

Long Island Botanical Society

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The Quarterly Newsletter

Spring 2007

Ten Least Wanted

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NYSDEC Division of Water

Long Island is blessed with a surprisingly large number of lakes, ponds, and reservoirs, many of which enjoy a wide diversity of aquatic plants. Unfortunately, as in most other parts of the state, Long Island faces significant ecological threats from invasive exotic species. While terrestrial invaders such as phragmites and purple loosestrife may be more conspicuous, aquatic invaders can also be substantial and pervasive from Montauk to the New York City.

For many years, many Long Island lakes and ponds fit comfortably into one of two camps in regards to exotic aquatic plants: those with well-established populations of naturalized exotic plants, such as

Cabomba caroliniana (fanwort) or *Egeria densa* (Brazilian elodea), and those populated entirely by native plants. This has changed in recent years, with the recent introduction of *Myriophyllum spicatum* (Eurasian watermilfoil) and *Trapa natans* (water chestnut) to Long Island, and with the spread of new or “lesser” invaders to otherwise pristine regions of the Island. An example of the latter is the recent discovery of *Myriophyllum heterophyllum* (variable watermilfoil) in Long Pond in the Greenbelt, which encompasses remote coastal plain ponds thought to be less susceptible to exotic invaders.

This article highlights the 10 most important aquatic invasive plant species in New York State and Long Island. While these plants often share surprisingly

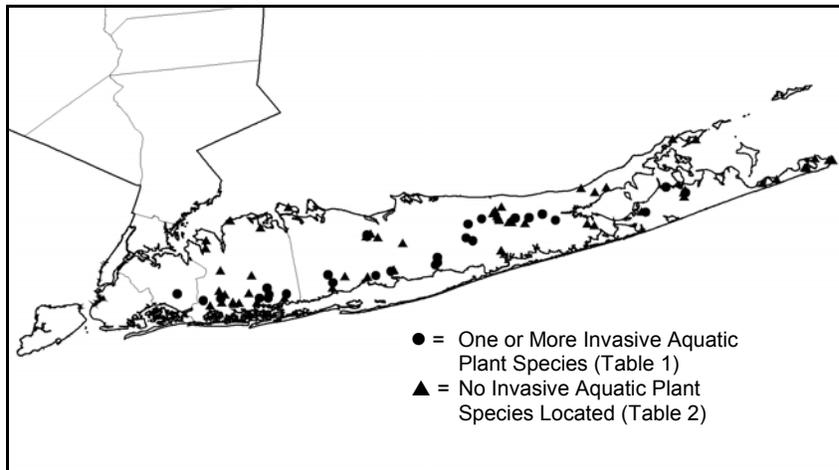
few characteristics—some grow in very deep water rather than in sluggish shallows, some reproduce by rhizomes rather than seeds, and some are new exotics rather than naturalized invaders—all have or could reap significant ecological havoc on the lakes, ponds, and streams of Long Island. The list does not include *Hydrilla verticillatum* (hydrilla), a very aggressive exotic plant

recently found in many New England states, but not yet anywhere in New York State. It is likely that this plant resides somewhere in the state.

It is clear that the distribution of these plants may be more widespread than reported here,

given the large number of unsurveyed bodies of waters on the Island.

The NYSDEC, the Nature Conservancy of Long Island, the Long Island Botanical Society, and many other partners are working together to improve surveillance networks and exotic plant distribution maps, and, more importantly, to help stem the tide of invasive plant introductions. Each of these organizations can be contacted if a suspicious plant is found; a good starting point is the NYSDEC Division of Water, via e-mail at sakishba@gw.dec.state.ny.us, or by phone 518-402-8282.



Long Island locations surveyed for aquatic invasive plant species.

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Long Island Botanical Society

Founded: 1986

Incorporated: 1989

The Long Island Botanical Society is dedicated to the promotion of field botany and a greater understanding of the plants that grow wild on Long Island, New York.

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www.libotanical.org

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Society News

Charter LIBS members Jane and Skip Blanchard are soon retiring to Florida. A farewell dinner for them will precede the May 8 meeting. We will meet at 5:30 p.m. at The Milleridge Inn, 585 North Broadway, in Jericho. RSVP to Rich Kelly by May 1.

Carol Johnston presented a Treasurer's Report for 2006. Total Income = \$20,523.74 (including \$6,100.00 in contributions). Total Expenses = \$19,869.34. Net Gain = \$654.40. Closing balance as of December 31, 2006 = \$16,998.37. Note that Income & Expenses were much higher than normal due to the trip to Newfoundland.

Al Lindberg reported on the status of the "Muttontown Preserve Master Plan," to be used as a model for other Nassau County preserves. LIBS has agreed to become a "stakeholder" and partner in the preparation of the Master Plan. The study will be funded through the Environmental Bond Act and will address concerns such as trail systems, management of invasives, etc.

The New York Times reported on the death and removal of the 550-year-old black oak tree on Lloyd Harbor. The big oak was listed on the National Register for Historic Trees as "the oldest and at one time the largest black oak in North America." It fell during a storm in early September 2006.

On January 17, the Council on Environmental Quality met and delivered its final review on Suffolk County's proposed Long Term Plan on Mosquito Management (see LIBS Newsletter Vol. 17 No. 1). As reported in the New York Times: "In an unusual move, a Suffolk County advisory panel has recommended major changes in a proposed county plan for controlling mosquitoes. The 10-member Council on Environmental Quality, which under the county charter advises lawmakers on environmental issues, has a record of approving plans it reviews. In a turnaround, led by LIBS member John E. Potente, a majority of the council agreed that Methoprene, which prevents larvae from maturing into adult mosquitoes, could harm wetlands and marine life. In a series of recommendations, the council also formally rejected excavating ponds and tidal channels in wetlands to control mosquitoes." On March 20, 2007, the Suffolk County Legislature ignored the recommendations of the committee and voted to approve the plan.

