Sediment Supply to San Francisco Bay: Today and Into the Future

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Sediment supply to San Francisco Bay affects the feasibility of marsh restoration, transport of sediment-associated contaminants, water clarity, and navigational dredging. Suspended sediment in the Bay declined beginning in 1999 and there has been a paradigm shift where sediment that previously was considered a nuisance is now considered a resource to be managed. Since then, sediment supply to San Francisco Bay has been studied at several sites. During summer 2017, we updated and synthesized those studies to assist resource managers planning marsh restoration, evaluating marsh and mudflat resilience to sea level rise, planning dredging, maintaining flood control channels, and regionally monitoring and managing sediment. The scope of the synthesis includes fine sediment and sand and addresses 4 questions:

1) What are the magnitudes and sources of sediment transported to San Francisco Bay?
2) What are the present temporal trends of sediment supply to San Francisco Bay?
3) What are the most likely qualitative scenarios for future sediment supply to San Francisco Bay?
4) How can sediment monitoring be improved to fill data gaps and better provide information for resource managers?

We discussed the synthesis with stakeholders on October 5, 2017, and are currently preparing a written report.

Keywords: Sediment, suspended-sediment, San Francisco Bay, sediment transport,

Session Title: San Francisco Bay Sediment – Bringing Clarity to a Turbid Topic

Speaker Biography: Since 1993 David Schoellhamer has studied suspended sediment transport in San Francisco Bay for the US Geological Survey. Recently his studies have focused on the multi-decades decline of suspended sediment in the Bay. He earned a Bachelor and Master degrees in Civil Engineering from UC Davis and a doctorate in Coastal and Oceanographic Engineering from the University of Florida.

Sediment Savvy: Developing a Sediment Strategy for Bayland Resilience

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Sediment is a precious resource that is essential for sustaining tidal wetlands and mudflats (i.e., baylands) around San Francisco Bay that will be resilient under a changing climate. Developing an understanding of anticipated bayland sediment need and associated sediment supply in the coming decades requires sediment science to be integrated across the watershed, bayland, and bay components of the ecosystem, considering scenarios of sea level rise, large storm frequency, baylands restoration, and management choices in both the baylands and watersheds. Such integration is needed for discrete Bay shoreline regions to enable determination of areas with the greatest overall sediment need and development of localized sediment management strategies.

Currently, there is an effort underway to develop a science-based regional sediment strategy to inform decision-making for the resilience of San Francisco Bay wetlands and water quality. The regional sediment strategy is being conducted in close coordination with other regional efforts to: 1) assess projected bayland sediment demand, sediment supply, and associated long-term resilience for discrete shoreline regions for climate change-bayland restoration-land use change scenarios; 2) develop sediment management guidelines for bayland resilience (including key tradeoffs); and 3) develop a monitoring strategy aimed at collecting data to improve our ability to manage sediment delivery to and movement within the Bay. The sediment strategy will also include an assessment of potential sediment sources that could be used locally to improve bayland resilience (e.g., sediment excavated from flood control channels and construction sites). This presentation will provide an overview of knowledge gaps regarding long-term baylands resilience, this project's overall approach for assessing sediment dynamics and bayland resilience, and initial findings related to bayland sediment demand. Funding for this work is being provided by the EPA Water Quality Improvement Fund and the San Francisco Bay Regional Monitoring Program.

Keywords: bayland resilience, sediment management, climate change, tradeoffs

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Speaker Biography: Scott Dusterhoff is a senior scientist and geomorphologist at the San Francisco Estuary Institute with a background in fluvial geomorphology, watershed hydrology, and estuarine/tidal wetland dynamics. For two decades, Scott has been working in coastal and upland watersheds throughout California, Oregon, and Washington, as well as in the Mid-Atlantic, on projects that use in-depth scientific investigations to inform sustainable ecosystem management

approaches. He has extensive experience using a combination of field-based data, numerical modeling, and geospatial tools to characterize fluvial and coastal hydrologic/hydraulic processes and sediment transport dynamics. Scott currently leads several projects in the San Francisco Bay Area that focus on developing holistic management approaches that support resilient, multi-benefit tidal and riverine landscapes.

Managing Mud, A Valuable San Francisco Bay Natural Resource

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Management actions that affect sediment processes in San Francisco Bay requires coordination of regulatory and voluntary actions, and a familiarity of the ongoing scientific research, and scientific-decision making. The San Francisco Bay Conservation and Development Commission's (BCDC) Sediment Management Program has tracked and analyzed sediment management these activities and related sediment science for a number of years, with the goals of identifying methods to improve the health of the Bay system, work with scientists to fill data and knowledge gaps, change management practices, and prepare the system to adapt to future environmental conditions. The Bay sediment system has exhibited a decline in suspended sediment supply from the Delta, its primary source historically, and an increased relative contribution and importance of the local tributaries. Local tributaries are often flood control channels that were historically dammed and altered, thus limiting their sediment supply to the Bay. The restoration community has established ambitious goals of restoring 100,000 acres of tidal wetlands, and in combination with the projected future rising Bay waters and decreased sediment supply there is a large demand for sediment in the system. Understanding the efficient use of limited sediment resources and solutions to future sediment demands requires a complete understanding of the physical processes, supply, demand and management activities which regulate the outcome. Connecting USGS's David Schoellhamer's sediment budget discussion and SFEI's Scott Dusterhoff's recent work on channels and shorelines, this talk will incorporate what is understood about the overall system, the current management activities, and ways the region may reconsider current management practices and activities.

Keywords: sediment, wetlands, restoration, ecology, management, regulation, beach nourishment, estuary

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Speaker Biography: Brenda Goeden is the Sediment Program Manager for the San Francisco Bay Conservation Development Commission, where she has been working on issues related to sediment supply, management and use in San Francisco Bay for the past 17 years. She manages the Long Term Management Strategy for the Placement of Dredged Sediment (LTMS) in the Bay Region for the Commission, the planning and regulatory framework for all dredging projects in the Bay. This program produces between 2.5 and 4 million cubic yards of sediment annually and strives to maximize beneficial reuse of the sediment. She has expertise in dredging, aggregate mining, wetland restoration, sediment transport, and region's regulatory framework. She has been expanding sediment management and planning beyond dredging and sand mining to include needed sediment for habitat projects, flood control management and watersheds. She is an avid birder, wildlife rehabilitator and naturalist, focusing on the marine and estuary environment.