



Photo courtesy of Barbara A. