LONG ISLAND SOUND STUDY HABITAT RESTORATION INITIATIVE

ANNUAL SUMMARY FOR THE YEAR 2004

Technical Support for Coastal Habitat Restoration

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LONG ISLAND SOUND STUDY HABITAT RESTORATION INITIATIVE -- Annual Summary for the Year 2004

BACKGROUND

This report summarizes the accomplishments of the Long Island Sound Study's (LISS) Habitat Restoration Initiative (HRI) for year 2004, the seventh 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 have been compiled into a Habitat Restoration Geographic Information System, an Access database and 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 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 Long Island Sound Study plays a major role in habitat restoration by providing annual funding to the New York 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).

In New York, due to limited in-house capacity for construction projects, most restoration projects are being carried out by local governments who have received funding under the 1996 New York State Clean Air / Clean Water Bond Act, Environmental Protection Fund and other state, federal, and private grants. Projects receive technical and planning assistance from state staff, and other members of the Habitat Restoration Workgroup.

The OLISP provides a coordination function for habitat restoration efforts in Connecticut. To that end, four habitat teams have been formed which meet several times a year. These are Tidal Wetlands, Riverine Migratory Corridors, Coastal Barriers/Beaches/Dunes, and Eelgrass (Submerged Aquatic Vegetation). The teams, composed of representatives from federal and state agencies, scientists, and non-governmental organizations, establish annual work plans. The lead agency or organization varies from project to project.

2004 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 2004, significant progress was made toward the restoration goals. Four tidal wetland projects were completed, resulting in 20.5 acres restored. Three riverine migratory corridor projects were completed which now provide access to an additional 13.25 miles of migratory passageways for fish. Progress on other habitat types includes restoration of 9 acres of freshwater wetland and 3 acres of coastal forest. Additional progress on more than 65 other on-going projects was made in such areas as securing funding, initiating engineering design, and conducting preliminary tidal studies.

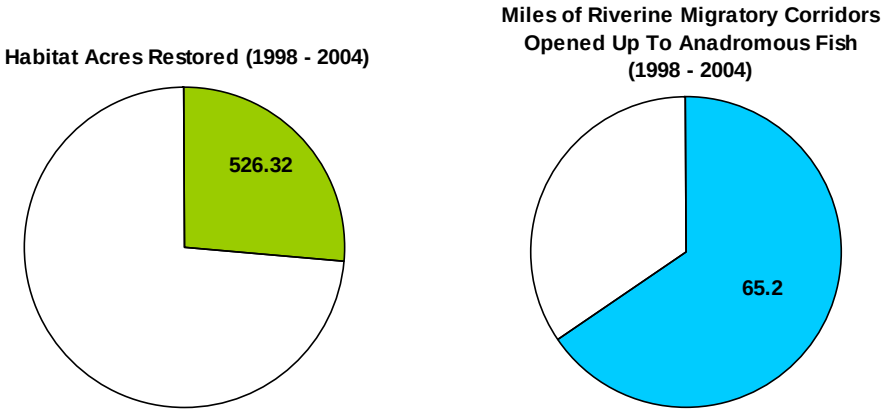


FIGURE 1. Acres and miles restored relative to HRI goals – we are currently at 26.3% and 65.2% of the goals of 2000 acres of coastal habitats and 100 river miles, respectively.

Other miscellaneous highlights include:

- In 2004, the Long Island Sound Study (LISS), with major funding from the U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Aeronautical Administration (NOAA), developed a grant program with the National Fish & Wildlife Foundation that identified habitat restoration as an eligible funding category. The first habitat restoration grant awards from the Long Island Sound Futures Fund will be made in 2005.

The following sections summarize restoration projects completed in 2004 by the states of Connecticut and New York. The habitat types included are tidal wetlands, riverine migratory corridors, freshwater wetlands, coastal forest, and submerged aquatic vegetation.

TIDAL WETLAND RESTORATION

Four tidal wetland restoration projects were completed in 2004 for a total of 20.5 acres restored:

- Bronx Cement Plant Tidal Wetland (phase 2), Bronx, NY — 0.7 acres of tidal marsh
- Castle Rock Marsh, Branford, CT — 2.1 acres of tidal marsh
- Mile Creek Marsh, Old Lyme, CT — 13.0 acres of tidal marsh
- Minore Marsh, Branford, CT — 4.7 acres of tidal marsh

20.5 acres of tidal marsh

Project summary pages follow.

Completed tidal wetland project acreage for 1998–2004 are presented in **Figure 2**.

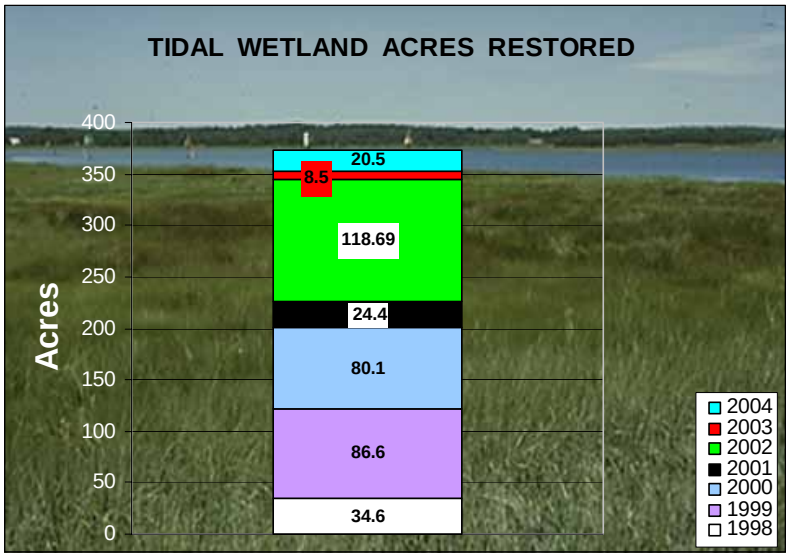


FIGURE 2. Acres of tidal wetlands restored (373.39 acres) between 1998 –2004.

