Bay Area Ecosystems Climate Change Consortium

in conjunction with

San Francisco Bay Area Sentinel Site Cooperative

Thursday, April 20, 2017, 10:00 AM - 2:00 PM
Room B/C, 2nd Floor, North Tower
Ronald V. Dellums Federal Building (1301 Clay St), Oakland, CA

Meeting Summary

Attendees:

Sarah Moore, Consultant to World Wildlife Fund
Ariel Rubissow Okamoto, SFEP
David Loeb, Bay Nature
Matt Gerhart, Coastal Conservancy
Roger Leventhal, Marin County
Madeline Foster-Martinez, UC Berkeley
Brian Benn, Environmental Financial Solutions
Andrew Gunther, BAECCC
Aimee Good, SF Bay NERR
Adam Fullerton, BCDC
Nate Kauffman, LEAP
Colin Grant, USFWS
Irina Irvine, National Park Service
Caitlin Sweeney, SFEP
Michael Vasey, SF Bay NERR
Shiva Berman
Brian Berns
Jenna Judge, SF Bay Sentinel Site Cooperative

Anne Morkill, USFWS*
Sara Hutto, GF National Marine Sanctuary*
Matt Ferner, SF Bay NERR*
Lisa Micheli, Pepperwood Preserve*
Carl Morrison, BAFPAA*
Sam Veloz, Point Blue*
Veronica Pearson, Marin County*
*via teleconference

Attendees introduced themselves and their BAECCC-related projects. There were no additions to the agenda.

Update on the next steps for BAECCC
Matt Gerhart, State Coastal Conservancy

Matt summarized where we stand for general operations. We're getting to the tail end of the Moore Foundation funding, and the BAECCC Steering Committee has been considering this issue. One change is that the Sentinel Site Cooperative has made Jenna available, and Andy has been obtaining some small contracts that will allow BAECCC to continue at a low rate while we look for funding to provide coordination support. In the meantime, we're developing some specific workshops and looking for more support. If there is interest in specific initiatives that BAECCC could be involved in please contact Andy or Matt. Andy will continue producing the BAECCC Brief as part of his personal work as a climate change educator.

Update on Development of the State's final Coastal Regional Sediment Management Plan for Marin and Sonoma counties

Sara Hutto, Greater Farallones National Marine Sanctuary

Due to bad traffic delaying the morning speaker's arrival from Marin County, Sara Hutto's update was moved up on the agenda. The Sanctuary is completing the final version of the Coastal Regional Sediment Management Plan, which is focused on the outer coasts of Marin and Sonoma Counties. Goals of this one-year project are to identify approaches for sediment management, encourage beneficial reuse, reduce shoreline erosion, and enhance public safety and access. A variety of state, federal, and local agencies, and nonprofit groups are involved in advising the project as part of a working group. Goals include mapping projected shoreline change at 10, 20, and 30 year intervals and investigating overlap of these changes to key infrastructure and resources. There is also an agency-only Technical Advisory Committee to provide specific context for the plan.

A draft plan is anticipated in the fall and final in Feb '18. Questions can go to technical lead Doug George (doug.george@noaa.gov).

Novato Creek Dredged Sediment Beneficial Reuse Project

Roger Leventhal, Marin County Flood Control District

Roger started his presentation by noting that eastern Marin County is one of the most vulnerable regions in our area to sea level rise. They are experiencing "sunny day" flooding, scarping of marsh edge, and damage to engineered (rip-rap) shorelines. Adaptation to sea level rise, whether traditional "hard" (or "gray") approaches or soft (or "green") approaches, often require sediment. In this context, "sediment" is actually not one thing but is actually a resource with much variability. Coarse sediments are needed to restore beaches, fine-grained mud for tidal marshes, and levees need sediments that are non-compressible. We don't generate very coarse sediment in the bay; Marin County's restoration project on Aramburu Island work required import of larger grained material from outside the Bay.

Finding and moving sediment is a very messy business. Sediment movement can be done as "bulk fill," where large amounts of sediment are delivered to a location, with the restoration of Hamilton Airfield being an example (4-5 feet of sediment delivered, 6 million cubic yards[yd^3]). Sediment movement can also be accomplished in "thin-lifts," where a smaller amount of sediment is moved and applied using different methods that create a thin layer on the surface (*e.g.*, in Louisiana, dredged sediment is sprayed onto marshes). Marsh vegetation has the capacity to grow up through the thin layer of sediment, as incidentally demonstrated in the Sonoma baylands at the end of the dredge pipe (this is taking advantage of the natural disturbance response of the plants). This provides an opportunity to raise marsh heights gradually with thin-lift applications.

