

SOUND OUTLOOK

A NEWSLETTER OF THE CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION
EXPLORING LONG ISLAND SOUND – ISSUES AND OPPORTUNITIES

Winter on Long Island Sound

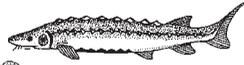
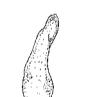
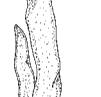
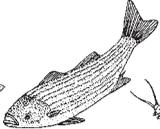
Water conditions in Long Island Sound (LIS) change with the seasons. While daylight increases during February and March, New England’s cold winter winds and powerful nor’easters will continue to influence not only the surface condition of the estuary, but the underwater conditions, as well.

Measurement of the physical characteristics of water, known as hydrography, is carried out in the Sound by the Connecticut Department of Environmental Protection’s Water Quality Monitoring group. Data from these efforts show that the average winter temperature of the eastern Sound is 38.8°F, while that of the western Sound is 36.5°F. An important factor in the seasonal cooling of LIS waters is outflow from the Housatonic, Connecticut, and Thames Rivers, which together contribute 90% of the fresh water entering the Sound. During winter, the water temperatures of these rivers drop, in part causing the LIS temperatures to reach their minimum in late February and early March.

While water temperature drops in winter, salinity in LIS increases above summer levels due to reduced freshwater input from winter river flows, reaching about 28.5 parts per thousand (ppt) in the western Sound and about 30.5 ppt in the eastern Sound, where there is more of an influence from the open Atlantic. Dissolved oxygen (DO) levels also increase in LIS in the winter. Cold water has a stronger ability to hold dissolved oxygen than does warm water. While summer DO levels in bottom waters often plummet below 3.5 milligrams per liter (mg/l) due to water column stratification and increased bacterial activity, winter levels can reach 11.3 mg/l. Wave action generated by strong winter winds causes frequent mixing between surface and bottom waters, making dissolved oxygen and salinity differences between surface and bottom negligible.

Amidst these winter extremes, however, the impending return of spring is signaled by a burst of plankton life. Increasing solar radiation and nutrient runoff triggers a bloom of diatoms in the Sound. Diatoms are phytoplankton that use silica, a mineral that exists in dissolved form in coastal and marine waters, to build their cell walls or “shell.” DEP monitoring shows that the level of dissolved silica in LIS drops in the late winter as the level of biogenic silica (that incorporated within the diatoms) rises, in correlation with the bloom. If the diatom bloom is large enough, it can contribute to future summertime hypoxia as the algae settle to the bottom of the Sound and are decayed by bacteria.

As climate change continues to have an impact on weather patterns around the world, Long Island Sound and the plants and animals that reside there may be affected in ways we do not yet fully understand. If rising ocean temperatures cause more intense or more frequent winter storms, we may see an estuary that is less salty, better mixed and more highly oxygenated during the winter. The monitoring programs described in this issue of *Sound Outlook* will help us to keep an eye on those changes.

			
		Inside	
		Winter Monitoring of LIS Lobster Population	2
		Spotlighted Coastal Access	3
		Look Out for Upcoming Events	3
		Putting Your LIS Plate Money to Work	4
		Sound Tips	4
		Spotlighted Coastal Resource	5
		Sentinel Monitoring for Climate Change in Long Island Sound	6
			
			
		FEBRUARY 2010	
		No. 33	

Winter Monitoring of the Long Island Sound Lobster Population

When water temperatures drop and even the hardest boaters have pulled out and battened down for the winter, the Sound's commercial lobster fleet gears up in pursuit of our favorite crustacean, the American lobster. The largest catches of lobster occur just after the animals shed their old shells to uncover new larger shells, and leave their burrows in search of food. The major shed is in late spring, but following a second shed in the fall, cool conditions in December and January are just right for lobsters to resume mating and feeding to get them through the later winter months until spring. During the coldest months of winter, lobsters become less active and spend almost all of their time in their burrows. Females incubate their eggs, which are attached to the underside of their abdomen, throughout the winter with fewer losses due to disease, parasites and disturbance.