Many other projects were in various stages of development. Connecticut's 2004 habitat restoration workplan contained 32 tidal wetland projects, including *Phragmites australis* control efforts (see discussion on following page). Some of the highlights include:

- Lower Connecticut River Marshes: Post-construction monitoring continued in 2004 at the Lower Connecticut River marshes (Great Island, Upper Island, and Lieutenant River near the confluence with the Connecticut River). Third-year monitoring was undertaken by researchers from Connecticut College; funding was provided by the Long Island Sound License Plate Fund as administered by the CTDEP and by EPA Long Island Sound Study.
- Great Meadows: Construction began at Parcel 3 of the Stratford Land Development Corporation's mandated fill removal project in the Great Meadows tidal wetland complex in Stratford, CT.
- Old Field Creek: Final design modifications were completed for marsh restoration at Old Field Creek, West Haven, CT.
- Barn Island Wildlife Management Area: The CTDEP was awarded a $1,000,000 grant through the U.S. Fish and Wildlife Service's National Coastal Wetlands Conservation Act grant program for the purchase of a 144-acre parcel of land directly abutting the Barn Island Wildlife Management area. Together with The Nature Conservancy and other private donations, CTDEP raised a total of

$1.4million to complete the transactions. The parcel consists of 11 acres of tidal wetlands, 25 acres of inland wetlands, and 108 acres of primarily forested coastal uplands.

Phragmites australis *Control and Evaluation of Restoration Techniques*

In marshes that are diked and drained, the non-native genetic strain (haplotype) of common reed (*Phragmites australis*) can become the dominant plant, in large part due to the reduced concentrations of salt and sulfides that are otherwise toxic for this grass. Phragmites invades these otherwise healthy, natural tidal marshes where the salinity is less than 18 parts per thousand (this includes brackish and tidal fresh marshes). The Connecticut Department of Environmental Protection (CTDEP) is conducting a series of experiments to control Phragmites, including manipulation of the hydromodifications caused by mosquito ditches.

One Phragmites control technique is application of the same herbicide that is used in an over-the-counter backyard weed herbicide. To date, CTDEP has found that single treatments of glyphosate only are effective for a period of 5 years or so, after which additional treatment is required. Many of the wetlands in the Connecticut River that are being invaded are designated as Wetlands of International Importance. Given the wetlands' ecological significance, CTDEP is making a long-term commitment to Phragmites control there. Because these treatments are not long lasting, the restoration effort is reported here, but the acreage of wetland treated with herbicide is not reported in the cumulative wetland restoration statistics.

In contrast to strictly spraying and mowing operations, projects that include significant modifications to marsh hydrology that result in long-term improvements in fish and wildlife habitat and Phragmites reduction are classified as restoration projects. For example, the construction phase of a large-scale marsh restoration project on a 96.5-acre section of Great Island and Upper Island (part of the Lower Connecticut River tidal marsh complex) was completed in June of 2002. The project consisted of testing different combinations of treatments (creating ponds, plugging ditches, filling ditches, and herbiciding and mulching Phragmites) to determine the most effective method(s) for reducing the amount of Phragmites and enhancing fish and wildlife habitat. The ultimate goal of this project is to restore and enhance nearly 300 acres of degraded marsh habitat to a mixture of brackish meadows interspersed with shallow, open water areas–a condition that approximates the pre-ditched marsh environment. Some of the individual objectives of this work are to:

- stop the spread and significantly reduce the aerial extent of Phragmites;
- restore the vegetation mosaic that characterized these brackish tidelands prior to their invasion by Phragmites; and
- enhance the habitat value of the marsh system for birds, fish, and other wildlife.

Post-construction monitoring began immediately after project completion and has continued through 2003 and into 2004. Additional monitoring is expected over the next several years with funding awarded by CTDEP's Long Island Sound License Plate program and the US EPA's Long Island Sound Study. Researchers at Connecticut College in New London, CT, were awarded a grant through the Long Island Sound License Plate Program and used those funds to begin their monitoring of the Great Island and Upper Island marsh system in 2003. The Long Island Sound Study made funds available to CTDEP – Office of Long Island Sound Programs to continue the monitoring effort, and these funds were used to hire the same Connecticut College researchers as private contractors.

Preliminary results of this study indicate that Phragmites cover was significantly lower in pond & plug sites than in meadow sites (pond & plug sites are those which were sprayed and mowed, and treated with hydrologic modification; meadow sites were sprayed and mowed, but received no hydrologic modification beyond the filling of mosquito ditches). Mean water table depths were not significantly different between treatments, but were significantly and consistently more variable in meadow sites. There were no significant differences between treatments for the seven dominant invertebrate species captured in litter bags; nor were there any significant differences detected between treatments for fish captures per trap set. Gut fullness, however, was significantly greater in fish captured leaving meadow sites.

