

HAMMONASSET BEACH STATE PARK SALT MARSH RESTORATION



Success Stories

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*Connecticut Department of Environmental Protection, 79 Elm Street, Hartford, CT 06106-5127
Arthur J. Rocque, Jr., Commissioner*

The Resource

Hammonasset Beach State Park is located on Long Island Sound in the town of Madison, Connecticut. The park consists of approximately 1,000 acres of salt marsh, forest, fields, and a three-mile long beach. It provides numerous opportunities for camping, hiking, swimming, fishing, and bird watching. The Hammonasset salt marshes, which comprise 460 acres of the park, are bordered by the barrier beach to the south, Clinton Harbor and the Hammonasset River to the east, and recreational areas to the north and west. The largest tidal wetland complex, just over 400 acres, lies along the Hammonasset River and is designated as the Hammonasset Natural Area Preserve. The extensive system of high quality freshwater and brackish tidal marshes provides essential habitat for several species of regionally, nationally, and globally rare or otherwise important species of plants, fish, birds, and other wildlife (see **Functions and Values of Salt Marshes** sidebar).



Functions and Values of Salt Marshes

Salt marshes are coastal wetlands that are subject to the twice-a-day ebb and flood of the tide, and are found along the shores of Long Island Sound and the Sound's many tributaries. Salt marshes are ecological systems with high biological productivity; nutrients stored and recycled within them provide the foundation of the estuarine food chain. The dead leaves and stems of many plants enter the water, are broken down by bacteria, and become food for crabs, worms, snails, finfish, and shellfish. The marshes provide nesting, feeding, and refuge for shorebirds and other wildlife, and they store floodwater, stabilize the shoreline, and act as buffers against wave energy. The marsh functions as living filters where pollutants are contained, diluted, or stabilized as tidewater and stormwater flow through marsh grass and over mud flats. The vegetation in wetlands helps to filter out excess nutrients, which contribute to water quality problems in many coastal areas, including Long Island Sound. Small fish and birds thrive in healthy salt marshes and help keep nuisance mosquito populations under control. Salt marshes also provide scenery, and many recreational, scientific, and educational opportunities.

Environmental Problems

During the 1900s much of the salt marsh was filled in or otherwise altered during the development of the state park and by the disposal of sandy sediment dredged from the nearby Clinton Harbor and Hammonasset River. Wetlands were filled and tidal creeks were channelized or blocked to construct access roads and camping facilities for the park, and in certain areas low earthen dikes were built to contain the dredged material. Like many other coastal areas in Connecticut, the remaining salt marshes were often ditched and drained for mosquito control purposes. The ditches drained shallow pools and ponds that were critical habitat for waterfowl, shorebirds, wading birds, and small fish. The reduced salinity and disturbance associated with the park's development caused the marsh vegetation to become dominated by common reed (*Phragmites australis*).

Phragmites is a non-native, invasive plant that, unchecked, crowds out native plants and reduces wildlife diversity. It can grow 10-15 feet in height, eventually shading out native plants. In addition, the dead shoots of *Phragmites* can persist for several years, accumulating a large volume of combustible material and creating a fire hazard. The decreased tidal flow across the marsh was caused by the filling, diking, draining, and undersized culverts (termed hydromodifications). As a result the natural functions of a healthy salt marsh system, including the ability to filter out the nonpoint source pollutants that affect local water quality and Long Island Sound (see **Nonpoint Source Pollution** sidebar) were substantially diminished.

The Solution

The Hammonasset Beach State Park salt marshes were identified as a high priority for restoration by the CT DEP's Office of Long Island Sound Programs (OLISP) and the Wildlife Division's Wetland Habitat and Mosquito Management Program (WHAMM) due to its large size, its utilization by many species of fish, birds, and other wildlife, and its high visibility (see **CT DEP Wetland Restoration Programs** sidebar).

CT DEP Wetland Restoration Programs

Connecticut is nationally recognized for its leadership role in tidal wetland (including salt marsh) restoration. Since 1980, the CT DEP Office of Long Island Sound Programs (OLISP) and CT DEP Wildlife Division's Wetlands Habitat and Mosquito Management (WHAMM) Program have restored or assisted in the restoration of nearly 1,700 acres of formerly degraded tidal wetland. The WHAMM Program was formally established in 1994 and is one of the first wetland habitat restoration programs in the country with dedicated staff and specialized low-ground pressure earth moving equipment.