Winter sampling cruise on DEP's R/V John Dempsey.

The DEP Marine Fisheries Division's Lobster Monitoring Program goes on year round, but only the most experienced sea-samplers venture out on commercial lobster boats in winter to record biological data such as size, sex, number of females with eggs or v-notch, and incidence of damage or disease in the lobsters that are captured in their traps. (As a conservation measure, some females are marked with a small v-notch in their tail flipper and then thrown back;

if caught again, they must be returned, allowing them extra time to lay eggs.) This information is recorded for lobsters large enough to be harvested, as well as those that are too small to be kept and that are returned to the water along with all egg-bearing and v-notched females. A tagging program, carried out as a special addition to the sea-sampling program in 2001-2004, showed that most of the lobsters in the Sound have a relatively small "home range" and do not travel much more than about 10 kilometers to feed and mate in harems established by dominant males. Since individual lobsters are often recaptured many times, lobstermen learn to recognize some of them and tend to view their traps as providing food (from the bait) and shelter for their crop of lobsters, which rarely stray away from the lobsterman's fishing grounds.

The Marine Fisheries Division has monitored the commercial and recreational lobster fishery in Long Island Sound since 1976 and lobster larval production since 1983.

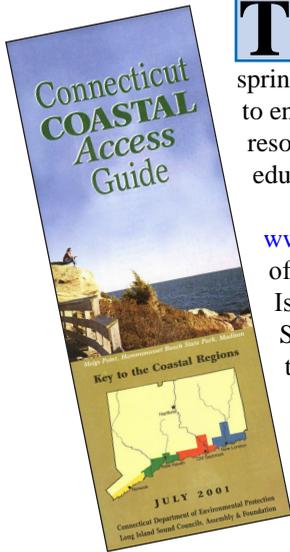
Over the last quarter century, these programs have documented many changes in the Sound's lobster population. Abundance increased to historic highs in the late 1990s, supporting a fishery valued at \$12 million and providing income to over 600 licensed lobstermen. However, the population experienced a severe die-off in the fall of 1999, followed by lesser die-offs and weak reproduction every year since then. Several factors have been implicated as playing a role in the die-offs, including elevated water temperature and disease. Recent research has shown that lobsters experience respiratory stress, like the fast panting of a dog, when exposed to water warmer than 20°C (68°F). Such temperatures were relatively uncommon in the 1990s. From 1994 to 1998 only 27% of stations sampled by the Division's Soundwide Fall Trawl Survey had bottom temperatures above this stress threshold. Occurrence increased to 44% of stations sampled in 2000-2005. In late August 2007, the bottom water of the entire Sound was warmer than this stress threshold and sampling throughout the fall resulted in 48% of the sampling stations registering temperatures warmer than 20°C. Bottom water temperatures recorded by DEP since 1988 show a warming trend in all seasons. Consequently, deep water cobble and reef habitats will become increasingly critical thermal refuges for lobsters as well as more than 30 cold-adapted finfish species (those preferring temperatures of 3-15°C) now using the Sound as nursery and feeding grounds.

The programs described above are examples of the research and management activities conducted by DEP specialists to protect marine resources that are important to the health of the LIS ecosystem, and to support the quality of life for the people of Connecticut who have for centuries enjoyed the Sound's beauty and bounty. For more information about lobster management in Long Island Sound, contact Penny Howell of the Marine Fisheries Division at 860-447-4307 or at penny.howell@ct.gov.



DEP conducts winter sea-sampling aboard commercial lobster boats on Long Island Sound.

SPOTLIGHTED Coastal Access: Winter Recreational and Educational Opportunities



There are many opportunities to enjoy the Connecticut shore during the remaining days of winter and as we transition into spring. Winter is often a less hurried time along the coast in which to enjoy both passive and active recreational activities, to investigate resources unique to the colder months, and to take part in seasonal educational programs offered at State, Federal and private facilities.