BRONX CEMENT PLANT TIDAL WETLAND RESTORATION, PHASE 2

State: New York
Town: Bronx
Habitat Type: Tidal Wetland
Acres Restored: 0.7

Cause of Degradation: During the industrial revolution of the 19th century, the Bronx River valley was turned into an industrial corridor, and became what one official commission called an "open sewer." Due to the nearly complete channelization and armoring of its banks, the intertidal portion of the Bronx River shows little of the vegetation that once dominated its shores. Stretches of bulkhead, sheet piling, and historic filling and dumping have left the area with contaminated soils unsuitable for fish and shellfish.

Project Description: Restoration of this site involved removing large blocks of concrete and debris, re-grading the banks, replacing invasive plant species such as the Japanese knotweed with native species, and installing coir mats loaded with saltmarsh cordgrass (*Spartina alterniflora*), a native species that prevents erosion better than its invasive counterpart. Additional high marsh and upland plantings included *Iva frutescens*, *Baccharis halimifolia*, upland grass species, and seaside goldenrod.

Implementation Partners: New York City Department of Parks & Recreation; Bronx River Alliance; Sustainable South Bronx; Hunts Point Community Development Corporation; Youth Ministries for Peace and Justice.

Funding Provided By: NOAA Restoration Center; New York City Department of Parks & Recreation.

This cement plant on the Bronx River not only is an eyesore, it also has hindered functioning of the river's ecosystem.

Cordgrass is grown on mats near the cement plant. When they are ready, the mats are then moved into the river to recreate a brackish marsh.

Source of project information and photos:
http://www.conservationconference.noaa.gov/case/bronx_river.html

CASTLE ROCK MARSH RESTORATION

State: Connecticut
Town: Branford
Habitat Type: Tidal Wetland
Acres Restored: 2.1

Cause of Degradation: Tidal exchange had been greatly reduced due to natural and anthropogenic sedimentation within the main tidal creek. As a result, common reed (*Phragmites australis*) started expanding within the marsh.

Project Description: Tidal flow was restored to the existing tidal marsh and Phragmites-dominated areas by removing sediment deposits from the main tidal creek. A few ditches were plugged to help restore panne habitat and a new pond also was created. Low ground pressure equipment was used to excavate and move the material around the marsh surface.

Implementation Partners: Connecticut Department of Environmental Protection – Wildlife Division (lead and construction); Castle Rock Condo Association; U.S. Fish and Wildlife Service - Stewart B. McKinney National Wildlife Refuge.

Funding Provided By: U.S. Fish and Wildlife Service - Partners for Fish & Wildlife Program; Connecticut Department of Environmental Protection – Wildlife Division.

The main tidal creek into Castle Rock marsh was cleared of sediments and other debris, restoring tidal flow.

MILE CREEK TIDAL MARSH RESTORATION

State: Connecticut
Town: Old Lyme
Habitat Type: Tidal Wetland
Acres Restored: 13

Cause of Degradation: Over the last several years, storms have deposited large quantities of sand in the inlet of Mile Creek. The sand had accumulated to the point where tidal exchange was greatly reduced. Too little salt water was entering the system, and *Phragmites australis* also was spreading in areas of higher freshwater runoff. Decades ago, this and many other tidal marsh systems had been systematically grid-ditched as a means of draining the marsh for mosquito control. The spoils from this activity were deposited right alongside the ditches, creating micro-levees and trapping water in this grid of marsh panels, and saturating the panne habitat within many of the panels.

Project Description: The accumulated sand was dredged from the mouth of Mile Creek, restoring flow and increasing tidal flushing. Ditches and other small tidal creeks within the system were cleaned and connected to the pannes to further improve tidal exchange. This will help maintain wetland quality by lowering salinity and saltwater residence time in pannes. Tidal ponds were excavated, and dense stands of Phragmites were sprayed with herbicide and mulched.

Implementation Partners: Connecticut Department of Environmental Protection – Wildlife Division (lead and construction); U.S. Fish and Wildlife Service - Stewart B. McKinney National Wildlife Refuge.

Funding Provided By: U.S. Fish and Wildlife Service - Partners for Fish & Wildlife Program; Connecticut Department of Environmental Protection - Wildlife Division.

Above: Aerial view of the mouth of Mile Creek. Left: A low-ground-pressure mechanical excavator rests beside one of the tidal wetland panels.

Aerial view of the Mile Creek tidal marsh system looking north – a few of the saturated marsh panels are visible toward the middle and upper part of the system.

Above: Close-up view of a saturated marsh panel, mostly devoid of vegetation.

Right: Salt-marsh mosquito breeding was also a big problem in these saturated areas.

MINORE MARSH RESTORATION

State: Connecticut
Town: Branford
Habitat Type: Tidal Wetland
Acres Restored: 4.7

Cause of Degradation: Freshwater run-off from residential areas and other surrounding uplands was entering the marsh and promoting the expansion of the invasive weed *Phragmites australis* (common reed). This plant does not tolerate full-strength seawater, but has the ability to tolerate moderate salinity concentrations. Phragmites tends to expand at the rate or 3% per year in tidal areas that are diluted with excessive freshwater.

Project Description: The Phragmites was treated with herbicide and mulched throughout the entire project site. A new channel was excavated to divert the run-off to a freshwater drainage area. Three small ponds were created on the marsh surface.

