San Francisco Bay RSM

THE SCIENCE OF SEDIMENT WORKSHOP:

IDENTIFYING REGIONAL SEDIMENT SCIENCE PRIORITIES

bcdc @50

Commission Briefing February 2016

Outline

- Context
- Background and Goals
- Preparation
- Execution
- Initial Outcomes
- Next Steps

Context

Why should we care about sediment?

We have a serious sediment deficit

Commissioner McGrath (March 19th, 2015)

"We have put dams on most of the rivers and we've known for about the last 20 years, through the work of Phil Williams and Associates and through the USGS, that we are **facing a fairly serious sediment deficit in the Bay. And that [sediment] is needed to deal with sea level rise**, deal with **sustaining wetlands** and, more recently, the importance of mineral deposits, that is the **coarser sediment**, as a base for those systems."

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Commissioner Zwissler: January 15th 2015

"How are we to go about reconciling the inherent conflicts within the various policies, 'Don't dredge,' 'get sand' and 'restore beaches?' "

Balancing conservation and development with constrained resources

Commissioner Pine: January 15th 2015

"I think this is going to be one of the more difficult decisions for the Commission to assess particularly given how much science and technical expertise is involved….It is very hard for me to know how to look at this given the complexities."

Complexities of Science and Technical Expertise

Bay Plan Policies

Tidal Marsh and Tidal Flats

The Commission **should support comprehensive Bay sediment research and monitoring to understand sediment processes necessary to sustain and restore wetlands.** Monitoring methods should be updated periodically based on current scientific information.

Bay Plan Policies

Subtidal Areas

The Commission should continue to **support and encourage expansion of scientific information on the Bay's subtidal areas, including:** (a) inventory and description of the Bay's subtidal areas; (b) the relationship between the Bay's physical regime and biological populations; (c) **sediment dynamics, including sand transport, and wind and wave effects on sediment movement;** (d) areas of the Bay used for spawning, birthing, nesting, resting, feeding, migration, among others, by fish, other aquatic organisms and wildlife; and (e) where and how restoration should occur.

Bay Plan Policies

Dredging

The Commission should continue to participate in the LTMS, the Dredged Material Management Office, **and other initiatives conducting research on Bay sediment movement,** the effects of dredging and disposal on Bay natural resources, **alternatives to Bay aquatic disposal,** and funding additional costs of transporting dredged materials to non-tidal and ocean disposal sites.

Background and Goals

Workshop Background

2010

BCDC & USGS co-host State of Sediment Science Workshop

2011

BCDC receives Coastal Impact Assistance Plan (CIAP) grant

BCDC conducts literature review for RSM plan

2013

LTMS 12-year Program Review

2014

BCDC hosts Sand Mining Science Panel

2015

BCDC hosts Sediment Strategy Workshop

Workshop Goals

- Establish an understanding between practitioners and scientists about information needs and management decision considerations.
- Identify priority management issues by area related to the physical processes of sediment in the Bay.
- Develop a research strategy for how to address the highest priority sediment management issues.

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Preparation

Workshop Preparation

Engagement with scientists

- With the advice of two scientists (SFEI and USGS), BCDC's sediment management team began developing the structure for the workshop

Engagement with practitioners

- Solicited feedback from managers and regulators around the Bay who work with sediment to gather a baseline of existing management questions

Sediment Management Questions Related to Dredging	Number of Responses		
	Highly Relevant	Somewhat Relevant	Irrelevant
Will placing dredged material in Bay work to augment marshes or mudflats? What are the water quality implications of this?	10	0	3
Would dumping dredged sediment in the Bay help minimize the impacts of clearing?	8	2	3
Does the water coming into the Bay equate to less sediment in our channels/berths/marinas?	7	4	2
Is the bay really clearing? (decreasing in sediment)	7	4	1
Where is my sediment coming from?	7	3	3
What do we consider the sediment system? What is the "whole"?	7	1	4
Is the Bay moving to a new normal in terms of a sediment balance? When or will it stabilize?	6	6	1
What is the shoaling rate of sediment in my berth/project area?	6	4	3
What is the effect of removing sediment from the Bay?	6	3	4
What is the long-term fate of aquatic disposal of dredged material and disposal plumes? Is an eelgrass bed buffer needed/effective?	5	7	1
How do adjacent projects impact my project?	5	5	3
What will clearing mean nearshore and in deeper water?	5	6	2

