



# Prioritizing Urban Salt Marshes for Restoration and Protection

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## Introduction

Salt marshes adjacent to large urban areas are put under great duress as a result of surrounding land use, water quality, and development pressures. In large coastal cities such as New York, the benefits provided by salt marshes, including wave attenuation, impact large numbers of residents whose homes are in low lying flood zones, making it particularly important to identify which urban marsh areas may be more vulnerable to loss due to erosion, filling, draining, and ditching, eutrophication, and the effects of sea-level rise. The New York City Department of Parks & Recreation, Natural Resources Group, in partnership with the Natural Areas Conservancy of New York City, will take a multi-tier approach to assess the ecological health and sustainability of salt marshes in New York City.

## Objectives

- To assess the ecological health and sustainability of NYC salt marshes
- To compare NYC marshes to marshes around the Mid-Atlantic region
- To compare condition of marshes within NYC
- To create a vulnerability index incorporating data from a variety of sources that prioritizes salt marsh complexes within the city for protection and restoration
- To determine the long-term sustainability of salt marshes in NYC
- To identify salt marsh migration zones under various sea-level rise scenarios

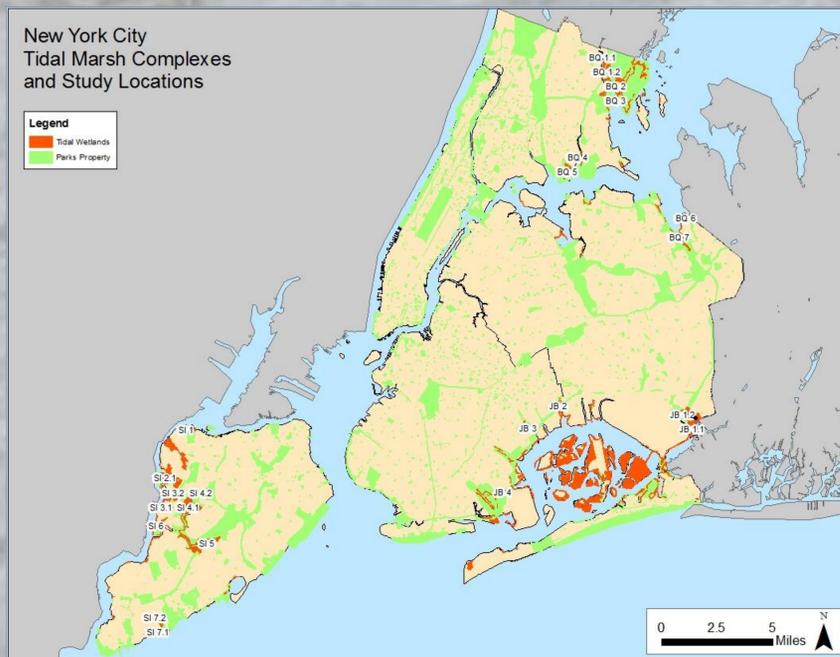


Figure 1: Twenty-five salt marsh complexes within New York City on NYC Parks property were selected for assessment



Figure 2: Damage from Hurricane Sandy on a neighborhood in Staten Island



Figure 3: Collecting Tier 3 data in Pelham Bay Park, The Bronx

## Methods

NYC Parks and the Natural Areas Conservancy will take a multi-tier approach to assessing salt marsh condition. Those tiers include:

- Tier 1: Landscape Analysis
- Tier 2: Rapid Assessment: Mid-Atlantic Tidal Wetland Rapid Assessment Method (MidTRAM)
- Tier 3: Marsh-wide Ecological Assessment
- Tier 4: Site-Specific Intensive and Long-Term Monitoring

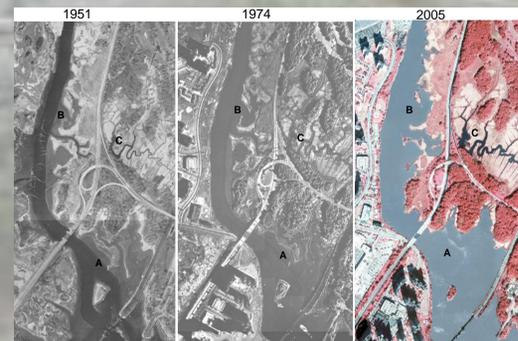


Figure 4: Example of landscape analysis, historic trends in marsh loss analyzed through aerial photo interpretation

