LONG ISLAND SOUND STUDY HABITAT RESTORATION INITIATIVE

ANNUAL SUMMARY FOR THE YEAR 2006

Technical Support for Coastal Habitat Restoration

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Cover photo: Fivemile River experimental restoration technique, designed to promote sedimentation.

LONG ISLAND SOUND STUDY HABITAT RESTORATION INITIATIVE --
Annual Summary for the Year 2006

BACKGROUND

This report summarizes the accomplishments of the Long Island Sound Study's (LISS) Habitat Restoration Initiative (HRI) for year 2006, the ninth year of implementation. The HRI is a bi-state, multi-organizational effort to restore estuarine coastal habitats in Connecticut and New York. The HRI members meet several times a year to discuss progress, share new technologies, and identify emerging issues. In 1997, the LISS HRI established the following goals:

- Restore the ecological functions of degraded and lost habitats;
- Restore at least 2000 acres of coastal habitats and 100 miles of riverine migratory corridor habitat over the next 10 years; and
- Use partnerships to accomplish the restoration objectives and to leverage limited state, local, and federal funds.

Potential restoration sites were identified through interviews with individuals knowledgeable with the states' ecosystems, and the public was provided an opportunity to nominate sites as well. These data were published in a brochure called "Restoring Long Island Sound's Habitats." Implementation of restoration projects began in 1998. Twelve priority coastal habitat types have been identified by the HRI members as particularly important to sustaining the living resources of the Long Island Sound ecosystem. These habitat types are Tidal Wetlands, Freshwater (non-tidal) Wetlands, Riverine Migratory Corridors, Submerged Aquatic Vegetation, Coastal Grasslands, Intertidal Flats, Estuarine Embayments, Coastal and Island Forests, Shellfish Reefs, Cliffs and Bluffs, Rocky Intertidal Zones, and Coastal Barriers, Beaches, and Dunes.

In 2000, eleven state, federal, municipal and non-governmental organizations, including the LISS Policy Committee, signed a Memorandum of Understanding (MOU) that codified their commitment to work cooperatively on the LISS HRI goals. To view the MOU, please visit the LISS website: http://www.longislandsoundstudy.net/archive/misc/mou.pdf. For more information on the habitat restoration initiative, go to: http://www.longislandsoundstudy.net/habitatteam.htm.

The Policy Committee, comprised of the Commissioners of NYS DEC and CT DEP, and Regional Administrators of EPA region 1 and 2, met once again in 2006 to sign a new MOU and establish updated goals for the Habitat Restoration Initiative. Many of the same partners who signed the 2000 MOU renewed their commitment this year to promote coastal habitat restoration, and a few new organizations also joined the partnership. Under the terms of the 2006 MOU, the partners resolve to:

- Work together to restore or protect an additional 300 acres of coastal habitat and open up an additional 50 miles of riverine migratory corridor to diadromous fish from January 1, 2006 to December 31, 2011, as stated in EPA's Strategic Plan, and ultimately restore 2,000 acres by 2020;
- Use partnerships to accomplish restoration objectives and leverage limited local, state, and federal funds.

The 2006 MOU can be viewed online at:
http://www.longislandsoundstudy.net/committees/Habitat_MOU06.pdf.

The Long Island Sound Study plays a major role in habitat restoration by providing annual funding to the New York State Department of Environmental Conservation's Bureau of Marine Resources and to the Connecticut Department of Environmental Protection's Office of Long Island Sound Programs (OLISP).

2006 PROGRESS REPORT

Although the ultimate goal of habitat restoration is the implementation of projects, it can take several years of planning, design, obtaining permits and applying for grant funds before a project is ready for construction. For this reason, restoration acreages can vary considerably from year to year, and acreage alone is not a true measure of progress in the field of habitat restoration. Progress is reported by major habitat types with emphasis placed on completed projects. An introduction to each section is provided to summarize the overall work effort.

In calendar year 2006, progress was made toward the restoration goals, with one very important goal being met this year. Three tidal wetland projects were completed, resulting in 27.75 acres restored, plus a fourth experimental restoration project that resulted in zero acres restored. Three riverine migratory corridor projects were completed, which now provide access to an additional 13.56 miles of migratory passageways for fish. By the end of 2006, 106.7 miles of riverine migratory corridor were opened to fish passage, surpassing the goal set forth by the LISS, ahead of schedule. Progress on other habitat types includes restoration of 12 acres of grassland habitat. Additional progress was made in other areas, such as securing funding, initiating engineering design, and conducting preliminary tidal studies, on more than 64 other, on-going projects.