The *Connecticut Coastal Access Guide*, available online at www.lisrc.uconn.edu/coastalaccess, highlights many sites that offer routes to the shore or views of Long Island Sound. Barn Island Wildlife Management Area in Stonington and Bluff Point State Park and Coastal Reserve in Groton both feature miles of trails for winter walking and snowshoeing. The trails traverse a variety of coastal habitats, from beach and wetland border to coastal forest, affording opportunities for wildlife observation and for scenic and nature photography. While snow is infrequent on the Connecticut coast, Haley Farm State Park, also in Groton, provides a loop trail that is maintained for

cross country skiing in addition to walking and biking. The Denison-Pequotsepos Nature Center in Stonington will conduct a free Full Snow Moon Walk at Haley Farm on Sunday, February 28, 2010 from 5:00-6:00 PM. Hikers will visit the shore of Palmer Cove, where trip leaders will discuss the adjacent coastal habitats and their inhabitants. To learn more, visit www.dpnc.org/programs_events.html and follow the link for **Full Moon Walks**.



Trail at Haley Farm State Park, Groton, leads to the shore of Palmer Cove.



Dike road at Barn Island Wildlife Management Area, Stonington, overlooks Little Narragansett Bay.

Walking trails (2.5 miles) are also available in Westbrook at the Salt Meadow Unit of the Stuart B. McKinney National Wildlife Refuge, leading to the marshes of the Menunketesuck River. The Potapaug Audubon Society, which serves the towns of the central coast and the lower Connecticut River, conducts and sponsors field trips throughout the year at the Salt Meadow Unit and at Hammonasset Beach State Park in Madison and other locations, as

well as indoor educational programs at the Essex Town Hall and Westbrook Public Library. For more information, visit www.potapaugaudubon.org.

Several coastal education centers offer year-round LIS-oriented educational programs, including those listed in our calendar of events on this page. Additionally, the Meigs Point Nature Center at Hammonasset Beach State Park is open on a limited schedule in the off-season, and is available on request to school and Scout groups or other organizations for both indoor and outdoor programs. Programs that have been conducted in the past have featured exploration of nearby tidal marshes, rocky shores and sandy beaches. For information, contact the Nature Center at 203-245-8743.

Directions to all of the sites listed above are provided in the online *Access Guide*. All sites provide free parking. For more information about Connecticut's coastal access programs, contact Dave Kozak at 860-424-3608 or dave.kozak@ct.gov.

LOOK OUT for upcoming events!

Norwalk Maritime Aquarium

10 North Water St., Norwalk, CT
Call 203-852-0700 x2206 for information, costs and registration:

Go Fish: Long Island Sound & Beyond Permanent Exhibit Opening Feb. 12. Observe large fish from Long Island Sound, on display in a new 30,000-gallon tank. Hands-on and multimedia experiences teach about fishing and sustainable seafood.

Winter Creature Cruises Most weekends through April (dates and times TBD); 2-1/2 hr cruises.

View seals and winter waterfowl. Passengers must be 42 inches tall. Bring binoculars and dress warmly.

March: Migrating osprey return to CT.

April: Striped bass migrate north to CT.

Connecticut Audubon Coastal Center

Milford Point, Milford, CT
Call 203-878-7440 for info. and registration.

Hooray for Horseshoe Crabs!

Thursday, March 4, 10:30-11:00 am

For 3-5 year olds & parents/guardians. Horseshoe crabs are living fossils that predate the dinosaurs. Come along and learn all about them.

Earth Day Beach Clean-up & Celebration

Sat., Apr. 17, anytime from 10 am-3 pm

Participate in an Earth Day beach clean-up to aid shorebirds and help remove invasive plants from the Coastal Center property. Trash bags and gloves will be provided. Free.

DEP EARTH DAY EVENTS!