Plant Sightings

David Taft reported via e-mail that he had visited the Flanders site shortly after Eric and Mary Laura Lamont reported that no autumn coralroot (*Coralorhiza odontorhiza*) orchids had emerged in early November 2006. David reported observing a few flowering individuals of this rare orchid.

Dave also located 10 leaves of crane fly orchid (*Tipularia discolor*) in Moore's Wood on Mach 10.

Peter Warny reported Water Hyacinth (*Eichhornia crassipes*) from the Peconic River just east of the canoe launch on Connecticut Avenue.

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***Myriophyllum spicatum* (Eurasian watermilfoil)**

Myriophyllum spicatum is a submerged, perennial dicot that is among the most invasive submergent aquatic plant species in much of the northern portion of the United States. It is a generalist invader, growing copiously in shallow and deep water over the full range of trophic states and sediment types found throughout the Torrey range. *Myriophyllum spicatum* gains a competitive advantage over native plants by growing rapidly in water colder than 10°C, reproducing by fragments, including those created through late summer auto-fragmentation (bearing adventitious roots), and by forming dense surface canopies that shade low-lying plants. It is characterized by whorls of three to six pinnate leaves with 12 or more filaments on each side of the leaf, reddish to pink flowers found on an emergent spike in late summer, tan to pink stems, reddish growing tips on the near-surface leaves, and especially blunt leaf tips.

The origin of Eurasian watermilfoil in the northeastern United States cannot be pinpointed with any certainty. The first confirmed collection came from a Maryland pond in the early 1940s. It is likely that the plant was introduced into the Finger Lakes region in the 1940s, and spread radially by boat traffic, water fowl, and water flow, probably most often along the Erie Canal. Over the last 60 years, *M. spicatum* has spread to nearly all of the 62 counties in New York State, with the interior Adirondacks and Long Island the only regions in New York State not colonized by the end of the 20th century. Unfortunately, established beds of Eurasian watermilfoil were found in 2005 in North and South Twin Ponds (aka Seamans Ponds) in the village of Wantagh in Nassau County. This may represent the pioneering introduction of this invasive plant to Long Island.

***Myriophyllum aquaticum* (parrotfeather)**

Myriophyllum aquaticum is a submerged, perennial dicot. It has also been known alternatively as *M. prosperpinacoides* and *M. brasiliense*. Parrotfeather is commonly grown in aquaria and garden ponds, and has become established through accidental and intentional introductions in sluggish streams and ponds. It is characterized by a stiff, bright (lime) green inflorescence that may emerge as much as a foot above the water surface, closely resembling small fir trees. Submergent leaves are pinnately feathered, usually in whorls of four to six, as is typical of the milfoil genera.

Parrotfeather was introduced from South America into the United States sometime in the late 1800s, with the first collection reported in the Washington, DC, and Haddonfield, NJ areas in 1890. Its origin in New York State is not clear, although by the time of the

1938 biological survey of the fresh waters of Long Island, it was reported as naturalized and persistent in Milburn Pond, the outlet of Belmont Lake, the Ponds at Wading River, and in many of the ponds in the Peconic River system above Riverhead. Recent Long Island aquatic plant surveys found it growing sporadically in the Peconic River system and in two ponds in eastern Nassau County. The presence of parrotfeather in the wild in New York State is largely limited to Long Island.

***Trapa natans* (Eurasian water chestnut)**

Trapa natans is a floating leaf, perennial dicot considered to be an aggressive, invasive species throughout New England and the mid-Atlantic region. It is the only submergent plant for which the “plant(ing), transport, transplant, or traffic(king)” of the plants, seeds, or nuts is outlawed in New York, as per the state Environmental Conservation Law. Water chestnut grows in sluggish waters of rivers and ponded waters. It is characterized by a rosetta of triangular, serrated floating leaves, inflated petioles, and a nutlike four-pronged fruit with strong, barbed spines.

Water chestnut first colonized North America just north of the Torrey range; there remains some debate within the botanical community whether the pioneering ornamental introduction can be traced to Sanders (now Collins) Lake in Scotia, New York or to a Harvard herbarium garden outside of Boston circa 1880. *Trapa natans* was first discovered in Long Island in Mill Pond (village of Wantagh, Nassau County) in late summer of 2004 as part of a routine water quality monitoring project conducted by the New York State Department of Environmental Conservation. A more detailed survey in 2005 identified a single bed approximately 150 square feet in area along the northern shore of the lake, and isolated single plants in scattered locations throughout the lake. This invasive plant was not detected in any adjacent lakes, ponds, or waterways.

***Myriophyllum heterophyllum* (variable watermilfoil)**

Myriophyllum heterophyllum is a submerged, perennial dicot. It is considered native to the United States, although the status of this plant in New York State is still debated. Variable watermilfoil is characterized by an emergent whorled floral bract that closely resembles the submergent leaves, and by a thick brown to deep red stem. It is commonly associated with acidic waters in much of New England.

It is likely that variable watermilfoil first colonized Long Island after 1940, since the 1930s biological survey of the Island did not report the presence of this plant. A 1974 inventory of aquatic vascular plants of New York State included a single confirmed sighting in

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north central Suffolk County. Recent Long Island aquatic plant surveys found it growing aggressively in several lakes and ponds in western Suffolk County, particularly around Patchogue, and in Long Pond in the Greenbelt.

***Cabomba caroliniana* (fanwort)**

Cabomba caroliniana is a submerged, perennial dicot. It is considered native to the United States, but not native to the northeast, including New York State. Fanwort is characterized by pinnately divided opposite leaves displayed in a fanlike appearance and connected to the stem by a small petiole. Small white floating leaves are sometimes apparent in mature plants. It is a common aquaria and water garden plant, and it is commonly associated with weakly acidic waters in much of New England.