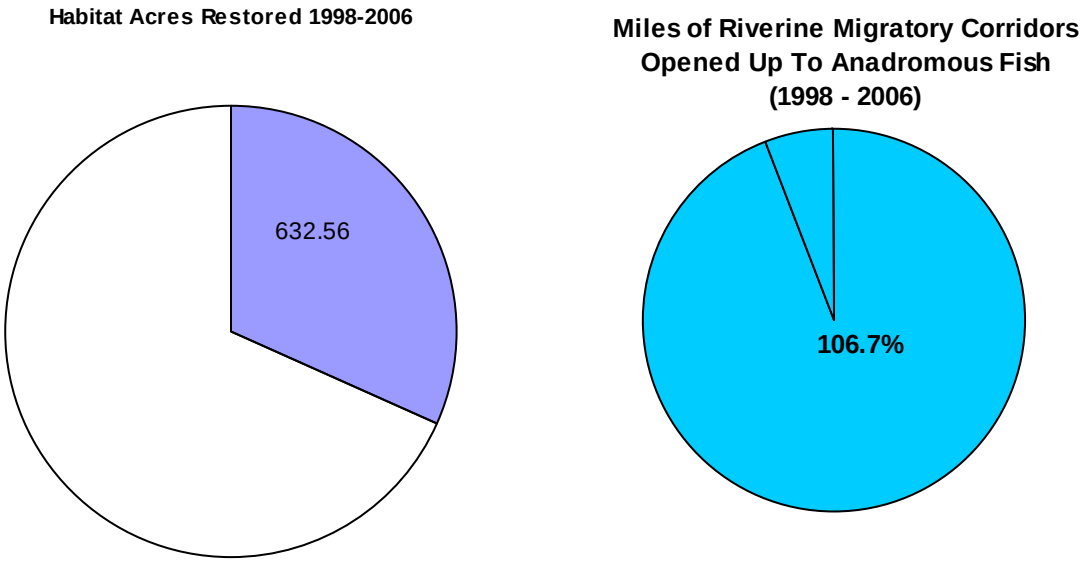


FIGURE 1. Acres and miles restored relative to HRI goals – we are currently at 31.6% and 106.7% of the goals of 2000 acres of coastal habitats and 100 river miles, respectively.

Other miscellaneous highlights include:

- The second round of awards from the Long Island Sound Futures Fund were made in 2006. They included funding for tidal wetland restoration, coastal forest restoration, and SAV restoration.
- New tidal wetland imagery acquired for New York's portion of Long Island Sound in 2005 has been used to analyze wetland loss rates.

The following sections summarize restoration projects completed in 2006 by the states of Connecticut and New York. The habitat types included are tidal wetlands, riverine migratory corridors, coastal grassland, and submerged aquatic vegetation.

TIDAL WETLAND RESTORATION

Two tidal wetland restoration projects were completed in 2006 for a total of 27.75 acres restored:

- Great Meadows Marsh system, Stratford, CT 15.15 acres
  - parcel 1 at 5.35 acres of tidal marsh
  - parcel 4 at 9.80 acres of tidal marsh

- Hammonasset Beach State Park, Phase 3 4.1 acres
- Hammonasset Beach State Park, Camp Store 8.5 acres

27.75 acres of tidal marsh restored

Completed tidal wetland project acreage for 1998–2006 are presented in Figure 2.