There is a need to pilot both engineering approaches and habitat creation techniques using thin-lift applications in the Bay Area. Among outstanding questions are the best application thickness for plant regrowth, the impact of sediment chemistry (including salinity) on sediment behavior and biological impacts, how to control placement, production rates and cost.

Marin County Flood Control (MCFC) de-silts about a mile of Novato Creek every four years to increase flood control capacity, removing in the range of 24-40,000 yd^3. Much of this sediment has been taken to landfills, and the flood control benefit is limited because the channel fills in quickly. Roger noted the

metric of 18 yd^3 per dump truck, so the dredging of Novato Creek generates 1,300-2,200 truck-loads of sediment.

MCFC was interested in pursuing an alternative type of project that beneficially reuses the sediment close to where it is generated, but they faced several challenges. One such challenge is that public agencies have some degree of inertia with how they have done things in the past. Agencies consider it essential that they get a permit and achieve specific goals when they spend public money, and so they can be very risk averse to piloting experimental techniques that might fail. Additionally, while hydraulic dredging that generates a sediment slurry is an attractive approach, it is not typically used in flood control channels in the Bay area and so there is limited equipment available to conduct such projects. Instead, coffer dams are installed in channels to dry out sediment, and then it is dug out and loaded in trucks.

MCFC decided to pursue a novel approach in Novato Creek, in part due to the understanding of the natural landforms developed in the Flood Control 2.0 project and projections for sea level rise. They requested permission to place sediment in an existing wetland to build an ecotone slope ("horizontal" levee), reusing the sediment locally to develop future protection from sea level rise. MCFC recognized that their novel project would require a novel permit, and one of their goals was to expose key permitting issues related to reuse of FC sediments, given the conclusions from the Baylands Ecosystem Habitat Goals Update regarding the need to accelerate wetlands restoration.

The project proposed to reuse 12-15,000 yd^3 of previously dredged material, as this drier material is required for the levee core for geotechnical reasons. The project proposed to thin lift 5-8,000 yd^3 to construct ecotone slopes, as these slopes do not have the same geotechnical constraints as the levee core, and to stockpile up to 4 feet of sediment for future levee core construction. Roger noted that levees built on soft ground settle over time, so it is best to build a levee slowly, as this allows for settlement to occur over time. However, this isn't how capital funds are appropriated by government agencies, and so the long-term construction plan of MCFC is also an innovation in the project.

The project was also complicated by the existence of a Novato Sanitary force main through the wetland proposed for thin-layer application. Novato Sanitary has counted on existing MCFC levees to protect the force main, although there is no formal agreement that requires MCFC to provide this service. As restoration moves forward, MCFC may make decisions that will increase vulnerable of the force main, pointing out that novel projects often require rethinking existing institutional arrangements.

MCFC made a variety of technical and policy arguments to the Regional Water Quality Control Board in support of the project. The technical highlights included (1) the cost-effective beneficial reuse of dredged sediments – especially local reuse, (2) the phased construction to meet geotechnical requirements, and (3) the commitment to evaluate effectiveness of various thin-layer placement techniques. The policy arguments included the project's (1) consistency with Board policies on beneficial reuse, the Baylands Goals, and Novato watershed planning, (2) support for policies that encourage pilot projects, and (3) the California Wetlands Policy (EO W-59-93).

In the end, the thickness of sediment to be placed was reduced from 4 feet to 2 feet, with 2 feet defined as "temporary", and thus no mitigation was required. Roger noted several times that the RWQCB was great to work with, but they are bound by their rules even though they are interested in innovative approaches. No stockpiles were allowed, and so MCFC had to move sediment around more than they thought was optimal.

MCFC implementation of the project included testing three thin-lift approaches: (1) using a concrete pumping system to place sediment, (2) "flinging sediment" into place using a long reach excavator, and (3) build temporary enclosures where the sediment was mixed into a slurry, and then the walls were breached to let sediment flow out. Concrete pumping had best control over location and thickness, but was not cost-effective as the dry material needs to be mixed, and moved into pump for distribution. The "fling it" method has the advantage of not requiring mixing, but it is likely too slow for large volumes. The mud enclosures require the most space to set up, but were the most effective as they produced a large and fairly even spread of material. MCFC is monitoring revegetation to make sure native species predominate.