Please be sure to check the Calendar of Events listed on DEP's website:

www.ct.gov/dep

Putting Your LIS Plate Money to Work: Renewed Opportunities

The Long Island Sound License Plate program, which was created in 1992 by the Connecticut State Legislature, is supported by the sale of Preserve the Sound motor vehicle license plates, individual donations, and proceeds from the Preserve the Sound affinity credit card. Since its inception, the fund has provided more than \$5 million in competitive grants to support 314 projects in the categories of outreach and education, public access to the shoreline, estuarine research, and coastal habitat restoration to help preserve and protect Long Island Sound.

This fund was almost a casualty of the state budget crisis, but fortunately has survived. Approximately \$621,000 in Long Island Sound Fund revenue that was initially diverted into the General Fund as part of an effort to balance the state budget was returned to the account. The legislature further ensured that all future donations and revenue coming into the fund will be allocated toward its intended purpose. DEP is currently evaluating the program process and timing in order to move forward with the most appropriate mechanism to use these funds for the greatest benefit to Long Island Sound and its many valuable habitats and resources.

Shown below are photographs of several recently completed license plate projects.



A research study to further scientific knowledge of survival, habitat use and post-fledgling movement of saltmarsh sharp-tailed sparrow, a tidal wetland bird species of special concern in Connecticut. Here, a researcher holds an adult sparrow.



A nest of saltmarsh sharp-tailed sparrow hatchlings in the tidal marsh.



A dune restoration project at Mitchell Beach, New London, consisting of the removal of invasive plants and replacement with native plantings and protective snow fencing, will restore a 1.5-acre dune system located adjacent to a 600 foot long sandy beach. Here, a volunteer applies herbicide to invasive plants in the dune. For more information about this project, see Issue No. 29 of Sound Outlook.



One of 14 educational signs installed at Hammonasset Beach State Park describing various coastal and marine plants and animals, as well as natural coastal processes.

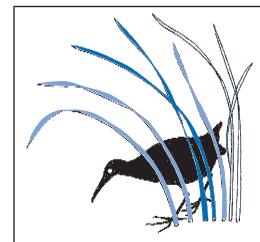


Construction of a handicapped accessible fishing pier at Cini Memorial Park on the Niantic River in East Lyme.

Sound Tips

Help Assess DEP's Coastal Access Program

DEP needs your assistance to re-examine the effectiveness of programs we administer to provide public access to Connecticut's coast. You can help by taking a 5-minute survey about how well existing coastal public access facilities meet your recreation needs and whether adequate information exists on DEP's website to plan your next visit to our State's shoreline. Please take the Coastal Access Survey at www.surveymonkey.com/s/coastalaccess, available until March 31. Let us know how we are doing!



Purchase of an LIS License Plate supports the LIS Fund



As of 12/31/09:

- Plates sold: 143,700
- Funds raised: Over \$5 million
- Projects funded: 314

The LIS Fund supports projects in the areas of education, public access to the shoreline, habitat restoration and research.

For information on ordering a Long Island Sound license plate, call 1-800-CT-SOUND.

View past issues of *Sound Outlook* at www.ct.gov/dep/soundoutlook

For more information about this program, or how you can support ongoing efforts to preserve and protect Long Island Sound, please contact Kate Hughes Brown, Grants and Outreach Coordinator, at 860-424-3652 or at kate.brown@ct.gov.

SPOTLIGHTED Coastal Resource:

The Winter Marsh

The coastline takes on a special look during the winter as the vibrant greens of summer give way to subtle browns. Yet, while this change may seem inhospitable to some, the shore remains a dynamic and productive environment. Many stories can be told about the winter marsh and its inhabitants – below are just a few:

As described by John and Mildred Teal in *Life and Death of a Salt Marsh*, the emergent stems and floral structures of wetland plants die in autumn (even as subsurface roots and rhizomes remain alive and healthy), and either fall or are sheared off by rising tides and ice. Some of the resulting plant debris accumulates

also seek protection from the cold of winter, although they stay within the marsh system. Individuals that reside in surface pools burrow into the mud bottom where they remain until spring. Others migrate to the mouths of tidal channels in which they have been living, where deeper, moving water will not freeze (NOAA Coastal Services Center, 2001).

