

THIN-LAYER PLACEMENT PROJECT SHEET



Southern Mississippi River Delta, Louisiana

July 2017

Location: Venice, Louisiana

Type: Marsh restoration

Area: 43 acres

City: Venice

Parish: Plaquemines

Main Agencies: Louisiana State University, US Environmental Protection Agency, Louisiana Sea Grant College Program, US Department of Commerce

State/Province: Louisiana

Country: United States

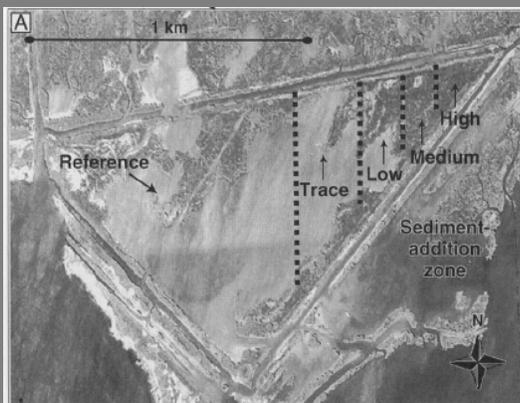
Background

The salt marsh receiving a thin layer of dredged material is located 106 km southeast of New Orleans, LA on the southern portion of the modern Mississippi Delta, near the town of Venice, LA. The salt marsh was degraded due to a combination of a high rate of sea level rise, subsidence, and sediment deficiencies as levees prevent regular flooding from the Mississippi River. The rate of sea level rise for the Mississippi River Delta experienced by this degraded marsh ranged between 0.36 and 1.77 cm yr⁻¹.

The salt marsh received sediment additions as a slurry (85% liquid, 15% solids) in January, 1992 when dredged sediment overflowed during filling of a gas pipeline canal for mitigation purposes. The sediment addition to this degraded salt marsh presented an opportunity to assess plant community response, soil conditions, and marsh resilience and stability. In addition, the marsh was assessed several times over a period of 15 years, providing one of the few long term studies of marsh response to sediment additions.

Project Description

The sediment addition resulted in a gradient of sediments depths across the marsh surface. This gradient was used to evaluate the effect of sediment depth on marsh response. These sediment depths were: reference (no sediment addition), trace sediment addition (< 2cm), < 15 cm sediment addition, 15-30 cm sediment addition, and > 30 cm sediment addition. Elevation, soil physicochemical parameters, including exchangeable nutrients (NH₄-N, P, Ca, Mg, K, Na, Fe, Mn, Cu, and Zn) and vegetation parameters such as above- and below-ground biomass and percent cover were assessed over time. In addition, a resilience and stability experiment was completed 15 years following sediment addition to the marsh surface that included clipping the vegetation to the soil surface or herbicide application. The response of vegetation following the disturbances were recorded.



Stagg and Mendelsohn, 2011

Findings

The addition of sediment to the marsh surface at intermediate depths reduced vegetation stress associated with prolonged inundation by increasing soil aeration and reducing the accumulation of toxic sulfides. The thickest sediment depths (> 30 cm) resulted in elevations above the intertidal position of *Spartina alterniflora*. Plant production was in part associated with the additional phosphorus associated with the dredged material. After 15 years, the marsh area that received intermediate sediment depths were stable and resilient to experimental disturbances, suggesting sediment additions to degraded marshes at appropriate depths is a sustainable restoration technique.

References

Mendelssohn, I.A. and N.L. Kuhn. 2003. Sediment subsidy: Effects of soil-plant responses in a rapidly submerging coastal salt marsh. *Ecological Engineering* 21:115-128.

Slocum, M.G., I.A. Mendelssohn, and N.L. Kuhn. 2005. Effects of sediment slurry enrichment on salt marsh rehabilitation: Plant and soil responses over seven years. *Estuaries* 28:519-528.

Stagg, C.L. and I.A. Mendelssohn. 2011. Controls on resilience and stability in a sediment-subsidized salt marsh. *Ecological Applications* 21:1731-1744.

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Main Agencies:

Funding for this project has been provided by:



Environmental Protection Agency

**Louisiana Sea Grant – National Sea Grant Program by National Oceanic and Atmospheric Administration
US Department of Commerce**

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). The POC for the Thin Layer Placement Website and Map-Portal is:

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