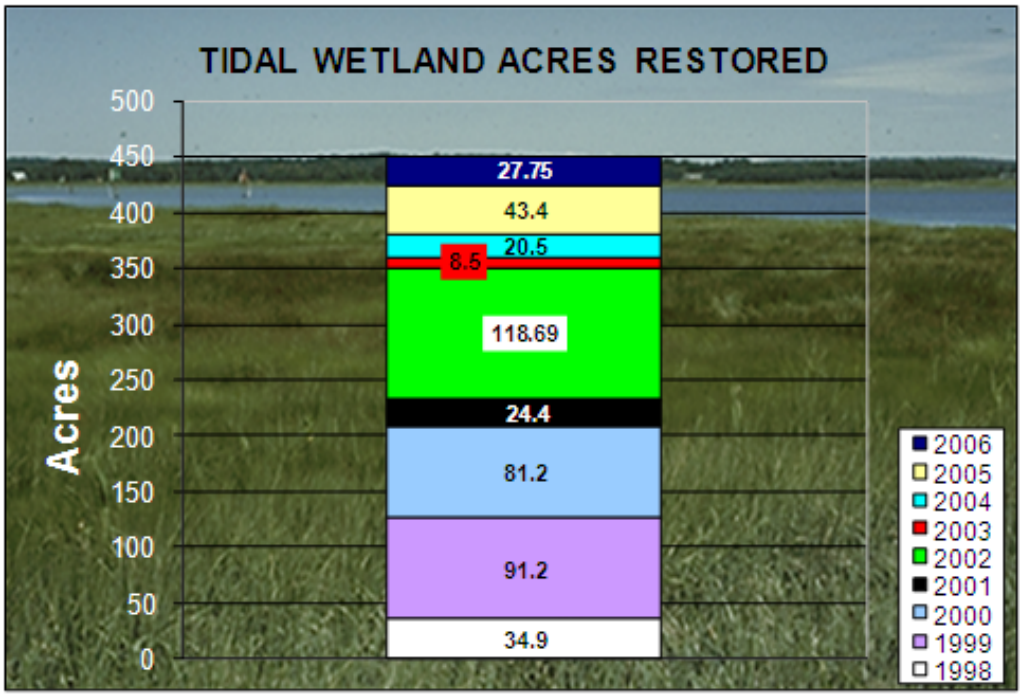


FIGURE 2. Acres of tidal wetlands restored (450.53 acres) between 1998 –2006.

Phragmites australis *Control and Evaluation of Restoration Techniques*

No new information was available for 2006, please see the 2005 report for previous information, updates to this section will be put into future annual reports.

SET Installation and Monitoring in Long Island Sound

No new information was available for 2006, please see the 2005 report for previous information, updates to this section will be put into future annual reports

FIVEMILE RIVER EXPERIMENTAL TIDAL WETLAND RESTORATION TECHNIQUE

State: Connecticut
Town: Darien
Habitat Type: Tidal Wetland
Acres Restored: 0 acres – just for evaluation of experimental restoration technique

Cause of Degradation: This particular tidal marsh in the Fivemile River has been gradually losing elevation and shrinking in aerial extent for decades. Analysis of aerial photos dating back to 1934 indicated that losses here have been going on since at least 1951. Loss of this tidal marsh in the Fivemile River is thought be caused by a combination of factors, including increased sea level rise, reduced deposition of riverine and marine sediments, and the seawall located along this marsh's landward edge since prior to 1934.

Project Description: An experimental restoration design utilizing coconut fiber logs was tested. Several logs were placed in a maze-like manner that would help collect suspended sediment during the falling tide by slowing down the velocity of the receding tidal waters out the log maze. The collection of sediment would hopefully promote additional sedimentation and rebuild marsh elevation lost to submergence. If additional work is done to expand this project in the future, more logs may be added and clean sediments from local dredging projects may also be deposited here.

Implementation Partners: Save the Sound (lead); National Oceanic and Atmospheric Administration - Restoration Center; Connecticut Department of Environmental Protection – Wetlands Habitat and Mosquito Management Program; Connecticut College.

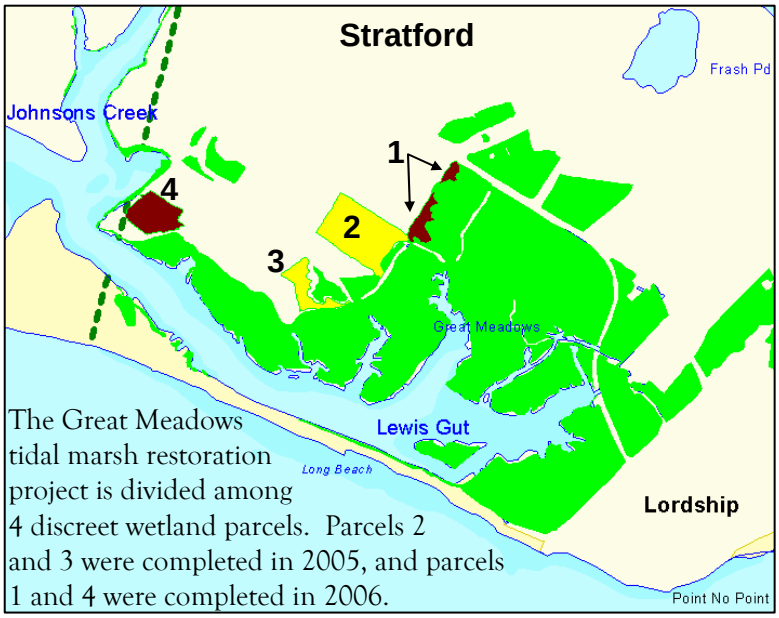
Funding Provided By: Save the Sound / National Oceanic and Atmospheric Administration - Restore America's Estuaries Partnership; Friends of Fivemile River; Carlson Foundation.