Fanwort was not reported in the 1930s biological survey of the Island, but the 1974 inventory of aquatic vascular plants of New York State included confirmed sightings in eastern Suffolk County. Fanwort has long been reported as an aggressive, invasive plant on Long Island, and recent Long Island aquatic plant surveys found it growing widespread throughout the island, particularly in the Peconic River system, southwestern Suffolk County, and southeastern Nassau County. This exotic plant has been identified sporadically throughout New York State, with differing growth characteristics in each location. It is generally a deepwater plant in upstate New York, but a low lying plant in Long Island.

***Egeria densa* (Brazilian elodea)**

Egeria densa is a submerged, perennial monocot. It is considered nonnative to the United States. This exotic plant was also known as *Anacharis densa*, and is still be sold in the aquaria trade as *Anacharis* and for laboratory displays as *Elodea*. Brazilian elodea is characterized by finely serrated strap-shaped leaves in whorls of four to six, and lacking a spiny protrusion on the midrib of the underside of the leaves.

Brazilian elodea was first reported in the United States in Millneck, Long Island in 1893. It was reported in the 1930s biological survey of the Island as established in the Peconic River and Milburn Pond in Nassau County. The 1974 inventory of aquatic vascular plants of New York State alluded to "persistent" sightings in some areas of Long Island. Recent Long Island aquatic plant surveys found the plant growing in thick, fibrous mats in Forest City Park Pond in eastern Nassau County and in various locations around the Island. Brazilian elodea has been recently found growing aggressively in a small lake in western Orange County, perhaps

the first sighting of this plant outside of Long Island since 1990. However, since this plant closely resembles common waterweed (*Elodea canadensis*), it is likely that Brazilian elodea has been incorrectly identified in other locations.

***Najas minor* (brittle naiad or brittle water nymph)**

Najas minor is a submerged, annual monocot. It is considered a nonnative plant introduced to the United States from Europe, although it is usually not referred to as an invasive exotic plant. This seed-producing plant, however, can aggressively colonize perturbed water bodies, particularly after plant control strategies such as herbicides or drawdown adversely affect rhizome-producing plants. Brittle naiad is characterized by coarsely serrated margins on opposite to subopposite leaves that appear recurved in some waterbodies.

The introduction of brittle naiad into New York cannot be well established, although it was likely introduced into the United States in the 1930s. It was not reported in the biological survey of the Island in 1938, but the 1974 inventory of aquatic vascular plants of New York State identified populations of brittle naiad along the Oswego River and the Hudson River between Troy and Kingston. Recent Long Island aquatic plant surveys found isolated specimens of the plant in western Suffolk County and eastern Nassau County.

***Potamogeton crispus* (curly leafed pondweed)**

Potamogeton crispus is a submerged, perennial monocot. It is considered a nonnative plant introduced to the United States from Europe, and it grows aggressively under the ice into the spring, usually dying off by early July. For many water bodies, it creates significant water use impediments in the spring to early summer. Curly leafed pondweed is characterized by serrated margins, a rounded tip, a curly (lasagnalike) appearance, and the formation of a woody overwintering turion.

Curly leafed pondweed was probably introduced into the United States in the early 1880s and in Finger Lakes region of New York within a decade. It was reported in the biological survey of the Island in 1938 in sluggish portions of the Peconic River and Cold Spring Harbor. The 1974 inventory of aquatic vascular plants of New York State identified populations of curly leafed pondweed in the Peconic River and northwestern Nassau County. Recent Long Island aquatic plant surveys found small populations in central to eastern Nassau County and on the South Fork. However, given the growth characteristics of the plant, other populations may not have been observed during summer surveys.

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Table 1. Long Island Plant Survey Locations of Exotics

Town	Lake Name	Park	Exotics
Kings County			
Queens	Baisley Pond		<i>Potamogeton crispus</i>
Nassau County			
Hempstead	Forest Park Lake	Forest City Park	<i>Cabomba caroliniana</i> , <i>Egeria densa</i>
Hempstead	Merokee Lake	Merokee Park	<i>Egeria densa</i>
Hempstead	Mill Pond-Wantagh	Mill Pond Park	<i>Trapa natans</i> , <i>Cabomba caroliniana</i> , <i>Najas minor</i>
Hempstead	Tanglewood Park Pond	Tanglewood Preserve Park	<i>Potamogeton crispus</i>
Hempstead	Upper-Lower Twin Pond	Twin Ponds Park	<i>Myriophyllum spicatum</i> , <i>Cabomba caroliniana</i> , <i>Egeria densa</i>
Hempstead	Mill Pond-Lynbrook	Valley Stream/Mill Pond Park	<i>Myriophyllum aquaticum</i>
Oyster Bay	Massapequa Reservoir	Massapequa Park	<i>Myriophyllum aquaticum</i> , <i>Potamogeton crispus</i>
Suffolk County			
Babylon	Belmont Lake	Belmont Lake State Park	<i>Cabomba caroliniana</i>
Babylon	Southards Pond		<i>Cabomba caroliniana</i>
Brookhaven	Randall Pond	Middle Island State Game Farm	<i>Egeria densa</i>
Brookhaven	Artist Lake		<i>Cabomba caroliniana</i>
Brookhaven	Upper Yaphank Lake		<i>Cabomba caroliniana</i>
Brookhaven	West Lake		<i>Cabomba caroliniana</i>
Brookhaven	Forge Pond		<i>Cabomba caroliniana</i> , <i>Egeria densa</i> , <i>Myriophyllum aquaticum</i> , <i>Ludwigia peploides</i>
Brookhaven	Great Patchogue Lake		<i>Cabomba caroliniana</i> , <i>Egeria densa</i> , <i>Myriophyllum heterophyllum</i>
Brookhaven	Canaan Lake		<i>Cabomba caroliniana</i> , <i>Myriophyllum heterophyllum</i>
Brookhaven	Lower Yaphank Lake		<i>Myriophyllum heterophyllum</i> , <i>Cabomba caroliniana</i>
Islip	West Brook Pond	Connetquot River State Park	<i>Myriophyllum heterophyllum</i> , <i>Cabomba caroliniana</i>
Islip	Knapps Pond		<i>Najas minor</i>
Riverhead	Swan Lake		<i>Cabomba caroliniana</i>
Smithtown	Lower Vail Pond	Caleb Smith State Park	<i>Myriophyllum heterophyllum</i>
Smithtown	Upper Vail Pond	Caleb Smith State Park	<i>Myriophyllum heterophyllum</i>
Smithtown	Willow Pond	Caleb Smith State Park	<i>Myriophyllum heterophyllum</i>
Southampton	Long Pond	Greenbelt	<i>Myriophyllum heterophyllum</i>
Southampton	Little Peconic Reservoir	Peconic Bog County Park	<i>Cabomba caroliniana</i>
Southampton	Trout Pond	Trout Park Pond	<i>Cabomba caroliniana</i>
Southampton	Little Fresh Pond		<i>Cabomba caroliniana</i> , <i>Potamogeton crispus</i>
Southold	Wildwood Lake		<i>Cabomba caroliniana</i>