Salt marshes are also home to a wide assemblage of vertebrate wildlife during the winter months. One species of particular interest is the American black duck (*Anas rubripes*), whose population dynamics and ecology on Long Island have been studied by Dr. Tina Yerkes of Ducks Unlimited. Numbers of black ducks, once the predominant species harvested by Atlantic Flyway waterfowlers, have declined from their peak abundance by as much as 60 percent. One of several

possible explanations for this decline is the loss and degradation of coastal habitat due to development in certain places where the birds winter. Fortunately, wintering numbers of black ducks have stabilized in the northern part of the Atlantic Flyway, which includes Connecticut.

Black ducks are notoriously shy, preferring relatively undeveloped watersheds within parks, state conservation lands or refuges. Yerkes



The emergent structures of salt marsh plants decay beneath winter's ice and snow.



The winter salt marsh remains a productive habitat. Great blue heron.

on the marsh surface and some is flushed into surrounding tidal waters. In either case, as the plant material decays, it releases nutrients that sustain the marsh and provide food for crabs and other wetland animals.

As the weather turns colder, marsh invertebrates, including spider crabs, salt marsh snails and mussels, become dormant and their growth rates slow. Some species of crabs burrow into creek bottoms to avoid freezing and desiccation in the dry winter air. Other animals, including horseshoe crabs (*Limulus polyphemus*), which are more closely related to spiders, move to warmer offshore waters.

Mummichogs (*Fundulus heteroclitus*), small omnivorous finfish,

found that black duck hens feed mostly on mudflats and in salt marshes where their invertebrate prey are most abundant, but sleep and loaf in freshwater and brackish habitats. Brackish and freshwater marshes are prevalent within Connecticut's tidal rivers. Still, when favored feeding grounds freeze during the winter, black ducks and other species of migratory birds face an interesting dilemma: Should they stay here or seek warmer environs? Yerkes reported that some ducks do not make very good decisions, remaining in frozen areas and starving to death during severe weather events.

The Connecticut Ornithological Association (COA) provides a comprehensive list of waterfowl and other birds that may be seen on Long Island Sound and along the coast during winter months - see www.ctbirding.org/resources_ct_winter.htm. Fact sheets describing some of these birds, as well as mammals, and their winter habits can be found by searching the DEP Wildlife Division website at www.ct.gov/dep/wildlife.

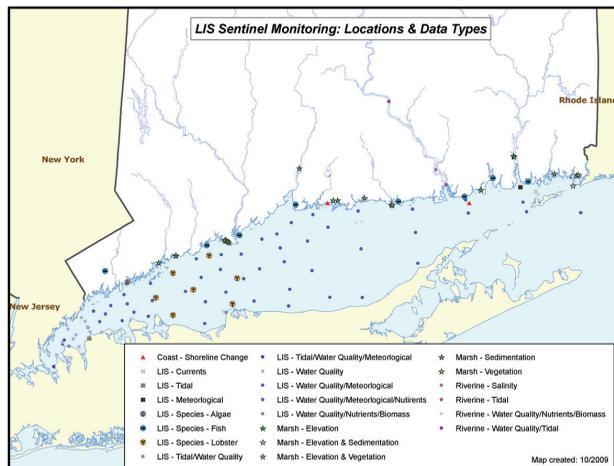


American black duck. Photo by Paul J. Fusco

www.ct.gov/dep/wildlife.

Sentinel Monitoring for Climate Change in Long Island Sound

In addition to seasonal weather variations such as those described on page 1 of this issue of *Sound Outlook*, the overall climate of Long Island Sound is changing. How climate change impacts LIS, including the water, habitat and species (including humans), is the focus of Sentinel Monitoring for Climate Change in LIS, begun as a partnership between the Department of Environmental Protection and the University of Connecticut (UCONN) in 2008. The goal of the program is to design and develop a dynamic climate change monitoring program for the ecosystems of LIS and its coastal ecoregions.



