

CASE STUDY



Scarborough Marsh Restoration

NATIONWIDE OFFICES

Corporate

25 Nashua Road
Bedford, New Hampshire 03110
603.472.5191

New Hampshire

Hampton
Westmoreland

Delaware

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Maine

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Massachusetts

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Maine Department of Inland Fisheries and Wildlife –
National Oceanic and Atmospheric Administration – U.S. Fish and Wildlife Service

BACKGROUND

The Maine Department of Inland Fisheries and Wildlife (MDIFW), the National Oceanic and Atmospheric Administration's Restoration Center, and the U.S. Fish and Wildlife Service are seeking to restore portions of the 3,000 acre Scarborough Marsh in Scarborough and Old Orchard Beach, Maine to a natural salt marsh ecosystem.

THE CHALLENGE

Portions of the marsh have been adversely affected by changes in tidal flow and invasion by common reed (*Phragmites australis*), a nuisance plant species. These alterations have adversely affected the ecological functioning of this salt marsh ecosystem. Normandeau Associates, in association with the Woods Hole Group and Dr. John Teal, Teal Limited Environmental Consultants is conducting multiple ecological monitoring, modeling and engineering design tasks to evaluate the salt marsh restoration.



Phragmites australis

THE SOLUTION

Normandeau first identified the historical conditions and land use changes within the upper Scarborough Marsh study area and its surrounds through the use of vegetation analysis of a series of historical aerial photography and review of existing maps and reports, and local knowledge. Aerial photographs were used to delineate major vegetation cover types, including high salt marsh, low marsh and brackish plant communities, as well as hydrologic features such as tidal creeks, ditches, and pannes. An ESRI-compatible GIS coverage map was created from the aerial photographs, then ground truthed for analysis and presentation.

Permanent vegetation transects were created for long term monitoring. Existing hydrology of the system was monitored through measurement of water elevation, salinity, temperature, which were all used as input data for a two-dimensional hydrodynamic model (RMA-2) to provide a complete and accurate representation of system hydrodynamics, including wetting and drying processes and a two-dimensional water quality model (RMA-4) to simulate the dispersion of salt throughout the marsh area (performed by subcontractor Woods Hole Group).

The nutrient load in the marsh was determined by conducting dry and wet weather water quality sampling of both freshwater and tidal flows into the marsh. Normandeau constructed a nutrient budget for the upper Scarborough Marsh using existing information and the hydrologic and water quality data collected as a part of this effort. Fish and macro-invertebrate use in the upper Scarborough Marsh in the various vegetation communities were quantified using a variety of sampling gear. Data collection results will be used to develop restoration options that may include tidal flow restoration, habitat enhancement, nonpoint source remediation, and elimination of invasive species. The final product for this project will be a restoration plan for the Dunstan Marsh area with the following goals:



Striped Bass

- Reducing or eliminating *Phragmites australis*;
- Restoring or enhancing waterfowl habitat while sustaining or enhancing fish habitats; and
- Reducing nutrient loading to the marsh, if adversely affecting water and habitat quality.

The evaluation includes hydrologic and biological effects of implementation, feasibility, and order of magnitude costs for viable alternatives. The goal of the plan is to identify key factors driving the current degradation and to develop preferred restoration solutions.

About Normandeau Associates

Normandeau Associates, Inc., an employee-owned company, was founded in 1970 as an environmental consulting firm. Today, Normandeau is considered one of the nation's foremost companies in the field. Our deep and broad background as both environmental and public involvement consultants provides a wealth of knowledge and experience in disciplines ranging from environmental assessment and permitting to stakeholder interviews and facilitation.

From offices nationwide, Normandeau's staff of over 170 employees work closely with clients, regulators, and the public to seek solutions that enhance economic development, meet regulatory requirements, protect and restore natural resources, and improve communities.

Our diverse team includes marine, aquatic, wetland, and terrestrial ecologists; environmental planners; fisheries biologists and limnologists; ornithologists and botanists; soil scientists, geologists, and hydrologists; engineers; statisticians and data processing specialists; report production personnel; and public involvement professionals.

Normandeau Associates, Inc., combines experience, continuous training, hard work, and a rigorous commitment to excellence to deliver the highest possible level of service to our clients.