Table 2. No Invasive Species Seen

Lake Name	Park
Nassau County, Hempstead	
Camaans Pond	Camaans Pond Park
Eisenhower County Park Pond	
Grant Park Pond	Grant Pond County Park
Halls Pond	Halls Pond County Park
Hemstead Lake	Hempstead Lake State Park
Milburn Pond	Milburn Pond Park
Silver Lake	Silver Lake Park
Lister Pond	
Lofts Pond	
Smith Pond	
Nassau County, North Hempstead	
Herricks Pond	Herricks Park County Park
Leeds Pond	
Nassau County, Oyster Bay	
Massapequa Lake	Massapequa Park
Mill Pond-Oyster Bay	Mill Pond Park
Mill Pond-Port Washington	Mill Pond Park
Dosoris Pond	
Suffolk County, Babylon	
Argyle Park Pond	Memorial Park
Suffolk County, Brookhaven	
Brookhaven Vernal Pond	Brookhaven State Park
Tarkill Jr Pond	Brookhaven State Park
Tarkill Pond	Brookhaven State Park
Dead Car Pond	Robert Cushman County Park
Fox Pond	Robert Cushman County Park
Horn Pond	Robert Cushman County Park
Unnamed Pond #1	Robert Cushman County Park
Unnamed Pond #2	Robert Cushman County Park
East Mill Pond	
Panamoka Lake	
West Mill Pond	
Suffolk County, East Hampton	
Amsterdam Pond	Amsterdam Beach State Park
Fresh Pond	Hither Hills State Park
13th Hole Pond	Montauk Downs State Park
16th Hole Pond	Montauk Downs State Park
5th Hole Pond	Montauk Downs State Park
7th Hole Pond	Montauk Downs State Park
Wooded Pond	Montauk Downs State Park
Unnamed Brackish Ponds	Montauk State Park
West Money Pond	Montauk State Park
Napeague Pond	Napeague State Park
Big Reed Pond	
Suffolk County, Huntington	
Freshwater Pond	Caumsett State Park

Lake Name	Park
Suffolk County, Islip	
Webster Pond	Caleb Smith State Park
Lower Pond	Connetquot River State Park
Main Pond	Connetquot River State Park
Lake Ronkonkoma	
Orowick Lake	
Paradees Lake	
Suffolk County, Riverhead	
Deep Pond	BSA Camp Wauwepex
Peasys Pond	Robert Cushman County Park
Sandy Pond	Robert Cushman County Park
Suffolk County, Smithtown	
Phillips Mill Pond	Caleb Smith State Park
Millers Pond	Millers Pond Park
Suffolk County, Southampton	
Crooked Lake	Greenbelt
Little Long Pond	Greenbelt
Round Pond	Greenbelt
Sears Lake	Sears Bellows County Park
Big Fresh Pond	
Suffolk County, Southold	
Hallocks Pond	Jamesport State Park
Orient Beach Ponds	Orient Beach State Park
Bellows Pond	Sears Bellows County Park
Dam Pond	
Laurel Lake	
Maratooka Lake	

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Ludwigia peploides (floating water primrose)

Ludwigia peploides is an emergent, perennial dicot. It is considered a nonnative plant introduced to the United States from tropical and subtropical South America, and it grows aggressively above the water surface, often crowding out native plants and promoting insect propagation. It is characterized by the bright yellow petals and bright green sepals that occur on long stalks between the leaves.

Floating water primrose was first reported in the Peconic River in 2003, and Prospect Park in Brooklyn represents the only other confirmed sighting on Long Island. An extensive management project has been undertaken to address the populations in the Peconic River.

Hydrocharis morsus-ranae (European frogbit)

Hydrocharis morsus-ranae is a floating to emergent, perennial monocot. It is considered a nonnative plant introduced to the United States from Europe. European frogbit was intentionally introduced to Canada in 1932, and eventually migrated to Lake Ontario by 1986. It is characterized by fibrous floating or emersed heart-shaped leaves on long stems, with a single three-petaled white flower, usually along the quiet edges of streams and ponded waters.

European frogbit has been reported in Forge Pond in the Peconic River system. It has not been the subject of intensive surveillance programs.