This aerial photo shows the maze-like arrangement of coir logs in the Fivemile River which were installed to "baffle" tidal waters, slowing the velocity and promoting sedimentation.

GREAT MEADOWS TIDAL MARSH RESTORATION – Parcels 1 & 4

State: Connecticut
Town: Stratford
Habitat Type: Tidal Wetland
Acres Restored: 15.15

- parcel 1 at 5.35 acres of tidal marsh
- parcel 4 at 9.8 acres of tidal marsh



Cause of Degradation: After a series of dikes were built throughout the marsh system in the 1950s, a large area of tidal marsh was filled when dredged sediments from Bridgeport Harbor were hydraulically discharged behind the dikes and onto the marsh. After having lost nearly all of its functions and values, the tidal marsh system became a dense monoculture of the tall invasive grass known as Common Reed (*Phragmites australis*). Prior to restoration, these wetlands were classified as formerly connected tidal wetlands as well as degraded inland wetlands.

Project Description: As a condition of their permit to conduct regulated activities in areas under CTDEP's jurisdiction, the Stratford Development Corporation (SDC) agreed to restore approximately 42 acres of tidal wetlands. The SDC sold some of its property, which contained filled tidal wetlands, to the US Fish and Wildlife Service and agreed to restore the ecological value of the federal lands. The restoration site is composed of 4 discreet parcels each ranging in size from approximately 5 acres to 20 acres, and divided by other upland parcels, as well as by a series of dikes designed to keep tidal waters out of this system. Beginning in 2003, the Stratford Development Corporation hired a private contractor as well as the DEP Wildlife Division to excavate the fill material to an elevation that would support a more natural assemblage of tidal wetland vegetation. A series of tidal creeks and ponds were excavated to help restore a more natural tidal flow and to support species of birds and fish that depend on the marsh as habitat or as a source of food. As noted from the photograph on the following page, no planting of marsh vegetation was done after excavation was completed. Restoration of tidal flow will result in a more natural distribution of plants, as seeds are deposited by the tides, and the sprouting plants spread out on their own.

Parcels 2 and 3 were completed in 2005, while parcels 1 and 4 were completed earlier this year. Upon completion of the construction phase, a grand total of over 140,000 cubic yards of fill was removed from 42.24 acres of tidal wetlands.

Implementation Partners: Stratford Development Corporation (lead); Connecticut Department of Environmental Protection - Wildlife Division; United States Fish and Wildlife Service - Stewart B. McKinney National Wildlife Refuge.

Funding Provided By: Stratford Development Corporation.

HAMMONASSET BEACH STATE PARK MARSH RESTORATION – PHASE 3

State: Connecticut
Town: Madison
Habitat Type: Tidal Wetland
Acres Restored: 4.1

Cause of Degradation: In the 1960s, the State of Connecticut removed sand from the beach side at Hammonasset State Park to make the beach safer for visitors. The beach was wide and very shallow at the time, requiring bathers to wade out a very long way from shore to find water deep enough for swimming. The beach's own natural topography made it hazardous for children and weak swimmers who waded out far from shore upon the return of the flood tide. The hydraulically dredged material was pumped into the nearby tidal wetland for the purposes of creating additional parking lots. Only a portion of the filled area was actually converted to parking - the rest, approximately 11 acres, was left unmanaged.

Project Description: The filled sand was removed in 2005 and 2006 and was used to renourish the eroding beach. The final wetland grading was done in 2006 by the Connecticut Department of Environmental Protection's Wildlife Division. This restoration incorporated high marsh and low marsh habitat, a large low marsh tidal pond and several small non-tidal high marsh ponds.

Implementation Partners: Connecticut Department of Environmental Protection Parks Division, Wildlife Division and Office of Long Island Sound Programs; US Environmental Protection Agency - Long Island Sound Study.

Funding Provided By: Natural Resources Conservation Service - Wetlands Reserve Program; Connecticut Department of Environmental Protection - Wetlands Habitat & Mosquito Management Program; Save the Sound; and Connecticut Duck Stamp.

Hammonasset Beach State Park wetland restoration project under construction.

HAMMONASSET BEACH STATE PARK – CAMP STORE MARSH RESTORATION

State: Connecticut
Town: Madison
Habitat Type: Tidal Wetland
Acres Restored: 8.5

Cause of Degradation: An old undersized culvert under the access road to the general store at the campground was restricting full tidal amplitude.