Respondents

- SF Baykeeper
- EPA/DMMO
- SCC - South Bay Salt Ponds
- EBRPD
- The Bay Institute
- USACE/ DMMO
- Port of Oakland
- WRA
- Contra Costa County Flood Control District
- Zone 7 (Alameda County Flood Control and Water Conservation District - Livermore-Amador Valley)
- Santa Clara Valley Water District
- San Mateo County Flood Control District
- Marin County
- Golden Gate National Parks Conservancy

Scientists	Practitioners
Watersheds, Tributaries, and Flood Control Channels	
Lester McKee - SFEI	Liang Xu - SCVWD
Dave Schoellhamer - USGS, Phillip Trowbridge - SFEI	Carl Morrison - BAFPAA
Laurel Collins - Watershed Sciences	Beth Christian - Regional Water Board
Maureen Downing-Kunz - USGS	Dan Cunning - EBRPD Delta Region, Luisa Valiela - EPA
Beaches and Shorelines	
Doug George - Applied Marine Sciences	Caroline Christman - Golden Gate National Park Conservancy, Mark Johnsson - CCC
Louis White - ESA	Ian Wren - Baykeeper
	Kristen Ward - GGNRA
Marshes and Mudflats	
John Callaway - USF	John Bourgeois - Coastal Conservancy
Jessie Lacy - USGS, Stuart Siegel - SF Bay NERR	Sandra Scoggin - SFBJV, Chris Barr - USFWS - SF Bay NWRC
Jeremy Lowe- SFEI	Bob Batha - BCDC
Mike Vasey - SFB NERR	Melissa Amato - USFWS
Open Bay and Subtidal	
Theresa Fregoso - USGS	Brian Baird - Aquarium of the Bay
Michael MacWilliams - Anchor QEA	Brian Ross - EPA, Sarah van der Schalie - NOAA
Lissa MacVean - Stanford, UCB	Rob Lawrence - USACE
Jeff Steevens - ERDC	Anne Whittington - Port of Oakland

Categories of Sediment Areas and Activities

Watersheds, Tributaries, and Flood Control Channels

Monitoring of Sediment Status and Trends

Marshes and Mudflats

Open Water and Subtidal Bay

Beaches and Non-wetland Shorelines

Execution

Workshop Structure

Day 1

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Participants

(Scientists + Practitioners)

- Introductory presentations from workshop team and practitioners
- Generation of list of most important management questions
- Prioritization of management questions within each of the 4 categories

Q I.D.	Votes	Watershed, Tributaries, and Flood Control Questions
W1	18	How can we design channels to help convey sediment to marshes/baylands rather than into the Bay?
W2	15	What do we estimate to be the change in sediment supply/erosion of our watersheds into the future (using modeling)?
W3	13	Where can we reuse dredged material from channels—nearby, locally, and cheaply?
W4	13	How do we resolve the conflict between policies encouraging the trapping of sediment upstream and those allowing it to flow through? -Are there opportunities here for decision science tools? -Can we identify the hurdles? -Could we use multi-criteria decision analyses tools to address sediment management alternatives?
W5*	13	How do we better link our flood plains with our marsh plains?

