Salt Marsh Loss

Possible Causes, Restoration Needs, and Research Opportunities

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Research to address coastal issues within an urban landscape:

- Nutrient enrichment and contaminants
- Invasive species
- Shoreline change
- Habitat restoration
- Species harvest
- Resource inventory and monitoring

http://www.ci.uri.edu/naccesu/

Marsh Loss at Jamaica Bay, NY

Marsh Loss, Jamaica Bay

Courtesy of NY DEC

Examples of Marsh Loss in Jamaica Bay

(source: Hartig et al. 2002)

	1974 acres	1999 acres	% Loss
All Marsh Islands	1,974	1,223	38%
Individual Islands			
Big Egg Marsh	84	52	38%
Yellow Bar Hassock	172	96	44%
Elders Point	98	22	78%

Why are Jamaica Bay Marshes Being Lost?
(2001 Blue Ribbon Panel and Science Board)

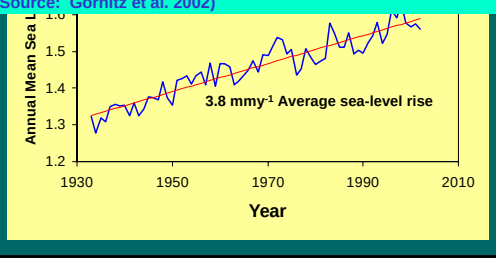
- Accelerated Rate of Sea Level Rise
- Lack of Sediment to Marsh Surface
- Wrack
- Dense Mussel Populations Alter Hydrology
- Contaminants and Nutrients
- Waterfowl Grazing
- Plant Pathogens

Relative Sea-Level Rise (Sandy Hook, NJ)

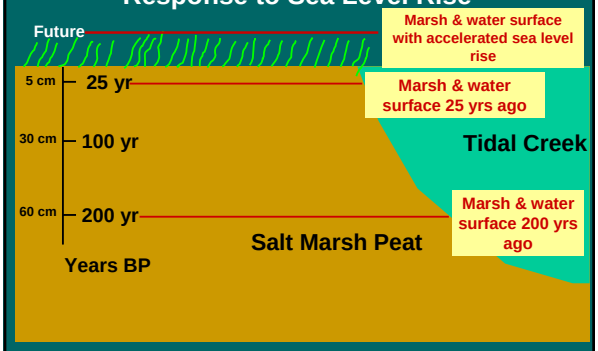
Absolute or Eustatic Rise in Sea Level = 1.3 mm y^{-1}
Regional Land Subsidence = 2.5 mm y^{-1}

Relative Sea Level Rise (tide gauge) = 3.8 mm y^{-1}

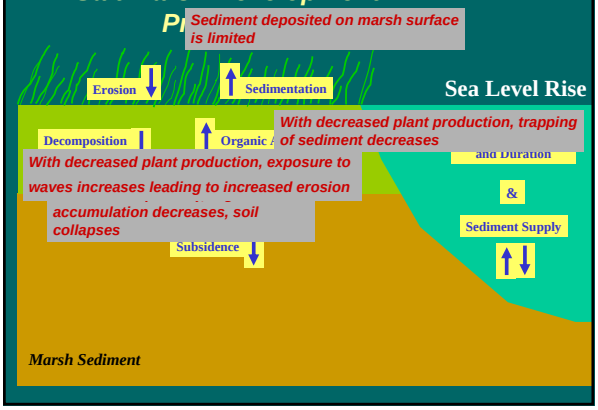
(Source: Gornitz et al. 2002)



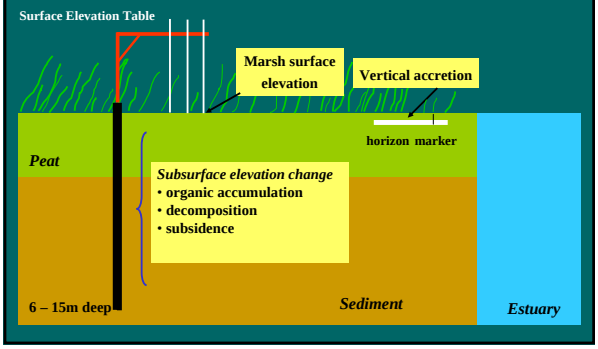
Salt Marsh Development in Response to Sea Level Rise