Project Description: The existing culvert, 39 feet of 60" reinforced concrete pipe, was replaced with a 59-foot span of 7'X10" precast concrete box culvert. The increased size of the new culvert removed a bottleneck and effectively widened the creek at that point, improving the hydrology in the downstream tidal marsh. A cantilevered crabbing platform also was constructed on the northwest side of the new bridge.

Implementation Partners: CT DEP- State Parks Division, Wetland Habitat & Mosquito Management Program and Agency Support Services Division/Engineering

Funding Provided By: CT DEP- State Parks Division

Top image shows the pre-existing culvert and the bottom photo shows the new culvert that better allows adequate flow. Photos Courtesy of CT DEP.

RIVERINE MIGRATORY CORRIDOR RESTORATION

The Connecticut Riverine Migratory Corridor (RMC) team, led by the CTDEP Inland Fisheries Division, completed three migratory fish projects resulting in habitat restoration that provided anadromous finfish access to an additional 13.56 river miles of migratory passageways. Project summary pages follow.

The 10-year goal (1998 - 2007) for this habitat type is to open up 100 currently inaccessible river miles to diadromous fish. To date, 106.7 river miles have been restored through fish passage projects such as dam modifications or dam removal, surpassing the HRI's goal ahead of schedule. River mileage for projects completed in 1998–2006 is presented in Figure 3.

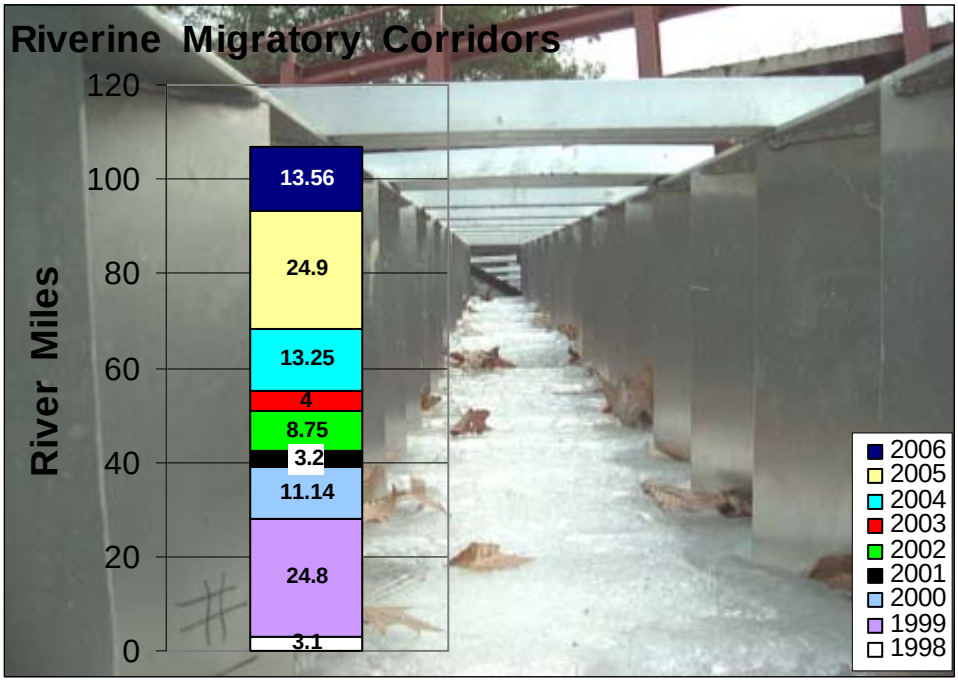


FIGURE 3. Cumulative river mileage (106.7 miles) for RMC projects completed between 1998–2006.

In 2006, New York City Parks & Recreation Natural Resources Group (NRG) collaborated with CT DEP Inland Fisheries to transplant 201 alewife from Brides Brook in CT to the Bronx River. Surveys over the next several months confirmed that the transplanted alewives had successfully spawned the first generation in centuries of alewives that will call the Bronx River home. Efforts are underway to build fish passages at the dams along the Bronx River, but NRG will have volunteers ready to move the fish over the dams when they return in a few years.

FISHING BROOK FISHWAY & EELPASS (at Ingham Hill Pond Dam)

State: Connecticut
Town: Old Saybrook
Habitat Type: Riverine Migratory Corridor
Stream Name: Fishing Brook
Miles Restored: 1.27

Cause of Degradation: Privately owned 4' dam blocked upstream passage of migratory fish.