Sentinel monitoring of LIS has since evolved into a bi-state initiative with Federal support and an overarching Long Island Sound Study (LISS) workgroup that has obtained multiple grants to develop a strategic plan for the program. Connecticut and New York have both established working groups of academics, managers and experts on the local, state and Federal levels to address relevant issues. This specially designed, long-term monitoring program will identify LIS resources that are most vulnerable to climate change and most critical to protect. These efforts will ultimately enable us to develop appropriate adaptation strategies to protect the Sound's biodiversity and significant natural resources.

Under the partnership, UCONN has already helped DEP develop a sentinel monitoring database of historic monitoring data. The long-term plan is to develop a comprehensive website that will document ongoing research and serve as a resource for investigators, resource managers and

the public. In addition to identifying a process for data collection and synthesis, the plan will help identify data and monitoring gaps that are necessary in the context of climate change to help identify trends on the regional, Sound-wide and local levels.

In looking at the latest climate science research and other available information, a list of climate drivers was developed along with potential indicators of climate change in LIS. Indicators are those factors that are predicted to change or are already changing, like ocean temperature and chemistry, rate of sea-level rise, precipitation form and timing, and many others. These indicators will assist in identifying environmental responses to such changes in LIS and its coastal ecoregions. For example, changes in precipitation form and timing are predicted to impact the spring freshet. Predictions for slushier snow mean more winter runoff and hence, the input of additional nutrients, pollutants and turbidity into LIS. This would also mean a reduction in the magnitude of the spring thaw and the subsequent freshwater flush into the estuary. Increased salinity and changes in the position of the salt water wedge in rivers and along the coast impact vegetation type and growth patterns, as well as the utilization of those habitats by indigenous and migratory wildlife.

Sentinel monitoring is a dynamic process. By looking at which physical, chemical and biological indicators will change due to climate drivers, and then relating that to habitats and ecosystems, this program will ultimately promote education, awareness and participation in climate change adaptation issues, and will inform management decisions on adaptation planning. As the estuary changes, so, too, will the management needs in LIS.

Remember, it is climate change, not global warming. We are currently in a phase of more frequent nor'easters, and storm intensity is predicted to increase, so don't put away your snow shovels yet. Recent projections predict milder winters with slushier snow, but with weather and ocean circulation patterns changing, no one is positive what the future will hold. Through sentinel monitoring, we hope the indicators of change will help us strategize to better protect Long Island Sound and its vital habitats and resources. For more information on sentinel monitoring in LIS, contact Jennifer Pagach at 860-424-3616 or at jennifer.pagach@ct.gov.



DEP staff use a surface elevation table (SET) to monitor sea level changes in a tidal marsh.

Visit the DEP website at www.ct.gov/dep.

Published by The Connecticut Department of Environmental Protection, Bureau of Water Protection and Land Reuse.

Editor: Tom Ouellette; Contributing Editor: Mark Parker; Layout: Caryn Furbush; Illustrations: Tom Ouellette; Contributors: Kate Brown, Penny Howell, Jennifer Pagach, Mark Parker. Printed on 100% post-consumer recycled paper using vegetable-based ink.

Financial assistance for **Sound Outlook** was provided by the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration (NOAA). Financial assistance was also provided by the federal Environmental Protection Agency under the National Estuary Program, Long Island Sound Study.

The Department of Environmental Protection is an affirmative action/equal opportunity employer, providing programs and services in a fair and impartial manner. In conformance with the Americans with Disabilities Act, DEP makes every effort to provide equally effective services for persons with disabilities. Individuals with disabilities needing auxiliary aids or services, or for more information by voice or TTY/TDD, call 860-424-3000.



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL
PROTECTION
79 Elm Street
Hartford, CT 06106-5127
www.ct.gov/dep
Amey Marrella, Commissioner