Salt Marsh Development

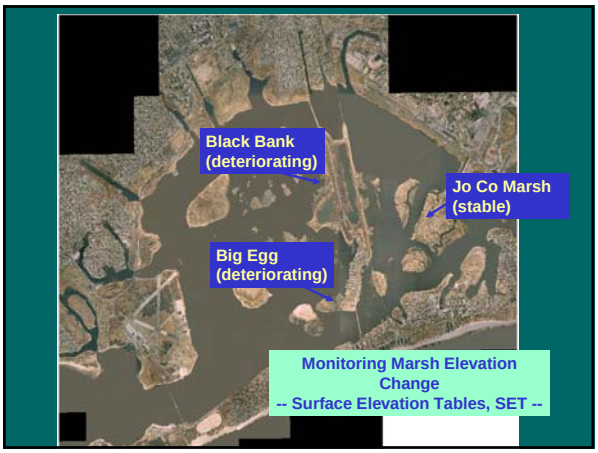


Monitoring Salt Marsh Elevation Change



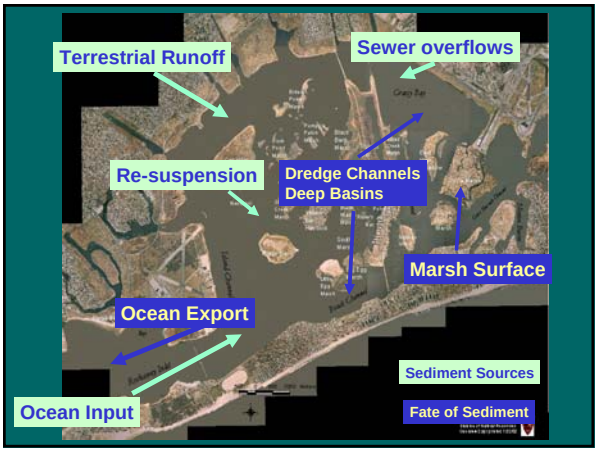
Measuring sediment accretion on marsh surface

Cryo-core technique



Factors Contributing to Marsh Loss

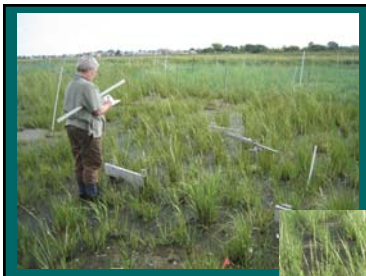
- **Sediment Deficit to Marsh Surface**
  SETs (Cahoon, USGS)
  Sediment Budget (Cochran & Goodbred, Stony Brook Univ.)
- **Wrack** (NPS study)
- **Dense Mussel Population Alters Hydrology**
  Mussel Berm Hypothesis (Franz, Brooklyn College)
- **Contaminants, Nutrients** (Kolker, Stony Brook Univ.)
- **Waterfowl Grazing** (Jamaica Bay EcoWatchers)
- **Pathogens and Spartina**



Big Egg Marsh Experimental Restoration

- Dredge with high-pressurized spray nozzle applies sediment over marsh surface
- Spray achieved a maximum distance of 120 ft.
- Sediment was applied in varying thickness (8 – 17 inches), but some depressions of several feet were filled.
- The fill material was 97% sand. 7,000 cubic yards was applied.

Fall 2003



Late Summer 2004 (1 growing season)

What measures can we take to reverse wetland loss and restore wetlands in Jamaica Bay?

Determine factors related to wetland loss

- role of local subsidence
- response of *Spartina* to high nutrients and contaminants
- sediment core analysis to refine marsh development history
- pathogens on *Spartina* (e.g., brown marsh in Louisiana)
- develop models that account for interactions of sea level, subsidence, nutrients, biotic processes, etc.

Design and implement remedial strategies

Establish pilot marsh restoration sites

- evaluate different restoration techniques
  - thin layer spray at Big Egg (small scale)
  - sediment application at Elder's Marsh (large scale)
  - Jamaica Bay fringe or periphery area restorations
  - Other techniques?
- determine long-term sustainability of restored sites