Project Description: An Alaskan Steeppass fishway and an eelpass were constructed on Ingham Hill Pond Dam to re-establish passage upstream for eels and other migratory fish.

Targeted Fish Species: alewife, blueback herring, sea-run brown trout, and American eel

Implementation Partners: Old Saybrook Land Trust (lead); Connecticut Department of Environmental Protection - Office of Long Island Sound Programs, and Inland Fisheries Division; Save the Sound, Inc; Natural Resources Conservation Service; National Oceanic and Atmospheric Administration - Restoration Center; United States Fish and Wildlife Service

Funding Provided By: Connecticut Department of Environmental Protection - Long Island Sound (License Plate) Fund; Natural Resources Conservation Service - Wildlife Habitat Incentives Program; National Oceanic and Atmospheric Administration - Fish America Foundation, and Restore America's Estuaries; National Fish & Wildlife Foundation - Long Island Sound Futures Funds grant; United States Fish and Wildlife Service funded the eelpass.

HANOVER POND DAM FISHWAY & EELPASS

State: Connecticut
Town: Meriden
Habitat Type: Riverine Migratory Corridor
Stream Name: Quinnipiac River
Miles Restored: 11.34

Cause of Degradation: A dam blocked upstream passage of migratory fish

Project Description: A City-owned dam that creates Hanover Pond in Meriden, CT, was in need of a complete reconstruction. As a condition of their dam safety permit from the Connecticut Department of Environmental Protection, the City was required to install a Denil Fishway which allows the safe passage of migratory fish.

Targeted Fish Species: American shad, alewife, blueback herring, sea lamprey

Implementation Partners: City of Meriden; Connecticut Department of Environmental Protection - Inland Water Resources Division and Inland Fisheries Division

Funding Provided By: City of Meriden, Connecticut Department of Environmental Protection - Flood and Erosion Control Board funds

Hanover Pond Dam with fishway installed along the west side.

SAUGATUCK RIVER FISH DIVERSION WIER

State: Connecticut
Town: Westport
Habitat Type: Riverine Migratory Corridor
Stream Name: Saugatuck River
Miles Restored: 0.95

Cause of Degradation: A dam blocked upstream passage of migratory fish

Project Description: A seasonally installed weir was designed and operated in the Saugatuck River to divert migratory fish away from the dam and toward a natural bypass channel that circumnavigates the dam. The dam connects a mid-stream island to the west bank of the Saugatuck River; the weir diverts fish to the eastern side of the island.

Targeted Fish Species: alewife, blueback herring, sea-run brown trout

Implementation Partners: The Nature Conservancy (lead); Connecticut Department of Environmental Protection - Inland Fisheries Division; Trout Unlimited; Aquarion Water Company; National Oceanic and Atmospheric Administration - Restoration Center; Save The Sound

Funding Provided By: The Nature Conservancy; National Oceanic and Atmospheric Administration - Restore America's Estuaries.

This weir is installed in the Saugatuck River seasonally (during the migration) to divert fish away from the dam and into a natural channel that bypasses the dam.

COASTAL GRASSLAND RESTORATION

Coastal grasslands are an exceedingly rare habitat type in the Long Island Sound watershed. Few opportunities exist to restore these habitats, which support a number of rare and endangered plant and animal species.

MATTHIES TRACT

State: Connecticut
Town: Waterford & New London
Habitat Type: Coastal Grassland
Acres Restored: 12

Cause of Degradation: This area was cleared and used for agriculture hundreds of years ago. Over the past half century or so, natural succession encroached on field edges that still were being mowed annually. In another section, pine plantation and young forest established. In the past twenty or so years many invasive woody plants, especially *Celastrus orbiculatus*, *Rosa multiflora*, *Privet* spp., *Lonicera japonica*, *Lonicera morrowii* became increasingly common.

Project Description: On seven acres, an encroaching woody edge was cut back to a stone wall boundary and woody plants were selectively removed in interior locations. In one section, *Juniperus virginiana*, *Cornus florida*, *Malus* spp. and a few other woody plants were selectively left. An uphill western area of five acres was completey cleared of pine, young forest and many invasives and seeded with a mixture of native grasses and forbs. A few large oak trees were left to create a savanna-like setting.

Implementation Partners: Connecticut College - Arboretum, Biology and Botany Departments; Natural Resources Conservation Service; United States Fish and Wildlife Service; Connecticut Department of Environmental Protection.