The Hammonasset Beach State Park salt marsh restoration project goals were to restore the natural functions and values of three contiguous areas of salt marsh by increasing salt water exchange with Long Island Sound. The CT DEP demonstrated in several other similar situations that when fill is removed and tidal flows are restored to a degraded wetland, the increased salt and sulfide content of the wetland's soil will cause a gradual and progressive loss of *Phragmites*.

Nonpoint Source Pollution

Nonpoint source (NPS) pollution is diffuse in nature, both in terms of its origin and in the manner in which it enters surface and ground waters. It results from a variety of human activities that take place over a wide geographic area. Pollutants usually find their way into waters in sudden surges, often in large quantities, and are associated with rainfall, thunderstorms, or snowmelt. NPS pollution generally results from land runoff, precipitation, atmospheric dry deposition, drainage, or seepage. Hydromodification – physical disturbance to a water resource caused by filling, draining, ditching, damming, or otherwise altering wetlands and stream courses – is also considered a nonpoint source problem.

This process will continue until the plants have completely died off or receded back to the upland areas, which allows native salt marsh plants and wildlife to re-colonize. During the 1990s, CT DEP completed three separate tidal wetland restoration projects in or adjacent to the Hammonasset Natural Area Preserve.



Location of the three restoration areas

Area 1

The first project, completed in 1995, focused on a five-acre area adjacent to the park access road on the west and a low ridge to the east. Tidal flow to this area had been cut off by construction of a low-lying dike at the northern end that was intended to trap hydraulically pumped dredged sediments from nearby Clinton Harbor. While the disposal of dredged sediments never occurred in this area, tidal flows were restricted enough to allow for the spread of *Phragmites* and native wetland shrub marsh elder (*Iva frutescens*). The restoration plan involved:

- (1) the removal of the dike and the disposal of those sediments on nearby upland; and
- (2) clearing and cleaning out the primary tidal creek.



Cleared ditch (area 1)

Area 2

The second project, also completed in 1995, targeted a 0.6 acre site just north of the Connecticut Audubon Society's Meig's Point Nature Center, about a half-mile southeast of Area 1. Historically, this area had several small pools, but had been filled and was dominated by *Phragmites*. The primary purpose of this project was to demonstrate open water marsh management (OWMM) to attract birds and fish, both to improve wildlife diversity and control mosquito populations. The restoration plan involved:

- (1) the removal of fill;
- (2) the cleaning of existing ditches and construction of new ditches to improve tidal flushing and increase salinity levels;
- (3) the construction of several small pools;
- (4) the placement of marine plywood at strategic locations to create a "sill" or dam to prevent ditch segments from draining at low tide, thus maintaining a more natural water elevation and providing permanent habitat for forage fish such as killifish; and
- (5) herbicide applications to some upland areas of *Phragmites*.

Following construction, the Connecticut Audubon received permission from CT DEP to construct a bird observation blind on the eastern end of the marsh.



Meig Point wetland (area 2). Shows the wetland immediately following the removal of the Phragmites dominated fill area and a small excavated pond.

Area 3

The third project centered on a 10-acre degraded wetland complex that had been filled with sandy dredged sediments. The project area is located on the west side of the park access road across from Area 1. Prior to the park's development, this area was a salt marsh connected to Long Island Sound through Clinton Harbor and the Hammonasset River by several natural tidal creeks. The goal of this project was to restore five acres of salt marsh and create five acres of coastal grassland, another high priority habitat identified by the Long Island Sound Habitat Restoration Strategy. The project was constructed in two phases beginning in September 1999 and was completed in August 2000. The project included:

- (1) excavating sand from former salt marsh and disposing of that sediment at an appropriate upland location in the park;
- (2) cleaning existing and creating new tidal channels to efficiently distribute salt water throughout the marsh;
- (3) recreation shallow pans and pools of varying depths and sizes to provide critical habitat for waterfowl and wading birds;
- (4) planting warm-season grasses and providing other habitat modifications on five acres; and
- (5) constructing a covered observation platform.



Western segment immediately following the removal of sandy dredged sediment at low tide. Small pond in the background and a section of excavated creek in the lower right (area 3).