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Eelgrass (*Zostera marina* L.) on Long Island: Yesterday, Today, and Tomorrow (Part II)

Chris Pickerell

Habitat Restoration Specialist, Cornell Cooperative Extension

In the previous article (Long Island Botanical Society Newsletter, Vol. 17, No. 1), we learned about the ecology and history of eelgrass (*Zostera marina*) on Long Island. This time, we'll consider aspects of conservation and restoration and what is being done to reverse significant historic losses. Although management efforts have clearly not kept pace with the rate and scale of these losses, there has been no shortage of attempts to plant eelgrass over the last 70 years. Beginning in the 1930s and continuing to this day, the science of restoration has advanced considerably; it remains to be seen whether resource management can advance similarly.

Background

The concept of seagrass restoration is not a new one as wildlife managers in the early 20th century realized the value of these plants to the nearshore environment and attempted plantings soon after the "wasting disease" wiped out most local populations. The first known proactive eelgrass planting effort on Long Island took place near Jones Beach in 1937 and involved planting "two bushels" of plants collected from Mecox Bay, Southampton, and an unknown quantity of plants collected from Virginia and Washington State (Lynch and Cottam, 1937). Although the report is short on details, apparently most plants died soon after planting except for the Washington plants, which lived long enough to

set seed. It is not clear if these seeds ever germinated and contributed in any meaningful way to the recovery of the meadows in Great South Bay (GSB), but it is interesting to note that our GSB plants *could* have a West Coast lineage. This is especially intriguing to us today when the issue of genetic contamination of native plant populations is at the forefront of conservation science.

The first study of the growth, reproduction, and ecology of Long Island's eelgrass was conducted in the 1960s as part of an effort to control the species (Burkholder and Doheny, 1968). This project, conducted in Hempstead Bay and South Oyster Bay, was initiated because eelgrass was considered to be "an unwanted nuisance by shoreline property owners and recreational boatmen." In the early 1970s, as the rise in navigational dredging stimulated interest in methods of stabilizing dredge spoils above and below the water, most work focused on salt marsh plantings to create marsh islands, but a few projects focused on planting seagrasses to stabilize subtidal sediments. The first and only known project of this type on Long Island was initiated by Dr. A. C. Churchill at Adelphi University (Churchill *et al.*, 1978). This project involved the "largest number of individual transplants completed" in the United States and demonstrated that large-scale eelgrass restoration was possible in the region (Churchill *et al.*,

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1978). Churchill's group was also the first to attempt the use of seeds, and their results hinted at the potential of this method.

Restoration Theory

The use of the term "restoration" implies that the site will be returned to some former condition or state and, therefore, it is essential that we understand the growth habit and distribution of the species before restoration is attempted. The key to any good restoration program is an understanding of the growth habitat of eelgrass in the area so that appropriate restoration targets can be established. Use of modern scuba gear, not available to early researchers, allows us to spend an unlimited amount of time in the field. In fact, during 2006, Cornell Cooperative Extension divers spent more than 500 combined hours working in eelgrass meadows around Long Island. The more time we spend in the water, the more we understand that there is no "typical" Long Island eelgrass growth form. Just as exposure to wind and elevation can cause differences in the growth habit of trees, differing wave exposure, currents, bottom type, depth, and temperatures will alter eelgrass's growth habit and meadow form. Given the significant role that temperature plays in the life cycle of eelgrass, we also deploy temperature loggers at many sites so that any changes in growth and survival can be related to trends in water temperature.

As we have come to understand the differences in the way grass grows under different conditions, our expectations and methods have changed accordingly. For example, it is unreasonable to expect 100 percent vegetative cover at a high-energy site in Gardiners Bay where "blow outs" are common. On the other hand, we expect that plantings in the shallow flats in Shinnecock Bay should eventually approach complete coverage.

In addition to improved understanding of plants in the natural environment, we have also made advances in seagrass horticulture. We are progressing to the point where eelgrass can almost be treated as an agricultural commodity rather than a biological oddity. In an effort to learn more about this species, in 2001 we constructed a greenhouse specifically designed to hold, process, and grow eelgrass for the purposes of restoration and experimentation. This facility allows us to work closely with these plants in large flowing seawater tanks and gives us the flexibility to work year-round regardless of weather.

Site Selection

When we stop and consider the factors that impact the ultimate success of a restoration project, nothing is more important than site selection. If the right site

is not chosen, there is no chance of success regardless of planting method or amount of effort. Today, we rely on a GIS-based Planting Suitability Index Model that allows us to input the various environmental, physical, and logistical factors that can affect planting success. The starting point for this type of system is a map showing historic eelgrass distribution, and in this area we are fortunate to have a complete aerial photo set dating from 1930, the year before the wasting disease appeared. From this, we can determine where the grass previously occurred, and combined with water quality and other data including maps of current distribution, we can determine the most appropriate planting areas. Before we had this tool, our work focused on shallow protected creeks and harbors where we had little, if any success. We believe that higher water temperatures, combined with fine sediment texture and possibly lower water quality may be limiting in these areas, although the exact causal agent is not clear.

In response to our inability to establish grass in creeks and harbors within the Peconic Estuary, in particular, we have experienced a "paradigm shift" with regard to site selection, moving away from protected waters and out into the cool deep, high-energy waters of Gardiners Bay and Long Island Sound. Current site selection criteria include a gravel to cobble bottom texture, high wave energy, and cold, clear water.

Methods

As we learned from Churchill's work during the 1970s, eelgrass can be planted from seed or by division using plants collected from existing meadows. Transplantation has been and continues to be the most common method of planting in the country, but seeding is gaining ground on transplanting given the obvious labor-saving and genetic advantages of seeds. Unfortunately, regardless of these benefits, seeding does not always work.