Funding Provided By: Natural Resources Conservation Service - Wildlife Habitat Incentives Program; Connecticut College

2005 False color infrared aerial photo with the outline of Matthies Tract Coastal Grassland Restoration project highlighted in bright green. The dark green line at the bottom of the image is the border between Waterford (to the north) and New London.

SUBMERGED AQUATIC VEGETATION (SAV)

Eelgrass

In 2001, Connecticut Department of Environmental Protection (CTDEP) was awarded a grant by the EPA Long Island Sound Study to re-map eelgrass *(Zostera marina)* beds in eastern Long Island and Fishers Island Sounds in New York and Connecticut. The CTDEP used those funds to contract with the National Wetlands Inventory Program of the U.S. Fish and Wildlife Service to (a) acquire low-altitude aerial photography, (b) perform photointerpretation of eelgrass beds, and (c) ground-truth those areas interpreted as possible eelgrass beds. Aerial photography was conducted in mid-June, 2002. The results of this survey were compared with mapping of eelgrass that was done during 1993 and 1994 to identify trends (gains/losses) in Long Island Sound eelgrass beds, and potentially identify future restoration opportunities. A Geographical Information Systems (GIS) project with a final summary report for this survey was created. An additional survey following the same procedure that was used in 2002 was planned for 2004, but was delayed and was undertaken in summer of 2006. The goal of the Long Island Sound Study and their partners is to make this aerial eelgrass survey a regular event, conducted every 2 to 3 years. The report from the 2002 survey is available at: http://library.fws.gov/Wetlands/eelgrass_report_v2.pdf and the 2006 report is available at: http://training.fws.gov/DivisionSites/ConservationLibrary/Wetlands/eelgrass_report_2006.pdf.

During the summer of 2006, NYS DEC had an intern researching the locations of historic eelgrass beds in the Sound by going through sources such as old newspaper records and scientific literature. Research is ongoing, but the image below depicts an updated map with locations of historic beds.

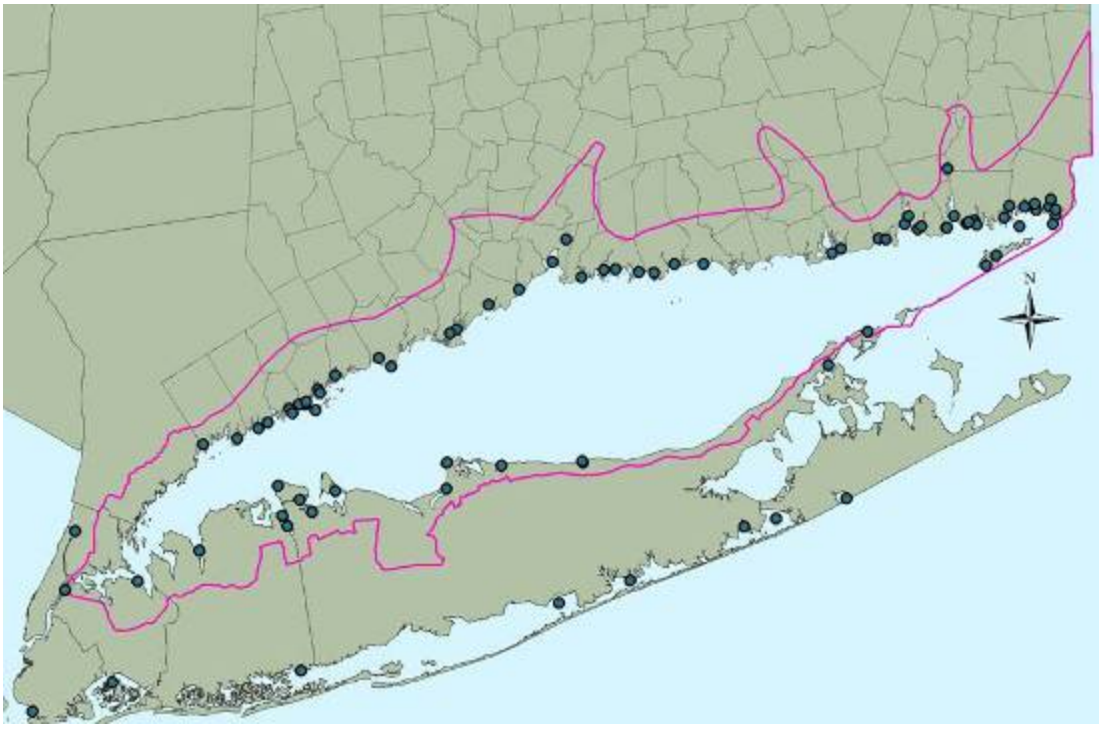


Figure 4. Historic locations of known eelgrass beds. In Summer 2006, NYS DEC had an intern researching the historic extent of eelgrass on Long Island's north shore, through newspaper accounts and scientific publications. Locations in CT were determined through historic records or early 20th century aerial photos of the coastal region.

