

THIN-LAYER PLACEMENT PROJECT SHEET



Great Bay

October 2023

Location: Great Bay National Estuarine Research Reserve

Type: Habitat restoration

Area: 70.5

City: Durham

County: Strafford

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: New Hampshire

Country: United States



Taken from <https://rb.gy/qjevd>.

Background

The Great Bay National Estuarine Research Reserve (GBNERR) has over 6000-acres (ac) of diverse land and water areas that include salt marshes, mudflats, tidal creeks, and upland forests. It is located 10 miles inland from the coast of New Hampshire and Maine border. The reserve is managed by the New Hampshire's Department of Fish and Game in partnership with the federal National Oceanic and Atmospheric Administration (NOAA).

Rising sea levels, caused by the increase of temperatures due to global warming, have resulted in extensive loss of salt marshes over the globe. Research results have shown that the strategic deposits of thin layers of sediment can help restore and maintain the ecological function of degraded marshes. For this reason, a thin-layer placement (TLP) project was conducted in a nearby marsh in Adams Point, a historic peninsula at the GBNERR. The project evaluated the effects sediment thickness and sediment composition had on the restoration of marshes, as well as compared the use of TLP on low vs high marsh communities.

Project Description

Treatment plots were established in both high and low marsh communities that tested the effect of sediment thickness, comparing thicker and thinner layer additions, on the restoration of tidal marshes. The reserve installed 40-50 treatment plots that were enclosed by a 0.7 m x 0.7 m wooden frame that minimized sediment slumping, erosion, and loss. The sediment thickness added to each treatment plot depended on the desired restoration of that specific area. Thicker sediment addition, 14 cm, aided habitat regeneration, while thinner sediment layers, 7 cm, encouraged vegetation growth. Each restoration area had five types of treatment plots:

a control plot with a frame, a control plot without a frame, a thick sediment addition plot, a thin sediment addition

plot, and a reference plot that represented the desired target. The frameless control plot tests the effects of frame use and site selection since it remained untreated. A standard composition of 75% sand and 25% silt and clay was used to achieve an ideal texture that imitates dredged and quarry sediments utilized in other local TLP projects. The sediment was sourced from local quarries. An additional 10% of local estuarine mud was incorporated into the sediment mixture prior to placement to replicate estuarine organic material and its chemical composition.

Findings

The project found that sediment addition was highly effective at restoring degraded salt marshes. It was found that thicker sediment layer additions were far more optimal at restoring marshes due to their higher elevation that kept pace with sea level rise. Although the 14 cm treatment plots regained vegetation at a slower pace than the 7 cm plots, after 15 months the vegetation cover was equal in both plots. Results showed that coarser sediments improved drainage and oxygenation, therefore creating a healthier marsh with a larger biomass.

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>
- Sediment may be solution to preventing tidal marsh loss.* (2023, March 22). UNH Today. <https://www.unh.edu/unhtoday/2023/03/sediment-may-be-solution-preventing-tidal-marsh-loss>

Points of Contact

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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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