Results

The combined result of the three projects was the restoration of 10.6 acres of salt marsh and five acres of coastal grassland. With free tidal exchange restored to these areas, the *phragmites* is gone and native salt marsh plants and wildlife are now found in abundance. Post-restoration monitoring by CT DEP will continue to measure the effectiveness of efforts to increase the flow of saltwater into the marsh and freshwater out of the marsh, the associated die-off of *Phragmites* and increases in native salt marsh vegetation, fish, and wildlife. The restoration of native vegetation will hopefully improve the natural pollutant-removal capacity of the marsh. Since completion of the project, the threat of fire has been greatly reduced. Signs erected during the restoration work at each site educated thousands of park visitors on the importance of restoring these vital habitats and acknowledged project partners. The restored salt marsh is presently serving as a “living” classroom for local residents and visitors to the Meig’s Point Nature Center.



Cleared ditch (area 1)

Future Plans

The CT DEP will continue to monitor the Hammonasset State Park salt marsh to measure the environmental improvements resulting from the restoration projects. Lessons learned from this project and others like it will be used to help meet the Long Island Sound Habitat Restoration Strategy goal of restoring at least 2,000 acres of habitat by 2008. These types of habitat restoration projects have been given high priority for funding by the Section 319 grant program and other state and federal funding sources.

Project Partners and Funding

Restoration of Area 1 cost \$25,000, including:

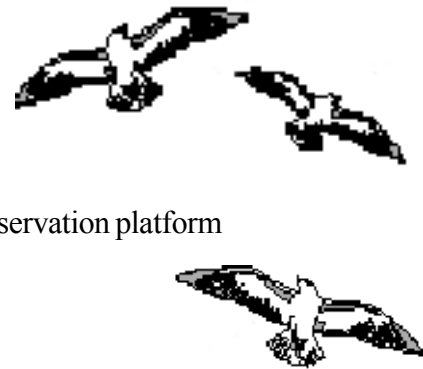
- \$15,000 Clean Water Act Section 319 Funds
- \$10,000 in-kind services by CT DEP WHAMM Program

Restoration of Area 2 cost \$11,000, including:

- \$5,000 U.S. Fish and Wildlife Service
- \$5,000 in-kind services by CT DEP WHAMM Program
- \$1,000 in-kind services by CT DEP Parks Division for covered observation platform

Restoration of Area 3 cost \$208,767, including:

- \$58,750 Clean Water Act Section 319 Funds
- \$39,167 Coves & Embayments Fund from CT DEP OLISP
- \$97,350 in-kind services by the CT DEP WHAMM Program
- \$500 in-kind nest structures from Connecticut Waterfowlers Association (CWA)
- \$10,000 in-kind equipment from U.S. Fish and Wildlife Service
- \$2,000 Ducks Unlimited
- \$1,000 in-kind service by CT DEP Parks program for covered observation platform





Salt marsh restoration site teeming with wildlife.

Section 319 of the Federal Clean Water Act authorizes EPA to award grants to states and tribes to support their NPS management programs. The CT DEP passes through a portion of these funds to other state, regional and local government agency and non-government organization to implement programs and projects.

Contacts

For more information regarding Hammonasset State Park Salt Marsh Restoration project and wetland restoration in general, contact:

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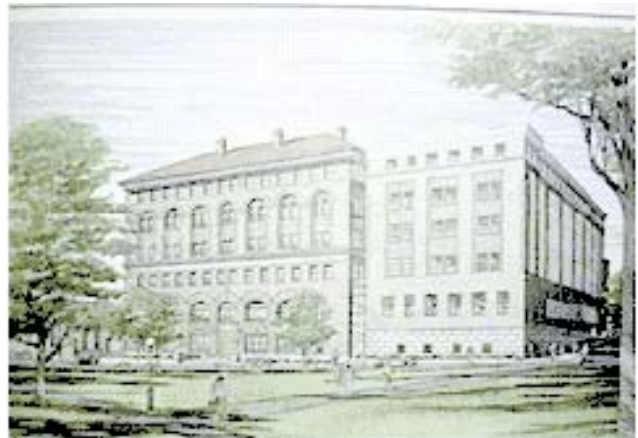
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CT DEP and US EPA websites
<http://dep.state.ct.us>
<http://www.epa.gov/owow/nps/education.html>

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