Using seeds requires an intimate understanding of the timing and sequence of flowering. In local waters, the flowering season begins in mid June, in the warmer waters of the South Shore and Peconic Estuary, and ends in August, in the colder waters of Long Island Sound and eastern Gardiners Bay. Timing of seed collection requires a close monitoring of flower development just prior to collection, and once the seeds are ripe, we typically have about a week to collect at any one site. After the flowers are collected, they can be treated in one of two ways: Reproductive shoots are transported to the greenhouse and placed in flowing seawater tanks until the seeds fully ripen and fall out. Alternatively, in a system we devised called buoy-seeding, the flowers can be placed in nets attached to

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buoys and placed at the restoration sites so that the seeds will drop out (Pickerell *et al.*, 2005). For “broadcast” seeding, the seeds are held in the greenhouse until fall when they are simply spread by hand from a boat.

In contrast, using eelgrass transplants is fairly straightforward: simply anchor the plant to the bottom long enough for it to root itself in the sediment. Given that new roots are initiated approximately every 10–14 days, this is the minimal time required for anchorage. However, longer-term anchorage is often beneficial and may be necessary in higher-energy (higher wave or current) environments. Various “anchors” have been devised ranging from metal landscape staples to bamboo skewers and even wire mesh frames. Our work at high-energy sites currently uses naturally occurring rocks to hold plants in place until they become established.

If transplants are to be used, there must be a ready supply of adult shoots for this purpose. Since there is no source of greenhouse-grown plants, shoots are commonly collected from natural meadows. In some parts of the country, managers dig out small portions of a donor meadow to gather shoots, while others will take the time to thin the canopy by removing individual shoots by hand. In our work, we have developed a different method that is both less destructive and easier than these two methods. We focus most of our collecting efforts on “blow-outs” in high-energy meadows. These naturally formed breaks in the canopy caused by wave energy cause uprooting of large numbers of shoots that can easily be gathered by trained divers and transported to the greenhouse for processing and storage.

Results

Although early planting efforts on Long Island did not always prove effective, recent advances in site selection parameters and transplant methods have made successful restoration possible. This is especially true of our work in Long Island Sound and Gardiners Bay where conditions are ideal for planting. At these cool-water, deep sites we are at the point where multiple-acre plantings are possible. At St. Thomas Point in Southold, we have created a two-acre meadow. Other sites in Gardiners Bay east of Shelter Island have had similar success, although conditions there are not as favorable as Long Island Sound. Despite the successes in these areas, reestablishment of grass in the creeks and harbors of the Peconic Estuary has remained an elusive goal. Hopefully, in the coming years, we will figure out what is limiting the growth of eelgrass in these waters. It may be that we have to consider bringing in more heat-tolerant plants from farther south (possibly Virginia), so

that our sheltered harbors can again support eelgrass. However, this is yet to be determined.

Management

Although the ecological value of eelgrass meadows was realized early on by resource managers, efforts to protect this species have not been consistent with this realization. A recent initiative in New York State may change this. On July 26, 2006, the governor enacted a law that called for the formation of a seagrass research, monitoring, and restoration task force. This law establishes “a task force that will examine and make recommendations on means of restoring, preserving, and properly managing seagrass” by December 31, 2008. It remains to be seen what this results of this task force will yield, but it appears to be a step in the right direction.

The Future

The future of eelgrass restoration and management on Long Island is an unwritten chapter. We will continue to develop new and improved methods for planting this species while regulators and managers may give the species that protection that it deserves. It is not clear where we will end up, but if we don’t do anything, this valuable resource will surely be lost forever.

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- Pickerell, C. H., Schott, S., and Wyllie-Echerria, S. 2005. Buoy-deployed seeding: Demonstration of a new eelgrass (*Zostera marina* L.) planting method. *Ecological Engineering* 25: 127–136.
- To learn more about eelgrass ecology and ongoing restoration efforts on Long Island visit our Web site www.seagrassli.org and view the SEAGRASS.LI newsletter. Click on the "Current Projects" link to view recent photos of work in progress. Chris Pickerell can be reached at cp26@cornell.edu*

Invasive Plants on the Horizon and More:

A Recap of The Annual Conference of the Invasive Plant Council of New York State

Steve Young, New York Natural Heritage Program

Back in the mid-1990s, when Bob Zaremba, Tom Lyons, and I began the ad hoc committee on invasive plants, we usually had about 20 or so people attend the meetings. We knew what the problems were but getting enough money to deal with them was always a struggle. We met many times with Department of Environmental Conservation in an effort to have them take a more active role in the problem. Under the direction of Steve Sanford and the Invasive Species Task Force, the DEC is now spending \$2.5 million a year on invasive species, which will be \$5 million if the money remains the same in the new budget. Through the hard work of the Board of the Invasive Plant Council (especially Pam Otis, Troy Weldy, and Tim Wenskus) and its director Meg Wilkinson, the revitalized interest in invasive species in New York was very evident at this year's conference.

On February 7 and 8, 2007, about 270 participants jammed conference rooms at the Holiday Inn on Wolf Road in Albany, and the new energy and excitement about dealing with invasives was palpable. There were representatives from The Nature Conservancy, other environmental organizations and consultants, national, state, and local governments as well as the nursery, herbicide, and other industries, mostly from New York, but also from adjoining states or national organizations. Steve Clemants, chair of the board of the IPC, opened the conference, and two full days of lectures about every aspect of invasive species began. Talks about plants outnumbered those about animals.

In the past, most meetings about invasive species concentrated on control, biology, and native substitutes, but this year there were many new aspects to the conference, including New York State's new active role in funding the effort, especially for the regional partnerships called PRISMs (Partnerships for Regional Invasive Species Management, formerly Weed Management Areas). Four of these partnerships have already been set up—Long Island (LIISMA); Adirondacks (APIPP); Saint Lawrence Eastern Lake Ontario (SLELO); and the Catskills (CRISP)—and four more got their start at this meeting: Lower Hudson, Capital Region, Finger Lakes, and Western New York. As much as \$50,000 per year could be provided to each of these PRISMs to coordinate invasive species management efforts.