Implementation Partners: Connecticut Department of Environmental Protection – Wildlife Division (lead and construction); Branford Land Trust; Save the Sound, Inc; U.S. Fish and Wildlife Service - Stewart B. McKinney National Wildlife Refuge.

Funding Provided By: Branford Land Trust; Save the Sound, Inc; U.S. Fish and Wildlife Service - Partners for Fish and Wildlife Program; Connecticut Department of Environmental Protection – Wildlife Division.

Post-restoration aerial view of Minore marsh.

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 13.25 river miles of migratory passageways. Fishways were built at Dorr's Millpond, and Taftville Dam, and the Chase Brass Mill Dam was completely removed. Existing fishways at Capello Pond Dam and Hummers Pond were replaced, and an eel pass was constructed at the Lake Whitney Dam. Project summary pages follow.

New York completed a number of riparian buffer restoration projects that involved plantings for bank stabilization. New York's portion of the Long Island Sound shoreline presents significantly fewer opportunities for migratory riverine migratory corridor restoration. However, those opportunities that do arise are very important to the overall health of riverine species, and in the reduction of sediment and nutrients reaching Long Island Sound. Because the projects described are riparian or streambank enhancements, and not migratory fish restoration projects that consist of dam removals or fishway installations, the miles for New York's projects are not included in the totals for riverine migratory corridors.

The 10-year goal (1998 - 2007) for this habitat type is to open up 100 currently inaccessible river miles to diadromous fish. To date, 65.2 river miles have been restored through fish passage projects such as dam modifications or dam removal. River mileage for projects completed in 1998–2004 is presented in **Figure 3**.

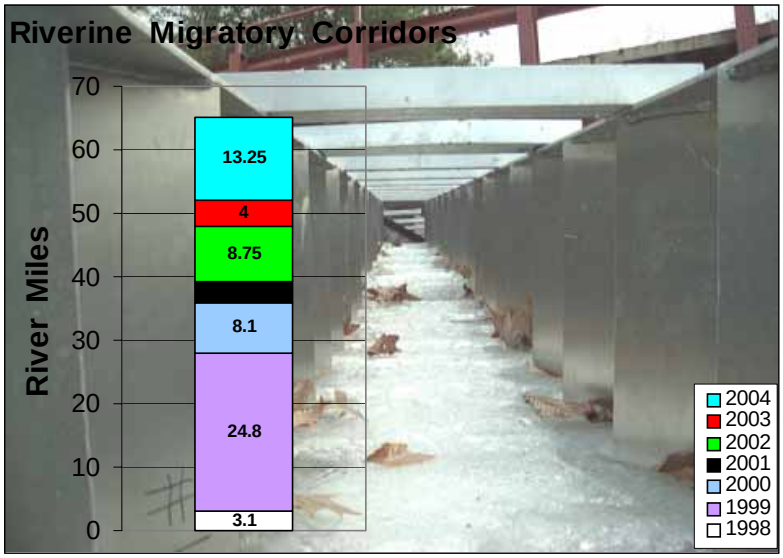


FIGURE 3. Cumulative river mileage (65.2 miles) for RMC projects completed between 1998–2004.

The RMC team also worked on 36 other projects that were in various stages of development. Highlights of progress include:

- Shetucket River: Construction of two Denil fishways began at Taftville Dam and Occum Dam, both on the Shetucket River in Norwich, CT. Taftville also was completed this year.
- Vargus Pond Brook: As a condition of a coastal permit issued by CTDEP's Office of Long Island Sound Programs to extend the Town Pier, the Town of Stonington has agreed to modify a dam in Vargus Pond Brook to allow the passage of anadromous fish.
- Mill River: An eel pass was added on to Lake Whitney Dam on the Mill River in Hamden, CT.

CAPELLO POND DAM FISHWAY REPLACEMENT

State: Connecticut
Town: Guilford
Habitat Type: Riverine Migratory Corridor
Stream Name: East River
Miles Restored: 0.5 – As an Adaptive Management project, this site cannot be applied toward the Long Island Sound Study's 10-year habitat restoration goal.

Cause of Degradation: An old, existing wooden fishway on the Capello Pond Dam in the East River, Guilford, was failing and needed replacement.

Project Description: Replacement of an existing, but rotting, wooden fishway with a permanent aluminum fishway.

Targeted Fish Species: Alewife, blueback herring, sea lamprey, sea-run trout, and possibly American shad.

Implementation Partners: Connecticut Department of Environmental Protection - Inland Fisheries Division; Valley Shore Homeowners.

Funding Provided By: U.S. Environmental Protection Agency 104(b)(4) Program Grant awarded to the Connecticut Department of Environmental Protection.

This new aluminum fishway replaced the dilapidated wooden one that was showing signs of failure. Replacing the old structure before it collapsed allowed anadromous fish uninterrupted access into Capello Pond and beyond.

CHASE BRASS MILL DAM REMOVAL

State: Connecticut
Town: Watertown
Habitat Type: Riverine Migratory Corridor
Stream Name: Naugatuck River
Miles Restored: 9

Cause of Degradation: A dam in the Naugatuck River in Watertown blocks the passage of anadromous fish.

Project Description: Complete dam removal and regrading of the banks and river bed.

Targeted Fish Species: American shad, blueback herring, sea lamprey, sea-run brown trout.

Implementation Partners: Connecticut Department of Environmental Protection - Water Bureau (lead); City of Waterbury.

