



RMP Sediment Workgroup Meeting

November 24, 2020
1:00 pm to 2:30 pm

San Francisco Estuary Institute
4911 Central Avenue, Richmond, CA

Meeting Summary

Attendees

Name	Affiliation (workgroup role)	Present
Michael McWilliams	Anchor QEA	Remote (Zoom)
Josh Gravenmier	Arcadis	Remote (Zoom)
Roman Berenshteyn	Bay Planning Coalition	Remote (Zoom)
Brenda Goeden	BCDC	Remote (Zoom)
Luisa Valiela	EPA (Technical Review Committee)	Remote (Zoom)
Jen Siu	EPA R9	Remote (Zoom)
Scott Bodensteiner	Haley & Aldrich	Remote (Zoom)
Bridgette DeShields	Integral Consulting (Technical Review Committee Chair)	Remote (Zoom)
Carole Foster	SCVWD	Remote (Zoom)
James Ujah	SCVWD	Remote (Zoom)
Sandra Scoggin	SF Bay Joint Venture	Remote (Zoom)
Kevin Lunde	SFBRWQCB	Remote (Zoom)
Setenay Frucht	SFBRWQCB	Remote (Zoom)
Xavier Fernandez	SFBRWQCB	Remote (Zoom)
Tom Mumley	SFBRWQCB (Steering Committee Chair)	Remote (Zoom)
Melissa Foley	SFEI	Remote (Zoom)
Scott Dusterhoff	SFEI	Remote (Zoom)
Sam Shaw	SFEI	Remote (Zoom)

Crisitina Grosso	SFEI	Remote (Zoom)
Derek Roberts	SFEI	Remote (Zoom)
Don Yee	SFEI	Remote (Zoom)
Jermev Lowe	SFEI	Remote (Zoom)
Lester McKee	SFEI	Remote (Zoom)
Letitia Grenier	SFEI	Remote (Zoom)
Tan Zi	SFEI	Remote (Zoom)
Donna Ball	SFEI, SBSPRP	Remote (Zoom)
Patricia Wiberg	University of Virginia (Technical Advisor)	Remote (Zoom)
Brian Gerrity	USACE	Remote (Zoom)
Jessie Lacy	USGS	Remote (Zoom)
Karen Thorne	USGS	Remote (Zoom)
Theresa Fregoso	USGS	Remote (Zoom)
Rachel Allen	USGS	Remote (Zoom)
Bruce Jaffe	USGS	Remote (Zoom)
Paul Work	USGS	Remote (Zoom)
Dave Schoellhamer	USGS ret., (Technical Advisor)	Remote (Zoom)

The last page of this document has information about the RMP and the purpose of this document.

1. Introduction and Goals for the Meeting

Scott Dusterhoff started the meeting with a brief overview of the agenda, the main items of which were to 1) Present a summary of the completed Sediment Monitoring and Modeling Strategy; 2) Update the group on the SEP-funded Sediment Conceptual Model effort; 3) Update the group on progress on 2020 and 2021 funded special studies; and finally, 4) Field general updates from workgroup members.

He then presented the ongoing funded studies for the workgroup, which consist of the following:

2020 Funded Special Studies

- Sediment Monitoring and Modeling Strategy
- Golden Gate Sediment Flux Modeling study
- Bathymetric Change Analysis Study - Year 2
- Sediment Bioaccumulation Threshold Study

2020 Funded Supplemental Environmental Projects (SEPs)

- Bay Sediment Conceptual Model
- Quantifying Stormwater Flow and Sediment Flux to the Bay from Select Tributaries
- Suspended Sediment Settling Velocity Study
- Suisun Bay Sediment Flux and Flocculation Study

2021 Funded Special Studies

- Temporal Variability in Sediment Delivery to a South SF Bay Marsh (Jessie Lacy & Karen Thorne)
- DMMO SF Bay Floating Percentile Method Update (Don Yee)
- DMMO Database Enhancements (Cristina Grosso)

Scott then briefly updated the group on the Multi-Year Plan (MYP).