Wastewater Biosolids, Wetlands Restoration, and the Bay Bridge Toll Plaza

Nate Kauffman, UC Berkeley Dept. of Landscape Architecture and Environmental Planning
Madeline Foster-Martinez, UC Berkeley Dept. of Civil and Environmental Engineering

Nate started his presentation by noting that by 2040, 2 million additional people are projected to live in the Bay Area, and our urban landscape will need to change in order to accommodate them. This change will occur in the context of alterations caused by climate change, requiring that we think in new ways about our urban areas and the interface between urban and natural lands. He has been considering the shoreline from this perspective, where there is much infrastructure that is vulnerable to sea level rise.

While the value of our baylands for flood control is recognized, there are challenges for re-designing our shoreline to take advantage of these ecosystem services. Nate noted that the urban edge is artificial, and landscape architects can think of it as a "scaffold" for creating a new landscape. To do so, one needs to consider cultural, physical, and economic interests to maximize benefits.

In the context of there being an increased demand for sediment at the shoreline to build resilience to sea level rise, Nate noted that there are many sediment sources including dredging, impounded sediment, upland cut/fill, sand, and biosolids from wastewater treatment. These sediments are currently being collected, conveyed, and stored, and often this storage is temporary prior to the sediments being conveyed again to a destination for use. There can also be steps where the sediments are processed. Given the availability of these sediment flows, and the financial resources expended in their management, they represent a potential resource that can be used.

In particular, Nate noted that we have wastewater treatment plants that are very vulnerable to SLR, and he and Madeline Foster-Martinez have been investigating the possibility of using biosolids produced through wastewater treatment to build shoreline resilience. Biosolids can be a seen as a sediment source, and depending upon their characteristics, could enhance the growth of restored marshes. Marshes built with dredged material, for example, are often quite sandy, and increasing the nutrient content of restoration materials could contribute to the BEGHU objective of accelerating marsh restoration.

Madeline Foster-Martinez then described the initial results of a two-year field experiment conducted at an intertidal site near the UC Berkeley Richmond Field station. Marsh plants were established in a set of tubes containing dredged material (control) or dredged material with a 8 cm layer of biosolids 12 cm under the surface (treatments). While complete data analysis from this experiment is still in progress, she reported that the treatment group had significantly more shoots per plant and more above ground biomass than the control group.

This result clearly demonstrates that biosolids can be used to accelerate marsh plant growth. However, there are outstanding questions that will need to be investigated in a pilot project. For example, it is possible that in such enriched soils marsh plants may not develop as extensive a root system, making them susceptible to damage during storm events. However, Maddie hypothesized that placing biosolids in a deeper layer may actually encourage roots to grow deeper to seek out the nutrient source, thus increasing vegetation stability and resilience to waves and storms.

Nate then described a concept for a pilot project to test biosolids as part of a shoreline resilience project at a site near the metering lights of the Bay Bridge in the Emeryville Crescent. The benefits of using this site include that it is extremely shallow, the waters currently are not used for recreational purposes, there is a threatened fringe marsh, and there is exceptional infrastructure vulnerability. In addition, there are multiple natural analogs existing on-site that can be imitated in developing the pilot project, including barrier beaches and tidal marsh. Nate noted that AECOM has developed a concept proposal for MTC that includes a large breakwater and a "living levee" (1:5 slope) along the roadway by the metering lights and toll plaza.

Nate presented illustrations of a concept for a pilot project that could test the suitability of "natural infrastructure" at this location. The concept includes 500 feet of breakwater and 450 feet of barrier beach to diminish and absorb wave energy, a 3.25 acre tidal marsh in the area protected from wave energy, and a 2.2 acre ecotone slope along the roadway for additional flood protection. These features are modeled after the natural analogs on the site. The tidal marsh could be constructed by shallowing "trench soils" that EBMUD has available from its storm sewer replacement program, and there would also be an opportunity to experiment with using a layer of biosolids to nourish the marsh and ecotone slope. He noted that, in collaboration with BAECCC, he will be working with EBMUD to prepare a workplan for scoping out this project.

The meeting adjourned at 2 PM**.**