Funding Provided By: City of Waterbury; Clean Water Funds administered by Connecticut Department of Environmental Protection – Water Bureau.

The Chase Brass Mill Dam was removed by the City of Waterbury as part of a legal settlement related to the Sewage Treatment Plan project.

DORR'S MILLPOND DAM FISHWAY

State: Connecticut
Town: Westport
Habitat Type: Riverine Migratory Corridor
Stream Name: Saugatuck River
Miles Restored: 1.8

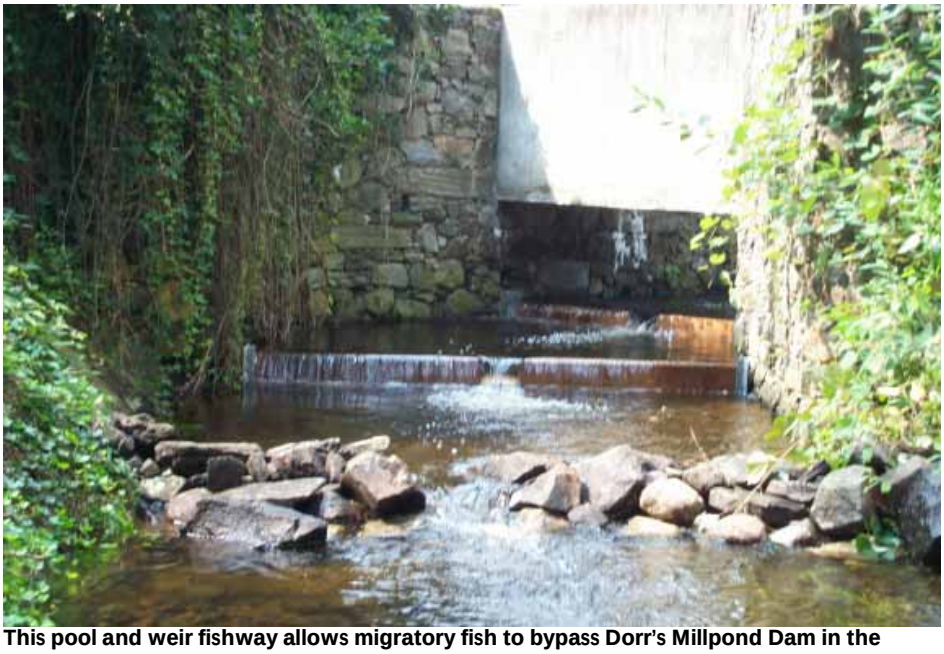
Cause of Degradation: A barrier dam in the Saugatuck River in Westport blocks the passage of fish.

Project Description: A pool and weir fishway was installed to restore fish passage above the dam.

Targeted Fish Species: Alewife, blueback herring, sea-run trout, and American eel.

Implementation Partners: The Nature Conservancy (lead); Connecticut Department of Environmental Protection - Inland Fisheries Division; Trout Unlimited; Glendenning Associates.

Funding Provided By: The Nature Conservancy; Connecticut Department of Environmental Protection - Inland Fisheries Division; Trout Unlimited.



This pool and weir fishway allows migratory fish to bypass Dorr's Millpond Dam in the Saugatuck River.

HUMMERS POND DAM FISHWAY REPLACEMENT

State: Connecticut
Town: Madison
Habitat Type: Riverine Migratory Corridor
Stream Name: Fence Creek
Miles Restored: 1.1 – As an Adaptive Management project, this site cannot be applied toward the Long Island Sound Study's 10-year habitat restoration goal.

Cause of Degradation: An aging wooden Denil fishway on Hummers Pond Dam in Fence Creek was no longer capable of safely passing fish.

Project Description: The wooden Denil fishway was replaced with an aluminum Denil fishway.

Targeted Fish Species: Alewife.

Implementation Partners: Connecticut Department of Environmental Protection - Inland Fisheries Division (lead); Kensington Acres Condo Association.

Funding Provided By: U.S. Environmental Protection Agency 104(b)(4) Program Grant awarded to the Connecticut Department of Environmental Protection.

This new aluminum fishway replaced the pre-existing wooden structure that had fallen into disrepair

MILL RIVER EEL PASS

State: Connecticut
Town: Hamden
Habitat Type: Riverine Migratory Corridor
Stream Name: Mill River
Miles Restored: 14.5 miles of passage for eels only; therefore, this project cannot be applied toward the Long Island Sound Study's 10-year habitat restoration goal.

Cause of Degradation: The Lake Whitney Dam in the Mill River in Hamden blocks the passage of fish.

Project Description: An eel pass was installed on the west bank of the Mill River, just below the spillway on Lake Whitney Dam. Connecticut Department of Environmental Protection staff visit the eel pass three times per week during the spring and once per week in the summer and fall to remove the trapped eels, count them, and manually carry them to the top of the dam for release. Water is provided by a siphon and PVC plumbing to a spray bar.

Targeted Fish Species: American eel.

Implementation Partners: South Central Connecticut Regional Water Authority (lead); Connecticut Department of Environmental Protection - Inland Fisheries Division.

Funding Provided By: South Central Connecticut Regional Water Authority.

A view of the Mill River Eel Pass installed at the base of the Lake Whitney Dam in Hamden, CT.

TAFTVILLE DAM FISHWAY

State: Connecticut
Town: Norwich
Habitat Type: Riverine Migratory Corridor
Stream Name: Shetucket River
Miles Restored: 2.45

Cause of Degradation: A barrier dam in the Shetucket River in Norwich blocks the passage of fish.

