. Tidal Area Remote Sampler Pilot (Yr3)	Pilot testing	Alicia Gilbreath	04/30/27	04/30/25	405		🚩	2		3/17/26 - Will not complete this year. Continuing to work out the kinks of the remote sampler, intend to wait until remote sampler is more reliable before collecting final samples for this study.
178	Bay RMP (2026)	37. PFAS in Precipitation Pilot Study	Presentation at ECWG	Miguel Mendez	04/30/27							
179	Bay RMP (2026)	38. Newly Identified Tire and Vehicle contaminants in Bay and SW	Draft report and presentation to ECWG	Rebecca Sutton	04/30/27							
180	Bay RMP (2026)	39. Carbendazim, Isothiazolinones, and other Biocides in wastewater and stormwater	Presentation of Results at ECWG	Miguel Mendez	04/30/27							
181	Bay RMP (2026)	50. Stormwater CECs Monitoring 2029	Section for the "Stormwater CECs Modeling and Data Analysis" final report	Rebecca Sutton	04/30/27							
182	Tracking Bay Health / USEPA	Meeting agenda's & summaries included in SAPR	October 2026-March 2027	Amy Kleckner	04/30/27							
183	Tracking Bay Health / USEPA	C. 2025 NTA	Presentation to ECWG	Rebecca Sutton	04/30/27							
184	Tracking Bay Health / USEPA	H. 2026 North Bay Selenium Monitoring	Sample collection - sturgeon	Amy Kleckner	04/30/27							
185	Tracking Bay Health / USEPA	501. Plastic Additives in Bay Water, Archived Sed, and SW	Presentation to ECWG	Rebecca Sutton	04/30/27							
186	Tracking Bay Health / USEPA	502. QACs in Bay water and SW	Presentation to ECWG	Rebecca Sutton	04/30/27							

	Project	Task	Deliverable	Assigned To	Due Date	Old Due Date	Days overdue	Due Date Extended (external delay)	Due Date Extended (internal delay)	# of extensions	Status	Comments
187	Tracking Bay Health / USEPA	503. NTA of SF Bay Fish (Yr 2)	Draft manuscript shared with WG	Rebecca Sutton	04/30/27	09/30/26	-113					
188	Tracking Bay Health / USEPA	505. PFAS NMR Analysis in WW, SW, and Bay Matrices	Presentation to ECWG	Rebecca Sutton	04/30/27							
189	Bay RMP (2026)	21. Small Microplastic Particles in Bay Water Pilot	Laboratory analysis	Diana Lin	05/28/27	02/28/27	-264			1		
190	Bay RMP (2025)	31. Tidal Area Remote Sampler Pilot (Yr3)	Update presentation at SPLWG on the results to date	Alicia Gilbreath	05/30/27	05/30/25	375			2		3/17/26 - Will not complete this year. Continuing to work out the kinks of the remote sampler, intend to wait until remote sampler is more reliable before collecting final samples for this study.
191	Tracking Bay Health / USEPA	505. PFAS NMR Analysis in WW, SW, and Bay Matrices	Draft Manuscript shared with WG	Rebecca Sutton	05/30/27							
192	RMP SEP	35. Sediment Dynamics in a NB Fluvially Influenced Salt Marsh	Presentation to the SedWG	Scott Dusterhoff	05/31/27							
193	Bay RMP (2023)	Special Study: Sediment Flux Richmond Bridge	Presentation to the RMP SedWG	Scott Dusterhoff	05/31/27							
194	Bay RMP (2026)	41. Analysis of fine sediment flux and development of Github transport modeling platform	Presentations to the Sediment Workgroup	Scott Dusterhoff	05/31/27							
195	Tracking Bay Health / USEPA	K. Wet season water data management	Process and upload wet season water sampling data (WY22-WY24)	Adam Wong	05/31/27							
196	Tracking Bay Health / USEPA	514. Sed. Trap Recon.	PCBWG Presentation	Don Yee	05/31/27	05/31/25	374			2		4/7/26 - No deployments at any sites yet. BAMSC still needs to provide clearance for sites so that sampling can happen in early WY27. Will be delayed again, and will need to file an amendment, however will wait until after deployment to get a realistic timeline for completion.
