



Salt Marsh Vegetation Monitoring

Background

Salt marshes constitute a significant proportion of coastal parks in the Northeast Coastal & Barrier Network. They are highly productive ecosystems that provide habitat for a wide variety of marine and estuarine biota. They also provide services for humans, including water quality enhancement and protection from wave energy and erosion. These coastal wetlands are responding to both natural and anthropogenic change, including global warming, sea level rise, eutrophication, changes in consumer populations, and tidal restoration projects. The most conspicuous responses to such factors will occur in the vegetation. As such, long term monitoring of salt marsh plant communities is vital to analyzing natural and human-related pressures on the system.

Long-Term Monitoring

A systematic, repeatable methodology has been developed to track the structure and composition of plant communities. Originally created to evaluate tidal restoration projects, the methods have since been refined and improved for monitoring all salt marsh areas within Cape Cod National Seashore (CACO) and are suitable for other coastal parks. In addition to their inherent value, these ground level data provide critical information for confirming landscape patterns in aerial photography. Together, these kinds of information can help us analyze changes in extent of salt marsh area, plant vigor, species composition, and the landward advance/seaward retreat of salt marshes with sea level rise.

Key Results to Date

Monitoring of tidal restoration projects has shown that re-starting seawater flow in systems that had been diked (or in some other way cut off from normal tidal exchange) can rapidly promote the spread of native salt marsh plants. Furthermore, increased tidal exchange



Losses of *Spartina alterniflora* in the low marsh. Areas that appear brown have lost vegetation.

has dramatically reduced or shifted the distribution of non-native, highly invasive taxa like *Phragmites australis* (common reed) and *Lythrum salicaria* (purple loosestrife).

Implementation of monitoring in other marshes not affected by tidal restrictions led to the discovery of large areas of unexplained vegetation loss in a number of locations. Monitoring data collected between 2003 and 2006 at CACO showed the losses to be ongoing and progressive, rather than the result of a single, short-term event. This finding prompted Dr. Mark Bertness of Brown University (Rhode Island) to investigate whether herbivory might be contributing to the observed plant demise. He has since determined that intense grazing pressure by a species of native, herbivorous crab (*Sesarma reticulatum*), whose populations have become extremely high on Cape Cod, is killing *Spartina*

alterniflora (smooth cordgrass) in the low marsh. Other losses of species such as *Spartina patens* (salt marsh hay) in the high marsh are still a mystery. Regardless, the loss of vegetation has resulted in significant marsh shrinkage from erosion.

Data applications

The data generated from salt marsh vegetation monitoring will be used to inform managers about the status and condition of this resource. This information is critical for making decisions on tidal restoration, adaptive management of tidal restoration projects, remediation (e.g., active planting), and for predicting future trends in associated fauna.

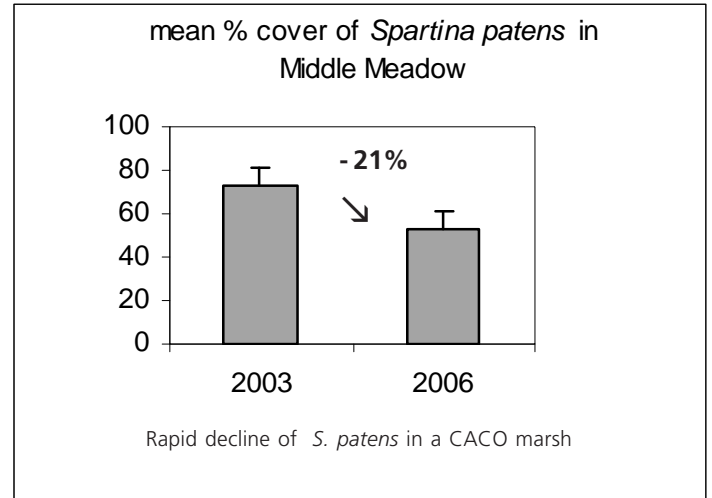
Resource Inventory Brief

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In virtually all tidal marshes, the more flood tolerant *S. alterniflora* is replacing *S. patens*. While some of these changes are related to variations in tidal inlet geomorphology, much of it appears to be an indicator of sea level rise.



Losses of *Spartina patens* in the high marsh. Areas that appear beige have lost vegetation.



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