Two more aspects that are coming to the forefront are the new efforts to survey and inventory invasive species and the process of drawing up early detection lists to prevent new species from establishing in the state or in adjacent PRISMs. Meg Wilkinson discussed a

new unit that will be established within the New York Natural Heritage Program to inventory invasive species across the state. Heritage methodology and techniques, as well as rigorous quality control, will be used to track invasive species. Unlike rare species, the goal will be to eliminate new occurrences instead of preserve them. All of the information will be available on the Web as will a method for reporting new sightings and management results.

Troy Weldy (TNC), Gerry Moore (BBG), Michael Irvine (Ontario Ministry of Natural Resources), and Les Mehrhoff (Invasive Plant Atlas of New England) presented information on early detection of species. Their message was to keep the new invasives out before they become established. It is the most efficient and cost-effective way to deal with them. If you see a new potentially invasive exotic for the first time, make sure you pull it and ask questions later. To help with this effort, each PRISM will have its own list divided into five categories.

The categories are: (1) AR: "Approaching Region." Available data indicate that these plants are not present in this region; however, they are known to occur in adjacent regions or in an adjacent state (keep a sharp eye out); (2) ED: "Early Detection Species." Available data indicate there are one, two, or three locations for each of these plants in this region (pull them now); (3) PE: "Presence Established." Available data indicate there are four or more locations of these plants in this region (it may be too late to eliminate them completely but they can be weeded out locally or come under biological control); (4) NA: "Not Applicable." Available data indicate these plants are not present in this region or adjacent regions (don't worry about these yet, but they are around); and (5) UK: "Unknown." There are insufficient data to determine the status of these plants in this region (more info is needed).

The first two lists are the most important to keep new invasions from becoming established on Long Island and where much of the money should be spent.

APPROACHING REGION plants for Long Island:

Arthraxon hispidus – Small carpgrass. Annual grass of freshwater wetlands, shorelines, and open areas. Present in New Jersey, Connecticut, and Massachusetts. Likely in New York. (Gerry Moore)

Avena sterilis – Animated oat grass

Butomus umbellatus – A wetland species "on the move." (Barre Helquist)

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Carex kobomugi – A threat to rare sea beach amaranth (Troy Weldy). Possibly the only *Carex* species found in upper beach habitat along the U.S. Atlantic Coast.

Digitalis grandiflora – Yellow foxglove

Digitalis lanata – Grecian foxglove

Dioscorea oppositifolia – Chinese yam (air potato)

Dipsacus laciniatus – Cut-leaf teasel

Echinops sphaerocephalus – Great globethistle

Elodea bifoliata – Whorls of leaves in pairs (twos) up to near top of stem. (Barre Helquist)

Emex spinosa – Devil's thorn

Filipendula ulmaria – Queen-of-the-meadow

Galega officinalis – Professor-weed

Geranium thunbergii – Thunberg's geranium

Glossostigma diandrum – mudmat

Hydrilla verticillata – Hydrilla

Linaria dalmatica – Dalmatian toadflax

Lobelia chinensis – Chinese lobelia

Lysimachia vulgaris – garden loosestrife

Marsilea quadrifolia – European water fern

Murdannia keisak – marsh dewflower. Introduced from Asia. An annual, emergent plant that invades wetlands throughout the southeastern and pacific north-western US. (Troy Weldy)

Mycelis muralis – wall-lettuce. From temperate continental Europe. (Les Mehrhoff)

Najas minor – brittle naiad

Ornithogalum nutans – drooping Star-of-Bethlehem

Paspalum scrobiculatum – Kodo-millet

Prunus cerasus – sour red cherry

Rorippa amphibia – great yellowcress

Senecio jacobaea – tansy-ragwort

Silphium perfoliatum – cup-plant

Spiraea japonica – Japanese spiraea

Utricularia inflata – native to New Jersey and south. Moved by NYNHP from rare plant list because it is a “weedy species predicted to expand range.” Present in Adirondack lakes, becoming abundant, dense growth reduces oxygen in sediments, suppresses native plants. (John Titus)

Veronica beccabunga – European speedwell. The species name comes from the old German word for brooklime, the common name in Europe which means growing in the mud of brooks.

Vincetoxicum nigrum – black swallow-wort. Bernd Blossey from Cornell is looking for locations that have both black and pale (*V. rossicum*) species, to compare invasiveness and look for “weird plants” that might be hybrids. Also there is a white swallow-wort species (*V. hirundinaria*) that may possibly be here.

EARLY DETECTION SPECIES list plants:

Akebia quinata – chocolate vine. Does it fruit and set viable seed? (Bernd Blossey wants to know).

Euphorbia lathyris – caper spurge

Heracleum mantegazzianum – Giant hogweed

Ligustrum sinense – Chinese privet

Ludwigia peploides – floating primrose willow

Myriophyllum spicatum – Eurasian water-milfoil

Trapa natans – water chestnut

Valeriana officinalis – common valerian

More information can be found about each species by typing the scientific name into a search engine.

If you see any of the species or would like to add to or comment on the lists please let the Long Island PRISM know by contacting Marilyn Jordan by e-mail at mjordan@tnc.org.

On Thursday the talks continued, including a contentious session about prohibiting nurseries from selling invasive plants on Long Island. Faith Campbell of TNC's worldwide office forest health program outlined New York's new efforts in relation to the influence they will have in federal actions on invasive species. She commended New York for being one of the leading states in the country for dealing with invasive species.



Field Trips

SATURDAY MAY 12, 2007, 10:30 A.M.