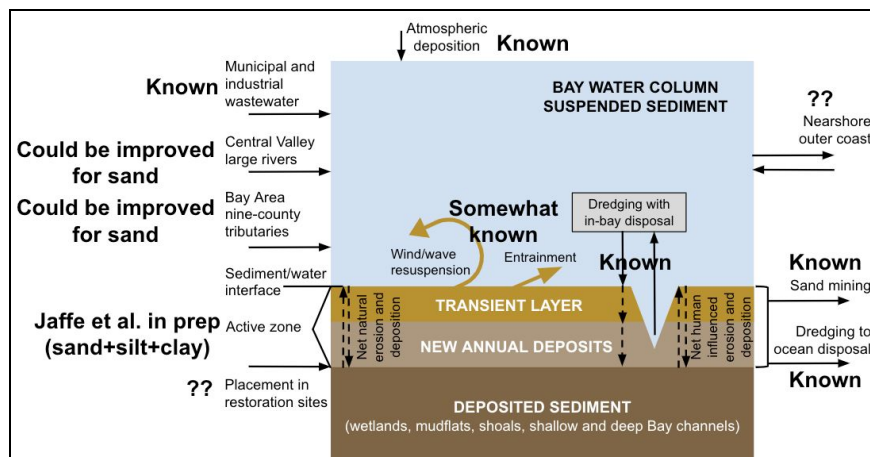
2. Information: Presentation of the Sediment Monitoring and Modeling Strategy (SMMS)

Lester McKee then presented an overview of the recently finished Sediment Monitoring and Modeling Strategy, which is published online and can be found at the following URL:

<https://www.sfei.org/documents/sediment-monitoring-and-modeling-strategy>

Lester began by acknowledging that the SMMS benefited from extensive input by workgroup members. He then summarized the content of the SMMS, which consists of the following six sections, with high-level points for each:

1. **Sediment workgroup (SedWG) goals and formation, connections to groups like BCDC and other RMP workgroups, and the goals of the SMMS**
 - a. SMMS goal is to provide a framework and work plan for monitoring and modeling elements that address the highest priority information gaps regarding sediment processes in the Bay
 - i. Facilitate the coordination of monitoring and modeling efforts among multiple groups and funding sources
 - ii. Support more efficient use of limited funding to support policy and management decisions
 - iii. Improve water quality and increase resilience to sea-level rise
2. **SedWG management questions 3-5, with a crosswalk to those of other groups**
 - a. What are the sources, sinks, pathways, and loadings of sediment and sediment-bound contaminants to and within the Bay and subembayments?
 - b. How much sediment is passively reaching tidal marshes and restoration projects, and how could the amounts be increased by management actions?
 - c. What are the concentrations of suspended sediment in the Estuary and its subembayments?
3. **Bay physiography, conceptual models, literature review and data gaps**
 - a. Complex system (geology, multiple inputs, different climates, urban/industrial influences)
 - b. Moderate understanding of whole-bay processes for sediment
 - c. Poor understanding of intra-bay sediment processes
 - d. Poor understanding of horizontal and vertical sediment concentrations and flux gradients in all areas except the South Bay
 - e. Prospects for improving knowledge of different sediment transport processes were summarized in the following graphic:



4. Monitoring and modeling recommendations

5. SedWG priority recommendations

SMMS recommendations are summarized in the following table:

Conceptual Model Element	Action Category	Priority Recommendation	Relevant Studies	Funding Source	Year
Loading to the Bay	Small tributaries sediment supply	Continue loads monitoring at existing tributary sites	Alameda, San Lorenzo, and Guadalupe loads (USGS sites)	Alameda County PW / Valley Water	WY 2020 & 2021
		Add monitoring at new tributaries for greater spatial coverage	Belmont, Arroyo Corte Madera del Presidio, Novato, and Walnut	SEP	WY 2020 & 2021
Transport Pathways	Flux at x-sections in the Bay	Improve the information for Benicia Bridge x-section for 2002-2019	Livsey & Downing-Kunz	SEP	Expected in 2021
	Flux on shoals and into wetlands	Initiate shoal flux studies near reference marshes	South San Francisco Bay: Lacy & Thorne	RMP special study	Expected late 2022
		Model suspended sediment flux between the Bay axis and shallows			
		Model changes in sediment delivery for future conditions			
	Golden Gate Bridge flux	Model suspended sediment flux at the Golden Gate	McWilliams et al in preparation	RMP special study	Report expected in Q1, 2021
		Empirical observations of flux at the Golden Gate Bridge	Winter high flow in response to a storm	RMP discretionary	Reactionary
		Develop a proxy for estimating long term SSC flux at the GG Bridge			
Whole Bay	Developing tools to track sediment sources, sinks, and pathways	On the SEP list			
Sinks and Reservoirs	Bathymetric change	Filling bathymetry data gaps	On the SEP list		
Sediment Character	Bed character	Bed erodibility estimates in at a variety of locations around the Bay			
Bay Water Column Character	SSC in the water column	Data on settling velocity and flocculation of different grain sizes for a variety of shoal environments	South San Francisco Bay: Allen et al.	SEP	Report expected late 2021
		Continuous SSC monitoring in the shallows and subembayments	On the SEP list		
	SSC in the water column	Use satellite imagery to analyze turbidity and SSC			
Conceptual models	Whole system	Sediment dynamics conceptual model and uncertainty analysis	Dusterhoff et al.	SEP	Expected late 2021

6. References

Discussion

Lester ended his presentation and took questions from workgroup members.

Setenay Frucht asked if there is a crosswalk linking these recommendations with conceptual models. Scott Dusterhoff replied that this is the main work of the Conceptual Model SEP project, which is just underway (presentation/description following).

Jessie Lacy asked how climate change was incorporated into the SMMS. Lester acknowledged that it wasn't heavily incorporated, which reflects a weakness in the document in its current form. Scott noted that the authors are hoping to incorporate changes in sediment delivery into the Conceptual Model SEP project, but other information is limited. Karen Thorne noted that with changing sea levels, marshes can potentially change from sediment sources to sinks.

Tom Mumley asked Lester to clarify his statements that it would take several years to implement priority projects. Lester replied that it's both due to limited funding and the years-long timescale of projects. There is also value in iterative studies across different times or different locations -- multi-year efforts to fill data gaps. Jessie agreed that iterative studies are necessary, especially considering significant hydrologic variability year to year.

Tom Mumley raised the issue that the RMP alone will not be able to pay for all of the studies in the SMMS and we need to spend time at the next meeting with an agenda item discussing fundraising for special studies and coordinating with partner organizations such as BCDC and USACE. Melissa Foley mentioned that the Microplastics Workgroup will have to do this as well and we should coordinate with Diana (Microplastics Workgroup lead) on that workgroup's approach.

3. Information: Conceptual Model SEP

Scott Dusterhoff presented the project plan for the SEP-funded Bay Sediment Conceptual Model.

He first presented the study goals:

- Develop a conceptual model of sediment dynamics in the SF Bay that
 - Is driven by key management questions
 - Reflects spatial and temporal scales appropriate for informing management, monitoring, modeling decisions
 - Addresses recent conditions and future conditions under climate change
 - Is informed by previous conceptual modeling efforts (notably Lowe & Schoellhamer 2017)
 - Will be used to update the SMMS and refine prioritization

Scott pointed out that the Conceptual Model primarily addresses the last three of the five SedWG management questions:

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?

The Conceptual Model will highlight two spatial scales, with major spatial and temporal processes for each:

Full Bay Scale

Major processes:

- Delta influx
- Tributary influx
- Subembayment flux
- Golden Gate flux
- Change in storage (subtidal erosion/deposition)

Temporal processes:

- Intra-annual (wet/dry season) transport
- Inter-annual (wet/dry year) transport
- Decadal change in storage

Mudflat-Marsh-Tributary Scale

Major processes:

- Tributary sediment flux and deposition
- Bay sediment flux and deposition
- Sediment resuspension
- Shoreline retreat/expansion

Temporal processes:

- Large storm events
- Intra-annual (wet/dry season)
- Inter-annual (wet/dry year)
- Decadal

Scott finished by presenting relevant project details, as follows:

- 1.5 year project
- Goal: Complete by March 2022
- Output: technical report with nested models
- Uncertainty assessment will cover main components
- Highlight elements of high magnitude and high uncertainty
- Linked to SMMS
- Coordinate with other conceptual model efforts across workgroups
 - A subgroup from the Sed WG will be formed to provide input as the project progresses

Discussion

Brenda Goeden asked how the project would address intra-annual transport considerations, as BCDC has had difficulty with the same issue. Scott said the group doesn't know yet, and that part of the Conceptual Model exercise will be highlighting areas with high uncertainty. Lester McKee pointed out that the model can still detail differences between wet and dry season processes.

4. Information: Presentations of Selected Special Studies

Simulating Sediment Flux through the Golden Gate

Michael McWilliams presented progress and results from the modeling study simulating sediment flux through the Golden Gate. The focus of the study was to evaluate modeled sediment flux in relation to empirical estimates of flux from the USGS. The sediment transport modeling period lasted from December 1, 2016, to April 15, 2017, spanning the timeframe of USGS data collected during high Delta outflow on February 27-28, 2017.

The analysis simulates hydrodynamics, waves, and sediment transport with the UnTRIM Bay-Delta model, which couples hourly hydrodynamic and wave models with a 90 second bed morphodynamic model. The model features high detail around the Golden Gate.

During wet periods, the model underpredicts peak SSC, while it remains very accurate for dry periods. Overall the model predicts a higher flux at the Golden Gate than USGS calculations, though not by a large amount. The model confirmed a larger sediment flux into the Bay on flood tide than out of the Bay during ebb tide due to tidal asymmetries, which calls for a full tidal sampling period over 24.8 hours to better understand the flux. However, during the sampling period, modeling predicts larger ebb-directed sediment flux and smaller flood-directed sediment flux than the USGS data. The higher predicted ebb flux is due to higher model-predicted SSC and the lower predicted flood flux is due to lower model-predicted flood flow. More investigation is needed. Also, proxy measures for sediment flux at the Golden Gate should be very close to the cross section, making Alcatraz insufficient.

Discussion

Derek Roberts remarked that it is interesting that the model is under-predicting fluid flux given that it's failing to capture some of the more complex flow structure.

Bruce Jaffe noted that the observed SSC was much more variable in the vertical than the modeled SSC. What causes this? Does this difference in SSC structure lead to differing ebb/flood dominance in observations and the model? Michael replied that part of this may be that in the model there are four sediment classes representing suspended sediment, so not all sizes are fully represented.

Luisa Valiela asked if Michael would recommend the 24.8 hour full tidal window sampling interval just at the Golden Gate or anywhere within the Bay. He replied that for fluxes it's helpful anywhere in the Bay, in that it closes the mass balance much better. If you have the flow over 24.8 hours you can compare with observed outflows over the same period.

5. Information: Presentations of Selected Special Studies

Temporal Variability in Sediment Delivery to a South San Francisco Bay Salt Marsh

Jessie Lacy presented on the newly-funded Special Study, which she is co-leading with Karen Thorne. The motivation of the study is to accurately predict how sediment delivery to marshes varies with tidal and wave conditions. The project will measure sediment supply both through tidal creeks as well as across the bay-marsh interface, with Jessie's team monitoring sediment movement and wave conditions, and Karen's team monitoring accretion. Primary research questions are:

- How is sediment deposition in a marsh influenced by SSC and suspended sediment flux (SSF) in the shallows, and SSF in the tidal creeks, on spring-neap and seasonal timescales?
- How is sediment deposition influenced by elevation, distance from source, and seasonal variation in vegetation density/type?
- How does deposition adjacent to the bay-marsh interface compare to deposition near a tidal creek in a marsh with a wave-exposed scarp?
- How does SSC in the eastern shallows of South SF Bay vary on daily, spring-neap, storm event, and seasonal timescales?