**Since there was a tie, the top 5 questions were included for this sector*

Q I.D.	Votes	Marshes and Mudflats Questions
M1	18	How can we verify or test (i.e., through pilot study) the modeling results of in-Bay placement naturally redistributing to marsh plain, leading to more efficient "beneficial reuse"?
M2	13	How and where do/should we assist vertical accretion of marsh/mudflats? (a) viability of thin layer deposition of dredged sediment in marshes; (b) reconnecting flood control channels to marshes; (C) effectiveness/timing/ location of sediment placement (source replenishment) on mudflats for redistribution onto marshes; (d) criteria to prioritize locations for marsh conservation or restoration
M3	12	What is the predicted "new normal" for suspended sediment concentrations (a critical driver for predicting marsh accretion rates), and how does it vary spatially around the Bay.
M4	12	How can we design an integrated monitoring program of both natural and restored marshes (e.g., water levels, accretion rates, sediment supply) to aid in future restoration designs? (i.e. data-driven transfer of lessons learned from existing restoration projects to aid in improving designs for newly planned restoration efforts)

Q I.D.	Votes	Beaches and Non-wetland Shoreline Questions
B1	11	Are there particular shoreline areas that are most at risk from erosion and sea level rise (SLR)?
B2	11	Are there new/candidate sites for shoreline restoration where natural processes can be used, as opposed to retrofitting existing armored shorelines (i.e. using horizontal levees)
B3	11	Where should managed retreat be applied/implemented? What are the cost/benefits?
B4	9	Where is armoring no longer needed and can be removed to restore sediment supply/ transport?

Q I.D.	Votes	Open Bay and Subtidal Areas Questions
S1	18	Does placement of dredged sediment at in-Bay disposal sites help with shores and wetlands? (fate and transport)
S2	14	Can we develop sediment budgets for embayments, tributaries, and the flux between the Golden Gate (GG) and outer coast?
S3	13	What is the sand budget of the Bay? (Including watersheds, shorelines, beaches & GG) What is the source and transport of sand moving on and off of beaches?
S4	12	How would deeper water (due to sea level rise) affect sediment deposition dynamics of mudflats and shallow subtidal shoals?

Votes	Watershed, Tributaries, and Flood Control Top Question
18	How can we design channels to help convey sediment to marshes and baylands rather than into the Bay?

Votes	Marshes and Mudflats Top Question
18	How can we verify or test (i.e., through pilot study) the modeling results of in-Bay placement naturally redistributing to marsh plains, leading to more efficient beneficial reuse?

Votes	Beaches and Non-wetland Shoreline Top Question
11	Are there particular shoreline areas that are most at risk from erosion and sea level rise?

Votes	Open Bay and Subtidal Areas Top Question
18	Does the placement of dredged sediment at in-Bay disposal sites benefit shores and wetlands?

Workshop Structure

Day 2

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Participants

(Mostly scientists)

- Reorganization of priority management questions into scientific research groups
  - Fate and Transport
  - Budget and Supply
  - Status, Risk, and Resilience

- Development of research strategy components for each group
- Identification of overlapping study ideas between groups

Initial Outcomes

- Extensive list of prioritized sediment questions
- Summary report of the workshop and the discussions that took place
- Beginning pieces of a research strategy
  - Region-wide monitoring and data needs
  - Outlines for each research group
  - Interested scientists

In Summary, this work will allow us to:

- Understand how much of what type of sediment we have, and where,

- Increase fluvial and tidal connections to improve sediment conveyance,

- Increase the beneficial reuse of sediment in the context of a limited incoming supply in order to maintain our wetlands,

- Identify shorelines at risk from sea level rise and ways to reinforce them through sustainable means, mimicking natural systems

Next Steps

Potential Next Steps

1. Development of working groups
   I. Sediment Fate and Transport
   II. Sediment Budget and Supply
   III. Sediment Status, Risk, and Resilience

2. Schedule of working groups
   I. Series of meetings from February through April
   II. Draft strategy anticipated by May
   III. Staff will report back in June 2016

Summary

- We have a sediment deficit in the Bay, so need to use what we have wisely, in a way that benefits the region
- This workshop was successful in identifying top priority management and research questions
- The research strategy will require follow-up work from participants
- Funding for studies related to this work exists

Thank you!

Questions?