197	Tracking Bay Health / USEPA	520. Modeling dispersal of dredged sediment placement	Presentation to the RMP Sediment Workgroup	Scott Dusterhoff	05/31/27							
198	Tracking Bay Health / USEPA	521. Central Bay Conceptual Understanding of Sediment Transport	Report	Kyle Stark	05/31/27							**This report is the EPA deliverable for this task to be included in the October 2027 progress report
199	Tracking Bay Health / USEPA	521. Central Bay Conceptual Understanding of Sediment Transport	2027 Sediment Workgroup presentation	Kyle Stark	05/31/27							
200	Tracking Bay Health / USEPA	522. Enhancement and Recalibration of WDM	Presentation to the SPL Workgroup	Matt Heberger	05/31/27							
201	RMP SEP	35. Sediment Dynamics in a NB Fluvially Influenced Salt Marsh	Final Report	Scott Dusterhoff	06/30/27							
202	Bay RMP (2025)	34. NTA and Target Analysis of Fibers in SW	Final Report posted to RMP website	Diana Lin	06/30/27	06/30/26	-21					
203	Bay RMP (2026)	38. Newly Identified Tire and Vehicle contaminants in Bay and SW	Data services and data upload to CEDEN	Rebecca Sutton	06/30/27							
204	Tracking Bay Health / USEPA	C. 2025 NTA	Final manuscript for submission	Rebecca Sutton	06/30/27							
205	Tracking Bay Health / USEPA	501. Plastic Additives in Bay Water, Archived Sed, and SW	Draft report shared with WG and RMP committees	Rebecca Sutton	06/30/27							
206	Tracking Bay Health / USEPA	502. QACs in Bay water and SW	Draft manuscript shared with WG	Rebecca Sutton	06/30/27							
207	Tracking Bay Health / USEPA	514. Sed. Trap Recon.	Draft technical report shared with WG and RMP committees	Don Yee	06/30/27	06/30/25	344					
208	Tracking Bay Health / USEPA	520. Modeling dispersal of dredged sediment placement	Open access journal article describing model results and analysis: draft ready for submittal	Scott Dusterhoff	06/30/27							**This report is the EPA deliverable for this task to be included in the October 2027 progress report
209	Tracking Bay Health / USEPA	522. Enhancement and Recalibration of WDM	Final modeling technical report	Matt Heberger	06/30/27							**This report is the EPA deliverable for this task to be included in the October 2027 progress report
210	Bay RMP (2026)	21. Small Microplastic Particles in Bay Water Pilot	Presentation at MPWG	Diana Lin	07/30/27	04/30/27	-325			1		
211	Tracking Bay Health / USEPA	K. Wet season water data management	Process and upload wet season water sampling data (WY26, S&T analytes only)	Adam Wong	07/31/27							
212	Tracking Bay Health / USEPA	514. Sed. Trap Recon.	Final technical report posted on website	Don Yee	07/31/27	07/31/25	313			2		**This report is the EPA deliverable for this task (to be included in April 2027 semi-annual progress report) 1/14/26 - EPA approved request to extend due date to April 2027
213	Tracking Bay Health / USEPA	H. 2026 North Bay Selenium Monitoring	Data received from labs	Michael Weaver	08/30/27							

	Project	Task	Deliverable	Assigned To	Due Date	Old Due Date	Days overdue	Due Date Extended (external delay)	Due Date Extended (internal delay)	# of extensions	Status	Comments
214	Bay RMP (2026)	41. Analysis of fine sediment flux and development of Github transport modeling platform	A GitHub repository to share the model online for community use.	Scott Dusterhoff	09/30/27							
215	Bay RMP (2026)	41. Analysis of fine sediment flux and development of Github transport modeling platform	A report (and publication) on modeling and analysis of the physical factors impacting the sediment flux across the Dumbarton Narrows and one other transect in SF Bay.	Scott Dusterhoff	09/30/27							
216	Tracking Bay Health / USEPA	503. NTA of SF Bay Fish (Yr 2)	Final manuscript submitted	Rebecca Sutton	10/01/27	12/31/26	-205					This report is the EPA deliverable for this task (to be included in October 2027 semi-annual progress report) 1/14/26 - EPA approved request to extend due date
217	Tracking Bay Health / USEPA	504. Tire rubber marker analysis	Final manuscript submitted	Diana Lin	10/01/27	07/31/26	-52			1		This report is the EPA deliverable for this task (to be included in October 2026 semi-annual progress report). Requested extension to October 2027. 1/14/26 - EPA approved request to extend due date
218	Tracking Bay Health / USEPA	505. PFAS NMR Analysis in WW, SW, and Bay Matrices	Final Manuscript submitted	Rebecca Sutton	10/01/27	06/30/27	-386					This report is the EPA deliverable for this task (to be included in October 2027 semi-annual progress report) 1/14/26 - EPA approved request to extend due date
219	Bay RMP (2026)	38. Newly Identified Tire and Vehicle contaminants in Bay and SW	Final report	Rebecca Sutton	10/31/27							This work was partially funded by TBH grant, please include final deliverable in a progress report
220	Tracking Bay Health / USEPA	520. Modeling dispersal of dredged sediment placement	Presentation at State of the Estuary Conference	Scott Dusterhoff	10/31/27							
221	Bay RMP (2026)	21. Small Microplastic Particles in Bay Water Pilot	Short report	Diana Lin	12/30/27	09/30/27	-478			1		
222	Tracking Bay Health / USEPA	H. 2026 North Bay Selenium Monitoring	Process and upload Se data results	Michael Weaver	12/31/27							
223	Tracking Bay Health / USEPA	H. 2026 North Bay Selenium Monitoring	Selenium report updated with most recent data	Amy Kleckner	03/31/28							
224	Tracking Bay Health / USEPA	H. 2026 North Bay Selenium Monitoring	Presentation of results to TRC	Amy Kleckner	03/31/28							
225	Tracking Bay Health / USEPA	501. Plastic Additives in Bay Water, Archived Sed, and SW	Final report posted to website	Rebecca Sutton	04/01/28	08/31/27	-448					This report is the EPA deliverable for this task (to be included in April 2028 semi-annual progress report) 1/14/26 - EPA approved request to extend due date
226	Tracking Bay Health / USEPA	502. QACs in Bay water and SW	Final manuscript submitted	Rebecca Sutton	04/01/28	08/31/27	-448					This report is the EPA deliverable for this task (to be included in April 2028 semi-annual progress report) 1/14/26 - EPA approved request to extend due date
227	Bay RMP (2026)	3. QA and Data Services	QA Summary Report for 2026 S&T Activities	Don Yee	04/30/28							
228	Tracking Bay Health / USEPA	515. Fixed Station Monitoring Network	Four working monitoring stations to support the RMP & a summary document of project outputs, to include a final list of network station locations and a description of the components	Lester McKee	08/31/31							**This report is the EPA deliverable for this task (to be included in the final-September 2031 progress report)