Flax Pond Salt Marsh, Old Field, Suffolk County, New York

Trip Leaders: Glenn and Sandy Richard.

This trip will visit various vegetation zones in the marsh, ranging from the edge of the mudflats to the adjacent uplands, as we walk to the inlet that connects Flax Pond to Long Island Sound. The leaders will bring GPS devices and digital cameras in order to create an online interactive map of our trip, and participants are welcome to contribute their own digital photographs as well. Our observations will focus on indigenous species as well as invasives.

Meet at the Earth and Space Sciences (Geosciences) Parking Lot at Stony Brook University. Dress appropriately for encounters with water, mud, and sun.

SATURDAY, MAY 19, 2007, 9:45 A.M.

Oakland Lake and the Alley Park Tuliptree Trail,

Bayside-Douglaston, Queens County, New York

Leaders: Aline Euler (APEC) and Andrew Greller

We will explore Oakland Lake, its margins and feeder stream, for rare plants such as *Heuchera americana*

More Field Trips →

More Field Trips . . .

(alumroot) and *Dentaria diphylla* (toothwort). After lunch we will take a walk on the Tuliptree Trail along the Cross Island Parkway that passes through giant beeches, red oaks and the largest tulip tree in NYC. This area was the site of a manual clearing of invasive *Rosa multiflora* (multiflora rose) and *Polygonum cuspidatum* (Japanese knotweed). We will look to see which local wildflowers are present there now. The area was recently saved from the widening of the Long Island Expressway. (*This trip is jointly sponsored with the Torrey Botanical Society.*)

Directions: APEC is located at 228-06 Northern Boulevard, just east of the Cross Island Parkway. They are a one story building with parking behind the center. APEC telephone is 718-29-4000. From the west: West to Cross Island Parkway north. Exit CIP at Northern Blvd. (Exit 31E). APEC will be on the right side as you come off the exit ramp.

SATURDAY, JUNE 16, 2007, 10 A.M.

Perennial Peppergrass at the West Meadow Beach

Stony Brook, Suffolk County, New York

Trip Leaders: Laura Schwanof and John Turner

We will explore the saltmarsh community at the head of West Meadow Creek as well as the recently reclaimed beach community along Trustees Road in this newly created Town Park.

Directions: From the intersection of Nichols Road and Route 25A in Stony Brook, take 25A West to the next light. Turn right on Quaker Path, bearing left onto Mount Grey Road at the fork. At a 4-way stop just before entering Old Field, turn left onto Trustees Road. The park entrance is at the end of this road. Meet at the West Meadow Beach Parking lot.

SATURDAY, JUNE 23, 2007, 9 A.M. – 2 P.M.

Inventory of the Scully Sanctuary

Islip, Suffolk County, New York

Trip Leaders: Andy Greller and Enrico Nardone

The Seatuck Environmental Association and Suffolk County have recently launched a partnership to establish a nature center on the County's 70-acre Scully Sanctuary in Islip. Join us as we help Seatuck establish a baseline inventory of the site, which includes salt marsh, freshwater wetlands and upland forest. Seatuck will provide lunch for all participants. Please call Seatuck's Enrico Nardone register.

Directions: Take Southern State or Sunrise Highway to Route 111 south. Go to the end and make a right onto 27A (Main Street). At the next light, across from Islip Town Hall, make a left onto South Bay Avenue. Head south toward Islip Town Beach. The entrance to Scully will be on your right after you cross over Maple Avenue. (Maple Avenue is your last cross street and has a yellow blinking light.)



Upcoming Programs

April 10, 2007*

Tuesday, 7:30 p.m.

JOHN POTENTE: "THE CARNIVOROUS PLANTS OF LONG ISLAND." John will give a preview of an inventory and photographic summary of insectivorous plants that he and Eric Lamont are working on. The program will cover slides and images of these unique plants in action. Attendees are warned not to get too close to the screen. John is the director of Native America, an LIBS Board member, and a member of the Suffolk County Council on Environmental Quality.

Location: Museum of Long Island Natural Sciences
Earth and Space Science Building
Gil Hanson Room (Room 123)
SUNY at Stony Brook, Stony Brook

May 8, 2007*

Tuesday, 7:30 p.m.

CAROL GRACIE: "A CLOSER LOOK AT SPRING WILDFLOWERS."

The wildflowers that brighten our woodlands in spring are more than just a delight for the eye and a lift for the winter-weary spirit. Come learn about the interesting life histories of some of your favorite spring wildflowers. Topics will include adaptations for early blooming, medicinal and other uses, the origin of wildflower names, and pollination and seed dispersal. Carol is the co-author, with Steve Clements, of *Wildflowers in the Field and Forest: A Field Guide to the Northeastern United States* (2006), and has organized and led natural history tours for The New York Botanical Garden to places around the world.

Location: Bill Paterson Nature Center
Muttontown Preserve, East Norwich

Prior to the meeting on May 8 there will be a **Farewell Dinner for Jane and Skip Blanchard** (Dutch Treat for all others). Meet at 5:30 p.m. at The Milleridge Inn, 585 North Broadway, Jericho, Nassau County (516-931-2201). *Since we will need to make a reservation, please call Rich Kelly by May 1 and let him know if you are coming.*

June 12, 2007*

Tuesday, 5:30 p.m.

(Please note early start time for the barbecue)
ANNUAL BARBECUE: The annual barbecue, featuring Chef Eric's made-to-order hot dogs and hamburgers. Salads, deviled eggs, desserts, gladly accepted. On the green behind the Muttontown Preserve meeting house.

Location: Bill Paterson Nature Center
Muttontown Preserve, East Norwich

* Refreshments and informal talk begin at 7:30 p.m.
Formal meeting starts at 8:00 p.m.