Project Description: Build a Denil fishway at hydrodam owned by Northeast Generation Services.

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

Project Partners: Northeast Utilities - Northeast Generation Services (lead); Connecticut Department of Environmental Protection - Inland Fisheries Division; U.S. Fish and Wildlife Service.

Funding Provided By: Northeast Utilities - Northeast Generation Services.

Photos of the upper section of the completed fishway (right) and the middle section (below). In all, the fishway is approximately 350 feet long.

FRESHWATER WETLAND RESTORATION (NON-TIDAL)

The term 'freshwater wetlands' is used collectively to describe the diverse range of non-saline (and non-tidally influenced) ponds, bogs, fens, swamps, and marshes found in the world. The U.S. Fish and Wildlife Service wetland classification system created by Cowardin et al. (1979)[1] categorizes freshwater wetlands in the United States as palustrine, lacustrine, or riverine systems. The classification system also addresses deep-water habitats where the substrate is predominantly non-soil and flooding is permanent, but those types of wetlands are generally not included in the Long Island Sound Study Habitat Restoration Initiative.

Palustrine Systems

Palustrine wetland systems are defined by Cowardin et al. (1979) as non-tidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens; or they may be non-vegetated, shallow water areas (less than six feet deep) with no wave formed or exposed bedrock shoreline features. In order to be considered palustrine, these non-vegetated areas must be less than 20 acres in size.

Lacustrine Systems

Lacustrine wetlands are wetlands and deep water habitats situated in a topographical depression or dammed river channel; lacking trees, shrubs, persistent emergent vegetation[2], emergent mosses or lichens with greater than thirty percent areal coverage; and with a total area larger than 20 acres. Certain wetlands smaller than 20 acres may be classified as lacustrine if there are active wave-formed or bedrock shoreline features making up all or part of the boundary, or if the deepest part of the basin exceeds 6.6 feet at low water (Cowardin et al., 1979). Although lacustrine wetlands do occur within the project boundary in Westchester County, NY, and in Connecticut, for the purposes of this initiative, restoration will focus on the shorelines of these bodies of water where the classification shifts to palustrine.

Riverine Systems

Riverine communities are defined by Cowardin et al. (1979) as "all wetlands and deep water habitats contained within a channel" except those that are dominated by persistent emergent vegetation, trees or shrubs (palustrine), or have more than 0.5 ppt ocean derived salinity (estuarine, marine). Community types are classified by the rate of water flow which in turn dictates the substrate composition and faunal and vegetation types present. Although the Cowardin et al. system also includes tidally influenced, freshwater, non-persistent emergent riverbank vegetation, such as wild rice, all tidally influenced wetland restoration sites were included in the Tidal Wetlands Restoration chapter of this report.

Restoration Objectives

The major cause of wetland degradation is the alteration of the hydrology in the wetland system. This alteration may be caused by a number of activities such as draining, filling, and impounding. In the past, surface water supplies to wetlands have been diverted for drinking water reservoirs, flood control projects, cooling of industrial plants, and irrigation of crops. Other degradation may be caused by chemical inputs to wetlands, or invasion by exotic species. While degradation is caused by unique combinations of circumstances in each affected wetland, some general causes and restoration methods can be outlined. These methods include fill removal, invasive species control, relocation of excessive runoff, and other hydrological modifications.

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[1] Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, FWS/OBJ.79/31. Washington, DC. 103 pp.

[2] Persistent emergent plants are those that leave all or a visible portion of their foliage above the saturation zone or water surface during the dormant season. Conversely, non-persistent emergents are those plants that leave no portion of their foliage visible during the dormant season.

In New York, three freshwater wetland restoration projects were completed during 2004, for a total of 9.0 acres restored (summary pages follow):

• Gardens Lake, Phase 1, Mamaroneck, NY	5.0 acres of lacustrine wetlands
• Nature Study Woods, Phase 1, New Rochelle, NY	1.0 acres of freshwater wetland
• Nature Study Woods, Phase 2, New Rochelle, NY	3.0 acres of freshwater wetland
	9.0 acres of freshwater wetland

Several other projects were in various stages of development.

No freshwater wetland restoration projects were completed in Connecticut. The State of Connecticut currently has no program dedicated to the restoration of freshwater (non-tidal) wetlands.

GARDENS LAKE RESTORATION, PHASE 1

State: New York
Town: Mamaroneck
Habitat Type: Lacustrine Freshwater Wetland
Acres Restored: 5

Cause of Degradation: An impoundment in the Sheldrake River that forms Gardens Lake also traps sediment flowing downstream. Gardens Lake, also known as the 'Duck Pond' experiences rapid sedimentation, requiring periodic and costly dredging. The accumulation of sediment degrades the lake's ecosystem, as well as water quality in the lake and downstream Sheldrake River, Mamaroneck River, and Long Island Sound. It also detracts from the lake's recreational and aesthetic values. Sedimentation problems also have resulted in increased flooding.

