

Are HRE Tidal Marsh Restorations Designed to be Resilient to Climate Change?

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ABSTRACT

Under Section 404 of the Clean Water Act (CWA) the U.S. Army Corps of Engineers and U. S. EPA share responsibility for regulating placement of fill material in wetlands and open waters. It is important to note that the purpose of Section 404 was not to specifically protect wetlands, but to regulate the discharge of fill materials into wetlands, which is an important distinction.

This study examined recent restorations in the Hudson-Raritan Estuary (HRE), San Francisco Bay Estuary and coastal Louisiana, including the use of dredge material to create new marshland or raise the marsh surface. Sea level rise or the effects associated with extreme storm events were not addressed by regulatory agencies in permitting the HRE restorations. However, regulators did take these factors taken into account in other regions of the US.

Adhering to an across the board 'No Discharge of Fill' policy and regulations pose a threat to low lying urban coastal wetlands. Opportunities for urban marshes to migrate inland are limited by development and sediment accretion rates are often less than the rate of local sea level rise. The benefits of allowing marsh 'replenishment' should be incorporated into national regulatory policy. Federal and State permitting decisions need to take into account broader geographic areas, expanded time frames, and projected effects of a changing climate. The prohibition against fill in wetlands and open water should be changed using 'purpose dependent' regulatory guidelines – follow CWA fill regulations to prevent further development, but require 'replenishment' (marsh nourishment) where coastal marshes are drowning or eroding.

Parameter	Jamaica Bay Marsh Islands	Lincoln Park West	Kane Mitigation Bank
Agencies Involved	National Park Service USACE NYSEDC NYCDEP	USACE, NJDEP, NOAA, USFPA, Port Authority NY/NJ, Hudson County Parks, Hudson County Improvement Authority	USACE, NJDEP, USFWS, USFPA, NOAA-NMFS, NJMC NJMIMAC - Freshwater MIMAC (IRT) - Salt water
Financing	Yellow Bar: Federal \$12,767,857 Non Fed: \$6,875,000 Black Wall, Rulers Bar: \$3,411,000 Non-fed	NOM's Stimulus (\$10.6M) NID - NJ (\$0.6M) NID - Federal (\$2.3M)	Privately financed by Emviro Finance Lease payments to the Meadowlands Conservation Trust (public land trust)
Restoration Acreage	154 acres	41.2 acres	240 acres salt marsh; 20 acres freshwater wetlands
Ratio of Low/High Marsh		21.44:1.42	No high marsh
Open Water/Mud Acres		11.29	Estimated 70:30 ratio low marsh:open water/mud flats
Off site Material Used	~900,000 yd ³	339,235 yd ³	No off site material used
Dredge Material Source	Ambrose Channel, Rockaway Inlet, Anby's Aggregates	Ambrose Channel	None
Monitoring Required	Elders - 5 years	No - voluntary 3 year monitoring plan	Yes - 5 years for mitigation banking credit release; 20 years active management by the bank
Monitoring Parameters		Vegetation structure & coverage; Hydrology; Macroinvertebrates; Nekton; Avian; Soil; Qualitative	Vegetation structure & coverage; Hydrology; Channel erosion & silt stability; Hg build up in the food chain
Construction Complete	Elders East - 2006 Elders West - 2010 Yellow Bar, Black Wall, Rulers Bar - 2012	2011	2012 pre-SuperStorm Sandy
Monitoring Complete	Elders East 2012	2013	2017 for mitigation credits; 2032 for bank prior to turnover of the site to the Meadowlands Conservation Trust

HUDSON-RARITAN MARSH RESTORATION CASE STUDIES^{1, 2}



Jamaica Bay Marsh Islands

Ambrose Channel dredged sand used to restore low marsh to 1974 footprint. Sea Level Rise not considered in designing the restoration – topography determined based on amount of available sand and arbitrary temporal restoration target date.



Yellow Bar, Jamaica Bay, NYC

Lincoln Park West Restoration

Garbage removed to build adjacent golf course creating low marsh topography. Restoration funded by NOAA and designed to increase low marsh fish habitat. Local Sea Level Rise not considered in restoration design.



Lincoln Park West, Jersey City, NJ

Kane Mitigation Bank

Subsided marsh surface elevations too low to support low marsh. Gabion style berm required sediment substrate for fill. Financial decision made to use only material available onsite, although regulators indicated they would approve importation of fill. To obtain needed substrate required expanding number, width, and depth of channels and open water areas in this design build project.



Kane Mitigation Bank, NJ Meadowlands

COASTAL MARSH SUSTAINABILITY DETERMINED BY:

- 1) ability of marsh surface elevations to rise at a rate comparable to SLR;
- 2) rate of marsh seaward boundary erosion; and
- 3) space for marsh migration landward.

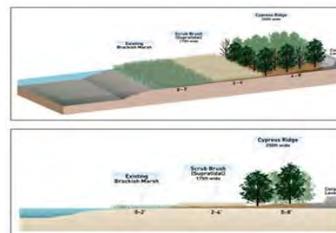
OTHER APPROACHES

Examples of using dredge materials to expand marsh acreage and increase surface topography can be found in other USACE Districts:

- San Francisco Bay "Horizontal Levee" (Bay Institute)³
 - Brackish marsh at landward edge of the marsh restoration
 - Self-maintaining levee
 - Marsh elevation builds as plant root system expands
 - Dredge sediment used as brackish marsh substrate



- Plaquemines Parrish, LA⁴
 - Stabilize existing marsh by filling with dredge sediment
 - Create transitional wetland that will develop a forested ridge adjacent to the levee
 - Enrich existing marsh with sediment and freshwater nutrients from Mississippi River
 - Infill areas where open water is penetrating existing marsh and expand marsh vegetation between open water and back of the levee



RECOMMENDATIONS

- Data based on the projected local Sea Level Rise rate, which will affect a coastal marsh's long-term sustainability should be required for all coastal wetland projects. This data should be integrated into the Federal and State regulatory policies and any project permitting requirements.

- The prohibition against fill in wetlands and open water should be changed using a 'purpose dependent' guideline – retain anti-fill regulations to prevent further development, but require 'replenishment' if existing marshes are subsided, drowning or eroding.

- USACE and USEPA should develop consistent Federal guidelines applicable in all Districts that require 'replenishment' with appropriate fill materials when coastal wetlands are created/restored or when existing coastal wetlands are threatened by local Sea Level Rise.

- Such guidelines should address complex issues, such as what constitutes acceptable fill material(s) and material sources for a specific site; allowable levels of contamination (if any); environmental impacts; project integration with existing Coastal Management Plans; cost and cost sharing; other.

- Public projects should consider construction costs which may be higher in the short term due to importation of offsite material(s) that would enhance greater future sustainability, and should not be required to select the lowest cost bid that does not address future sustainability.

REFERENCES

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