Water Chestnut Removal

Except for the figure below, no new information was available for 2006. Please see the 2005 report for previous information, updates to this section will be put into future annual reports.

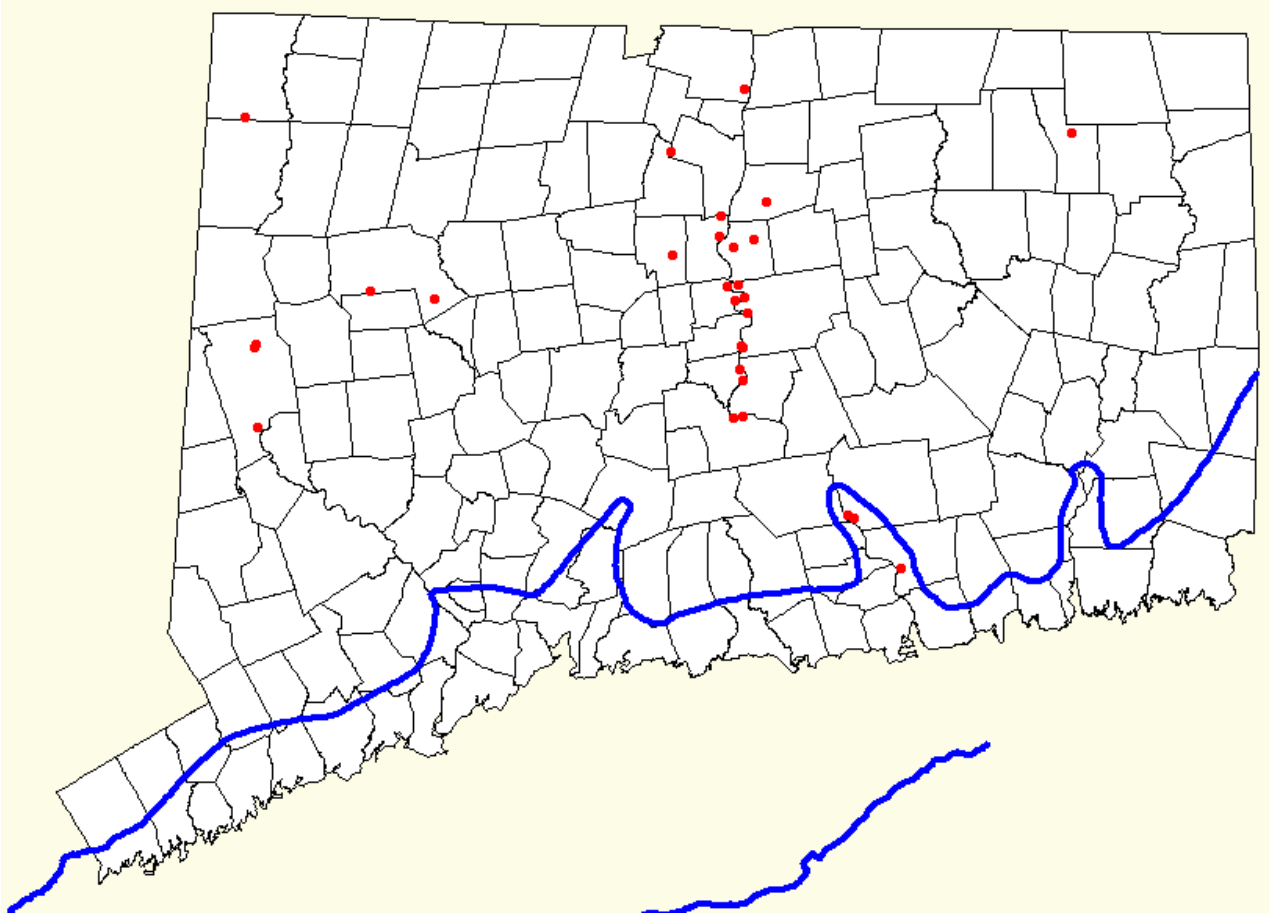


Figure 5. Known water chestnut populations (Red Dots) in Connecticut as of December 2006. To date, three water chestnut populations are known to reside within the Long Island Sound Study Project Boundary (thick blue line).