Project Description: Gardens Lake will be fully rejuvenated as part of a comprehensive, multi-phase restoration project to be completed by the end of 2006. The first phase of this work, in the fall 2004, involved the construction of a sediment trap where the Sheldrake River enters the lake. The trap consists of a concrete block and stone weir (underwater wall) across the lake's entrance. Sediment, leaves and other material carried by the river into the lake will drop out of suspension by the slower waters behind the weir, thereby preventing it from entering the lake. The sediment trap will need to be cleaned out at least once per year, but this will be far less costly over the long-term than dredging the entire lake. The second project phase will involve dredging the lake, establishing wetland habitats in and around the lake, adding a vegetated buffer (filter strip) along the lake's shores, and installing underground sediment traps where stormwater pipes enter the lake.

Implementation Partners: Westchester County Planning Department; Town of Mamaroneck; U.S. Department of Agriculture – Natural Resources Conservation Service.

Funding Provided By: Federal, NY State, and Westchester County governments.

Various stages of construction at Gardens Lake – source: http://www.westchestergov.com/planning/environmental/AquaticRestorationSites/gardenslake.html

NATURE STUDY WOODS – STORMWATER MANAGEMENT & FRESHWATER WETLAND RESTORATION PROJECT

State: New York
Town: New Rochelle
Habitat Type: Freshwater Wetland
Acres Restored: 1

Cause of Degradation: The outflow of an old discharge pipe scoured out part of the adjacent State-designated freshwater wetland by emptying hundreds of gallons of stormwater per minute into it.

Project Description: The discharge pipe was removed from the wetland and the portion of the wetland that had been degraded was restored.

Implementation Partners: Westchester County Department of Planning; Westchester County Department of Parks, Recreation & Conservation; New York Department of State.

Funding Provided By: NY State and Westchester County governments.


Photos by Westchester County Planning Department.

NATURE STUDY WOODS – INVASIVE SPECIES REMOVAL & FRESHWATER WETLAND RESTORATION PROJECT

State: New York
Town: New Rochelle
Habitat Type: Freshwater Wetland
Acres Restored: 3

Cause of Degradation: Invasive plant species replaced native species.

Project Description: The County of Westchester removed large patches of several invasive plant species from the buffer along a state-designated wetland and planted native plants suitable for the buffer.

Implementation Partners: Westchester County Department of Planning; Westchester County Department of Parks, Recreation & Conservation; New York Department of State.

Funding Provided By: NY State and Westchester County governments.



Photos by Westchester County Planning Department.

COASTAL FOREST RESTORATION

At this time, the Habitat Restoration Manual does not include a finalized chapter to summarize the key elements of coastal forest restoration. A draft chapter, however, is in the early stages of development.

In New York, one coastal forest restoration project was completed during 2004 for a total of 3 acres restored:

- Seton Falls Park, Bronx, NY 3.0 acres of coastal forest

Several other New York projects were in various stages of development.

No coastal forest restoration projects were completed in Connecticut. The State of Connecticut currently has no program dedicated specifically to the restoration of coastal forest habitat.

SETON FALLS PARK COASTAL FOREST RESTORATION

State: New York
Town: Bronx
Habitat Type: Coastal Forest
Acres Restored: 3

Cause of Degradation: The landscape was dominated by non-native plants including Norway maple, porcelain berry and smooth buckthorn.

Project Description: The invasive species were removed and the site was replanted with natives. Tree species, such as willow oak, sweet gum, and tulip poplar were planted along with shrubs, including sweet pepperbush, elderberry, and black and red chokecherry.

Implementation Partners: New York City Department of Parks & Recreation Natural Resources Group, Seton Falls Park Preservation Coalition, and Wave Hill Forest Project.

Funding Provided By: New York State Department of Environmental Conservation and City of New York.

Photo provided by New York City Parks & Recreation.

SUBMERGED AQUATIC VEGETATION (SAV)

Eelgrass

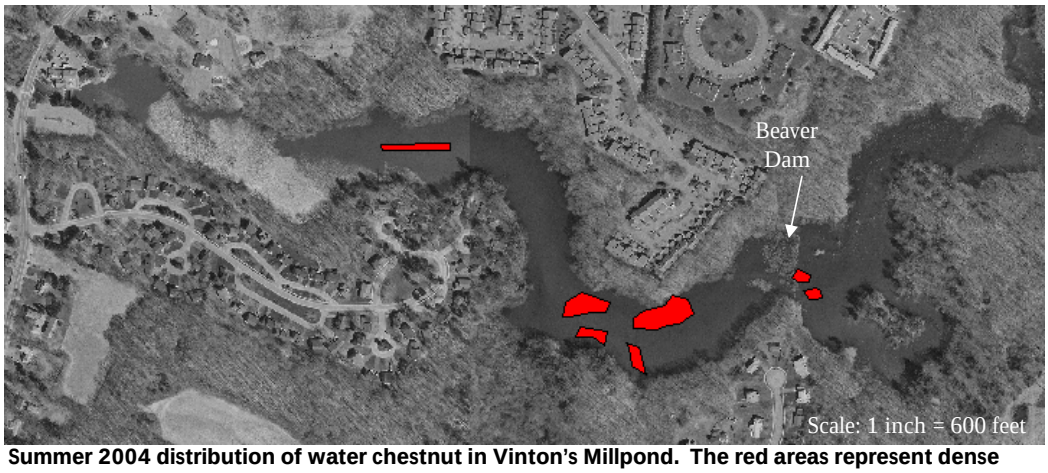
In 2001, Connecticut Department of Environmental Protection (CTDEP) was awarded a grant by the EPA Long Island Sound Study to re-map eelgrass *(Zostera marina)* beds in eastern Long Island and Fishers Island Sounds in New York and Connecticut. The CTDEP used those funds to contract with the National 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 should be undertaken in 2005 or 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.

