

THIN-LAYER PLACEMENT PROJECT SHEET



San Francisco Bay

October 2023

Location: San Francisco Bay National Estuarine Research Reserve Virginia

Type: Habitat restoration

Area:

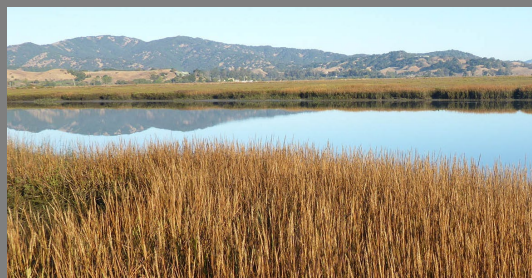
City: San Rafael

County: Marin

Main Agencies: Chesapeake Bay Maryland NERR, Chesapeake Bay Virginia NERR, Drexel University, Great Bay NERR, Narragansett Bay NERR, North Carolina, NERR, Roca Communications+, San Francisco NERR, Waquoit Bay NERR, Elkhorn Slough NERR

State/Province: California

Country: United States



Taken from <https://sfbaynerr.sfsu.edu>.

Background

The San Francisco Bay National Estuarine Research Reserve (SFNERR) manages over 3,700-acres of tidal marshes and undeveloped wetlands. The reserve focuses on the research, monitoring, and education of tidal marsh restoration. Approximately, 97% of the historic tidal wetlands in the San Francisco region have been lost to development, so the reserve serves as a valuable reference for scientific restoration activities. The San Francisco State University manages the reserve in partnership with the federal National Oceanic and Atmospheric Administration (NOAA) and assistance from local partners.

The thin-layer placement (TLP) restoration project was conducted on a small salt marsh called Manzanita marsh located along the western shore of the Richardson Bay just north of the Golden Gate. The marsh is vulnerable to inundation due to it being a small, flat, and poorly drained fringing wetland. The project aims to restore marsh habitat by raising marsh and mudflat elevations using onsite and imported sediment, and reestablishing vegetation. Overall, the project will improve marsh sustainability with sea level rise.

Project Description

The reserve applied the TLP technique in five low marsh and five high marsh habitats, where two different sediment layer thicknesses were tested to establish their effects on vegetation growth. The studied sediment thicknesses were 7 cm and 14 cm. Around 40-50 treatment plots, enclosed by a 0.7 m x 0.7 m frame, were placed within the study site. Six types of plots were used: a 7 cm sediment addition with a 7 cm high containment frame, a 14 cm sediment addition with a 14 cm high containment frame, a control plot with no frame or sediment addition, a reference plot about 10 cm higher than the others

that represented the target marsh, and a 14 cm sediment addition with dredged sediment with a 14 cm high

containment frame. The containment frames were made of untreated pine and were utilized to decrease sediment slumping, loss, and erosion. The reserve used a sediment sourced from local quarries composed of 75% sand and 25% silt and clay with a 10% addition of local mud. The sediment composition aimed to imitate the consistency of dredged and quarry sediments utilized in other local TLP projects. The addition of local mud was meant to replicate the composition of estuarine organic material. An additional plot incorporated dredged sediment to examine the effects of sediment type on marsh responses to TLP. The dredged sediment was sourced from nearby dredging operations or recent TLP project.

Findings

The project found that TLP is a highly effective technique in enhancing salt marsh resilience. The treated marsh maintained its elevation after sediment layer addition. Vegetation recovered in just a few months in the thin treatment plots, yet after 15 months the vegetation cover was equal in both the thick and thin plots. Results indicated that thicker sediment additions were optimal for the restoration of degraded marshes, their higher elevation kept pace with sea level rise. Sediment size was an important factor in this experiment, it was found that coarser sediments increased plant biomass. This suggests that coarser material improves drainage and oxygenation, increasing vegetation growth.

References

- Chesapeake Bay National Estuarine Research Reserve in Virginia. (2019) Mitigating Marshes Against Sea Level Rise: Thin-Layer Placement Experiment. Virginia Institute of Marine Science, William & Mary. doi: 10.25773/kqp4-0532
- Raposa, K. B. et al. (2023). Evaluating Thin-Layer Sediment Placement as a Tool for Enhancing Tidal Marsh Resilience: a Coordinated Experiment Across Eight US National Estuarine Research Reserves. *Estuaries and Coasts* (2023). <https://doi.org/10.1007/s12237-022-01161-y>

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Information on thin layer placement (TLP) case studies has been compiled as part of a DOTS/EWN project to provide a source of information, knowledge, and experience on TLP of sediment or dredged material in aquatic environments. The Thin Layer Placement Website and Map-Portal are funded by the US Army Engineer Research and Development Center (ERDC). POCs for the Thin Layer Placement Website and Map-Portal are:

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