Over transects across both the bay-marsh interface and across the marsh from a tidal creek, researchers will collect the following data:

- SSC, water levels, currents in the shallows, marsh, tidal creek, marsh platforms
- Deposition and accretion measurements
- Vegetation characteristics: species, % cover, height, density
- RTK-GPS elevations of all sites

These data will be collected over two study periods: May-June 2021, and December 2021-February 2022. Criteria for site selection included attributes including a large wind fetch, fine sediment in shallows, escarped marsh edge, proximity to restoration sites, accessibility, and interest from the WRMP. As a result, the joint research group selected Whale's Tail south.

Discussion

Lester McKee asked if summer survey results will result in any changes to the inter-study design or approach. Jessie replied that there is room for flexibility in the research design, and any issues from summer measurements can hopefully be rectified in the winter sampling.

6. Information: General workgroup member updates

Brenda Goeden announced that BCDC has moved forward with sand mining study work. A request for proposals in August was delayed but evaluation is now underway. The study consists of three scopes: Sand Budget, Stratigraphy, and Sand Transport. Decisions on study teams will be made by mid-December. The studies will directly inform questions on sand mining activities, but also on coarse grained sediment in the Bay and outer coast. It will be a 2-year effort.

Bruce Jaffe commented that work he and Theresa Fregoso have been doing on bathymetric change is nearing completion. North Bay DEMs were released in January 2020, and remaining DEMS are expected in January 2021. The end product of the effort will be a USGS open file report that updates previous analyses of erosion and deposition. It is expected in Spring 2021.

Jessie Lacy gave an update on USGS work studying erodibility in the North Bay, specifically Suisun Bay. Efforts have been going on for over a year, and emphasis is on the interaction of physical and biological processes, including the effects of benthic infauna on erodibility.

Jessie also briefly introduced a project funded by NERR that is related to site-specific parts of the conceptual model effort, and can inform that work. She also mentioned that USGS is convening a session on sediment transport at the Bay Delta Science Conference in April 2021.

Scott Dusterhoff announced that SFEI is finalizing a report for the EPA-funded Regional Sediment Strategy, which focuses on bayland sediment demand, dry- and wet-future sediment supplies, and management solutions.

7. Wrap up

Scott Dusterhoof detailed next steps for the workgroup. The workgroup will next meet in March 2021 to discuss 2022 funding priorities and proposals, then meet again in May 2021 to decide on funded studies. In the meantime, the Conceptual Model team at SFEI will reach out to some workgroup members for input on that effort.

ADJOURN

About the RMP

RMP ORIGIN AND PURPOSE

In 1992 the San Francisco Bay Regional Water Board passed Resolution No. 92-043 directing the Executive Officer to send a letter to regulated dischargers requiring them to implement a regional multi-media pollutant monitoring program for water quality (RMP) in San Francisco Bay. The Water Board's regulatory authority to require such a program comes from California Water Code Sections 13267, 13383, 13268 and 13385. The Water Board offered to suspend some effluent and local receiving water monitoring requirements for individual discharges to provide cost savings to implement baseline portions of the RMP, although they recognized that additional resources would be necessary. The Resolution also included a provision that the requirement for a RMP be included in discharge permits. The RMP began in 1993, and over ensuing years has been a successful and effective partnership of regulatory agencies and the regulated community.

The goal of the RMP is to collect data and communicate information about water quality in San Francisco Bay in support of management decisions.

This goal is achieved through a cooperative effort of a wide range of regulators, dischargers, scientists, and environmental advocates. This collaboration has fostered the development of a multifaceted, sophisticated, and efficient program that has demonstrated the capacity for considerable adaptation in response to changing management priorities and advances in scientific understanding.

RMP PLANNING

This collaboration and adaptation is achieved through the participation of stakeholders and scientists in frequent committee and workgroup meetings (see Organizational Chart, next page).