Water Chestnut Removal

Restoration of the Hockanum, Connecticut, and Podunk Rivers

CTDEP completed a sixth year of control efforts for the highly invasive aquatic plant, water chestnut (*Trapa natans*). Water chestnut was first documented in Connecticut in 1999 when it was discovered in Keeney Cove, a freshwater tidal cove of the Connecticut River in Glastonbury. Infestations since have been discovered in the Hockanum River (East Hartford), Vinton's Millpond in the Podunk River (South Windsor), Trout Brook (West Hartford), and in two private ponds in the eastern and western parts of Connecticut.

Water chestnut populations declined this year–some quite drastically over 2003–with the exception of only one site: at Keeney Cove, the population removed dropped from over 250 pounds to just a single plant. At Trout Brook, removal was reduced from over 2,000 pounds in 2003 to just 400 pounds this year. At the upper Hockanum River site, removal dropped from 35,000 pounds in 2003 to only 1,500 in 2004, while at the lower Hockanum site, the load was reduced from 6,300 pounds to approximately 1,300 pounds. The only site not following this declining trend was the population found at Vinton's Millpond, which experienced quite a large resurgence. Only 5,000 pounds were harvested in 2003, whereas in 2004 it took a large crew several days of effort to remove an estimated 28,000 pounds.



Summer 2004 distribution of water chestnut in Vinton's Millpond. The red areas represent dense patches, except for the two that lie east of the beaver dam (moderate density). The entire pond also had many plants scattered throughout.

Water Chestnut Expansion

Four new infestations of water chestnut were found during 2004, including three in the Connecticut River. The first site is a privately owned farm pond in New Milford, which had only a handful of plants. The second was discovered in the Windsor Locks Canal by a local fisherman who called CTDEP to report it. The weeds were found scattered throughout the nearly 5-mile stretch of the canal, but were primarily concentrated near the center, where an aqueduct carries the canal over Stoney Brook in Suffield, CT. The third site is a small, unnamed cove on the west bank of the Connecticut River in Cromwell. A total of approximately 500 pounds were quickly harvested from a few patches plus some scattered plants. The fourth site is at the mouth of the Eightmile River, also known as Hamburg Cove. Both this area and the Cromwell site are recognized as Ramsar sites, which contain "wetlands of international importance." The discovery of rooted water chestnut plants in Hamburg Cove, however, marks the first time the weeds were documented within the Long Island Sound Study's project boundary (Figure 4). Fortunately, only a handful of plants were found and collected.

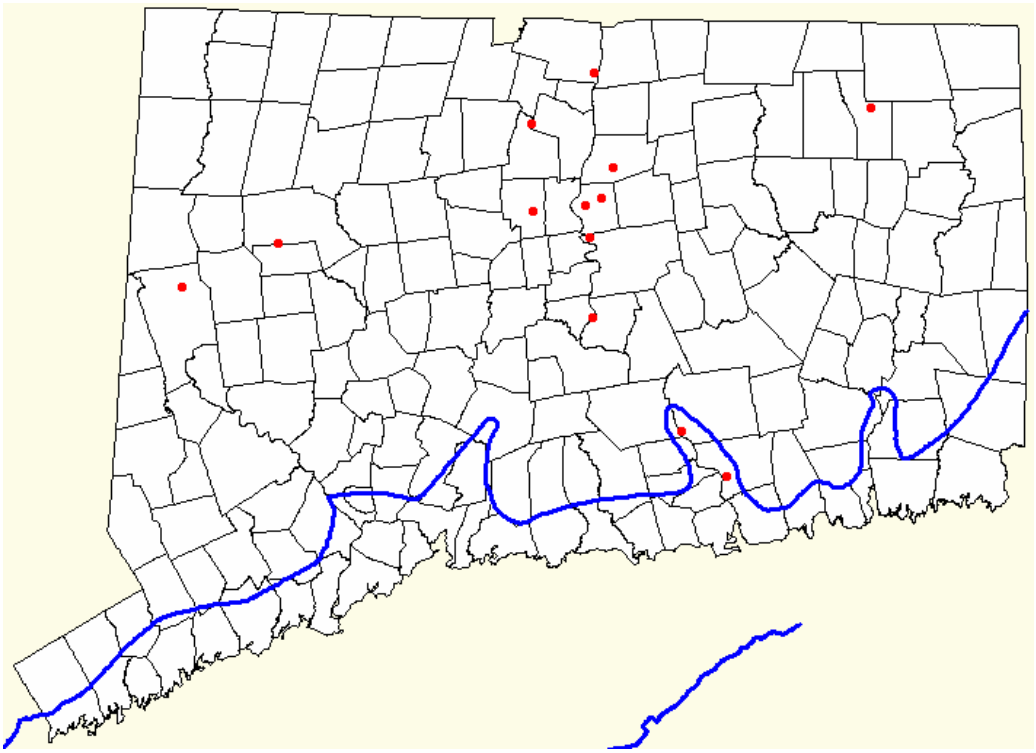


Figure 4. Red dots indicate known water chestnut populations in Connecticut through December 2004. The Lord Cove population is marked by the southern-most red dot. The other red dot within the LISS Project Boundary (blue line) represents water chestnut plants discovered in the Connecticut River just outside of Chapman Pond, East Haddam, in 2001, yet not reported to CTDEP until 2004.