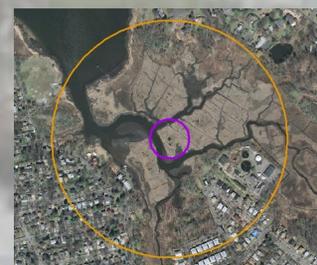


Figure 5: Example of rapid assessment sample point and desktop analysis at the Udall's Cove Park Preserve marshes. MidTRAM field assessment area in purple, 250 m buffer in orange



Figure 6: Desktop assessment of average distance to development to assess buffer condition for MidTRAM

Marsh-wide Ecological Assessment protocol includes arraying 50 random 5m<sup>2</sup> plots and assessing vegetation community as well as soil characteristics

- Species richness, density, percent cover, total cover
- Soil shear vane strength
  - Determined for rhizospheres of two dominant species; *Spartina alterniflora* and *Spartina patens*
  - Hand vane tester that tests for soil shear vane strength

## Preliminary Results

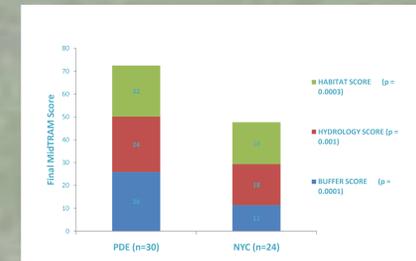


Figure 7: Results of rapid assessment (MidTRAM), New York City salt marshes compared with marshes of the Mid-Atlantic as sampled by the Partnership for the Delaware Estuary (PDE). Results are broken up by three major factors that influenced the overall scores

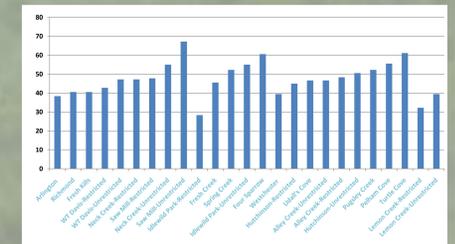


Figure 8: MidTRAM scores for all marshes sampled in New York City

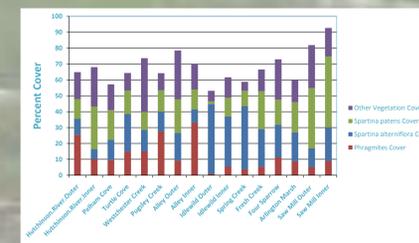


Figure 9: Total percent cover determined through Tier 3 assessments. Cover by site is broken up into native dominants, invasives (Phragmites) and other

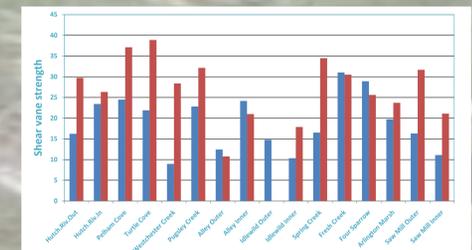


Figure 10: Shear vane strength in rhizospheres by species (*Spartina patens*: red, *Spartina alterniflora*: blue). Values are marsh-wide averages

## Long-term and Intensive Monitoring Plan Development

Six sites were established for long-term and intensive monitoring.

- Surface Elevation Tables (SET) and feldspar Marker Horizon (MH) plots installed
- Permanent study areas established
  - Long-term characterization of vegetation communities
    - Stem density
    - Percent cover
    - Stem height
  - Soil shear vane strength at multiple points over time
  - Lateral shoreline erosion (erosion pins)
  - Pool expansion and coalescence



Figure 11: Location of long-term and intensive monitoring sites

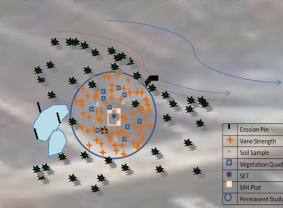


Figure 12: Experimental design of permanent study area long-term and intensive monitoring sites including for elevation and accretion metrics, vegetation, shoreline erosion, pool erosion, and soil shear vane strength metrics



Figure 13: Hartig reading a Pelham Bay Park SET, at one of the six long-term and intensive monitoring sites