

THIN-LAYER PLACEMENT PROJECT SHEET



Narragansett Bay

October 2023

Location: Narragansett Bay National Estuarine Research Reserve

Type: Habitat restoration

Area: 22 hectare (54 acres)

City: Prudence Island

County: Newport

Main Agencies: RI Department of Environmental Management, NB-NERR, Audubon Society of RI, University of New Hampshire

State/Province: Rhode Island

Country: United States



Taken from <https://rb.gv/4ync7>.

Background

The Narragansett Bay National Estuarine Research Reserve (NB-NERR) is located at the center of the Narragansett Bay on four islands: Prudence, Patience, Hope, and Dyer. The reserve contains about 4,400 acres of land and water. It is managed by the Rhode Island Department of Environmental Management in partnership with Audubon Society of Rhode Island.

Extensive loss of Narragansett Bay's salt marshes over the past century has been a result of subsidence, diking, draining, and sea level rise. A thin-layer sediment placement (TLP) project in Narragansett Bay was created to help minimizing the habitat loss by increasing salt marsh sustainability. The project evaluated the impact of elevation, sediment type, and layer thickness on the success of marsh restoration. A 22-hectare polyhaline marsh known as Coggeshall Marsh was the selected study site for this project.

Project Description

A \$500,000 federal grant provided to the Rhode Island Department of Environmental Management funded the thin-layer sediment placement (TLP) project in Narragansett Bay National Estuarine Research Reserve. The reserve established treatment plots in both high and low marshes that tested the effect of sediment thickness on the restoration of marsh vegetation. Two levels of sediment thickness were tested, 7 cm and 14 cm. The reserve set up 40-50 treatment plots that were with an area of 0.7 m x 0.7 m. 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 biochar amendment with a 14 cm high containment frame. Containment frames were utilized to decrease erosion, sediment slumping, and loss.

Findings

The 14 cm thickness plots recovered marsh vegetation at a slower pace than the 7 cm thickness plots, but the difference was not significant after 15 months of treatment. Consequently, thicker sediment layer additions were recommended to keep pace with accelerated sea level rise. The sediment utilized was sourced from local quarries and was a mixture of 75% sand and 25% silt and clay, to achieve an ideal texture that imitates dredged and quarry sediments utilized in other local TLP projects. A 10% local mud was added to the sediment mixture to provide replication of estuarine organic material. One of the control plots had an extra 10% of biochar called Blacklite Mix, composed of wood biochar, worm castings, and rice bran. Biochar amendment assisted in soil conditioning, increase of soil cation exchange capacity, and reduced soil acidity. Additionally, Blacklite Mix incorporated nutrients into the sediment mix, therefore enhancing the soil and marsh ecosystem. 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
- Thin-Layer Sediment Placement: Evaluating an Adaptation Strategy to Enhance Coastal Marsh Resilience | NERRS Science Collaborative.* (2017, November 1). <https://www.nerrssciencecollaborative.org/project/Raposa17>
- 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*, 46(3), 595–615. <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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