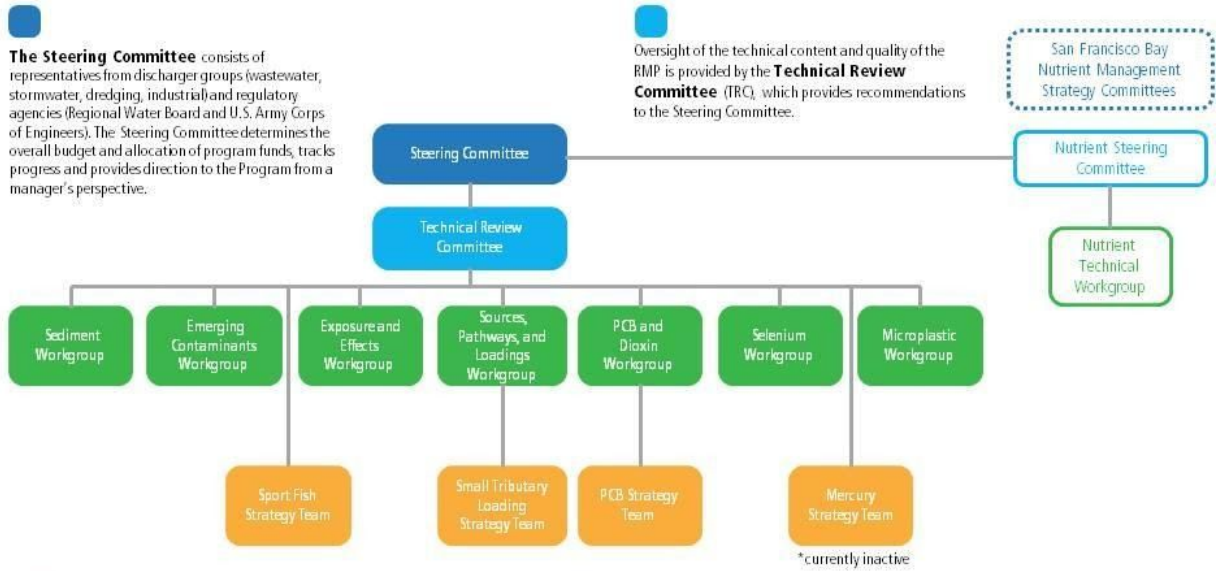
The annual planning cycle begins with a workshop in October in which the Steering Committee articulates general priorities among the information needs on water quality topics of concern. In the second quarter of the following year the workgroups and strategy teams forward recommendations for study plans to the Technical Review Committee (TRC). At their June meeting, the TRC combines all of this input into a study plan for the following year that is submitted to the Steering Committee. The Steering Committee then considers this recommendation and makes the final decision on the annual work plan.

In order to fulfill the overarching goal of the RMP, the Program has to be forward-thinking and anticipate what decisions are on the horizon, so that when their time comes, the scientific knowledge needed to inform the decisions is at hand. Consequently, each of the workgroups and teams develops five-year plans for studies to address the highest priority management questions for their subject area. Collectively, the efforts of all these groups represent a substantial body of deliberation and planning.

PURPOSE OF THIS DOCUMENT

The purpose of this document is to summarize the key discussion points and outcomes of a workgroup meeting.

Governance Structure for the Regional Monitoring Program for Water Quality in San Francisco Bay



The Steering Committee consists of representatives from discharger groups (wastewater, stormwater, dredging, industrial) and regulatory agencies (Regional Water Board and U.S. Army Corps of Engineers). The Steering Committee determines the overall budget and allocation of program funds, tracks progress and provides direction to the Program from a manager's perspective.

Oversight of the technical content and quality of the RMP is provided by the **Technical Review Committee (TRC)**, which provides recommendations to the Steering Committee.

Workgroups report to the TRC and address the main technical subject areas covered by the RMP. The Nutrient Technical Workgroup was established as part of the committee structure of a separate effort – the Nutrient Management Strategy – but makes recommendations to the RMP committees on the use of the RMP funds that support nutrient studies. The workgroups consist of regional scientists and regulators and invited scientists recognized as authorities in the field. The workgroups directly guide planning and implementation of special studies.

RMP strategy teams constitute one more layer of planning activity. These stakeholder groups meet as needed to develop long-term RMP study plans for addressing high priority topics.