

ENVIRONMENTAL Fact Sheet



29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WMB-CP-17

2005

NH Salt Marsh Restoration: Pickering Brook Marsh, Greenland NH

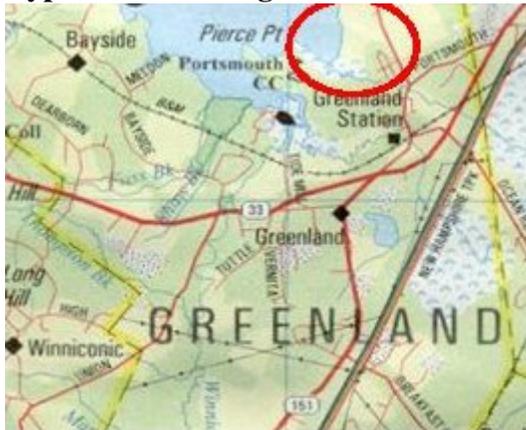
Year of Project: 2002/2003

Type of Project: Salt marsh Hydrology Re-establishment

Primary Project Partners: Ducks Unlimited, NH Coastal Program, NOAA, Town of Greenland

Contractor: Swamp, Inc.

Type of Monitoring: Post-Restoration



Location: Pickering Brook Marsh is on Great Bay adjacent to the Portsmouth Country Club in Greenland. From Interstate 95 take exit 3 to Route 33 west/south. Turn right onto Portsmouth Avenue at a traffic light intersection. Turn left onto Country Club Lane/Portsmouth Country Club after the end of a rock wall. From Route 101 take exit 11 to Route 33 north for approximately 8-10 miles. Turn left onto Portsmouth Avenue at a traffic light intersection. Turn left onto Country Club Lane/Portsmouth Country Club after the end of a rock wall.

Background: In the early 1900s, the majority of coastal salt marshes in New England were ditched as part of an aggressive mosquito control program. In an attempt to eradicate mosquito-breeding habitat, the ditches drained the open water necessary for a healthy salt marsh. The absence of mosquito-eating fish on the salt marsh surface allows high numbers of mosquitoes to breed and hatch, which necessitates spraying throughout the summer to control mosquito populations.

The Issues:

Elimination of Open Water. This has resulted in the disappearance of critical habitat necessary for black ducks, wading birds, shorebirds, shellfish, and fish, including those that eat mosquito larvae. Restoring the hydrology to Pickering Brook Marsh will result in positive ecological changes to plant and animal communities.



Increased Mosquito Populations Due to Lack of Predatory Minnow Habitat. Mummichogs on the marsh surface will naturally manage mosquitoes populations and eliminate the need to

larvicide on a constant basis. In past restoration projects, larval and pupal mosquito populations have been reduced by as much as 95 percent to 99 percent due to an increased minnow predation in combination with decreased mosquito breeding areas.

Man-Made Ditches. The man-made ditches have altered the marsh hydrology resulting in a marsh surface that is flooded by high spring tides, but causing short hydroperiods in the existing pools and pannes on the marsh surface.

The ditched marsh has resulted isolated shallow pools or pannes that cannot mix with nearby water bodies. These isolated water bodies vary considerably in their salinity, dissolved oxygen and water temperatures levels potentially creating "sinks" for the organisms trapped until the next spring tide of sufficient height.

The varying quality of limited open water available on the ditched marsh is not suitable to many salt marsh dependant aquatic invertebrates, although the life cycle of salt marsh mosquito larvae have evolved to thrive in these conditions. Mosquitoes can lay eggs and hatch in just a few days, which is within the time before the high marsh surface drains and evaporates. Mosquito population monitoring has been completed at the Pickering Brook Salt marsh since 1979 as part of an ongoing community mosquito control program.

Project Goal:

- To restore the surface hydrology of Pickering Brook marsh.

Project Objectives:

- Raise the average water table of the marsh.
- Increase open water wildlife habitat (pools and pannes) on the marsh surface.
- Decrease mosquito breeding on the marsh.
- Enhance habitat for birds and fish.

Restoration: The restoration design has allowed for a staggered adaptive management and monitoring regime. Pre-restoration monitoring of the entire site was completed from April 2002 to October 2002. Half of the site was restored in fall/winter 2002/2003 (Phase 1) the remainder was restored in fall/winter 2003/2004 (Phase 2). Post-restoration monitoring of completed Phase 1 and was conducted simultaneously with pre-restoration monitoring of Phase 2. Post-restoration monitoring of both completed Phases 1 and 2 as well as the reference site (Vol's Island, Newmarket) have continued. Approaches

- **Plugging of Selected Man-Made Ditches to the Marsh Level:** "Ditch plugs" prevent water from draining down the ditches, allowing tidal water to rise and recede naturally in the high marsh thus restoring natural permanent pool habitat. Open water habitat provides necessary forage and breeding areas fish and wildlife. Ditch plugs can be constructed with marsh soils excavated during other components of the restoration. The plugs can vary in size based on the size of the ditch to be plugged.
- **Excavating Deeper Areas in Pannes and Pools Prone to Desiccation:** Deep-water habitat areas have been excavated in areas prone to desiccation. Deep-water habitat areas or fish holdover areas provide permanent open water for aquatic organisms during periods of drying. Prior to restoration, the areas prone to desiccation were dry within

seven to ten days following flooding tides and/or rain. Often tidal flooding occurs only two to three days per month.

- **Connect Pools and Pannes by "Runnels":** Several pools and pannes have been connected by short (less than two feet long) and narrow runnels. They provide improved continuous tidal circulation and provide access for aquatic organisms over large areas of the marsh surface. Connecting isolated areas to one continuous system improves water quality. Preliminary investigations revealed many isolated pannes and transient pools. Runnels also provide mummichog holdover areas and/or access and to mosquito larvae and eliminate the need for mosquito control insecticide applications.

Phase I Measurements/Results: In Phase I, 20 acres of salt marsh were restored. In addition, the following tasks were completed:

- Six pools created
- Runnels created
- Eight ditches plugged (out of 13)
- One ditch filled
- Three small mosquito depressions filled
- One creek system reestablished

Project Partners:

Ducks Unlimited - in partnership with the Town of Greenland, the New Hampshire Coastal Program, University of New Hampshire, Great Bay National Estuarine Research Reserve, U. S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Coastal Conference Association, and the Portsmouth Country Club - will restore the Pickering Brook salt marsh to its former natural beauty and function.

Funding the Project:

Phase I: NHCP, \$30,000; Town of Greenland, \$18,000; University of New Hampshire, \$8,000 (in-kind technical assistance and project/monitoring design); US Fish & Wildlife Service, \$6,875; NH Coastal Program, \$5,000 (in-kind technical assistance and project/monitoring design), Volunteer Hours (289.25), \$4,784.00; Ducks Unlimited/Fuller Foundation, \$4,000; NH Department of Environmental Services, \$1,000 (in-kind technical assistance and project/monitoring design); Great Bay NERR, \$1,000 (in-kind technical assistance and project/monitoring design); and Portsmouth Country Club, \$1,000 (in-kind technical assistance) for a total project cost of **\$79,659**. This included project management, permitting/restoration, outreach, monitoring, and construction.

For Additional Information:

[Pickering Brook Final Report \(Phase 1\)](#)

[Appendix 1](#)

[Pickering Brook Final Report \(Phase 2\)](#)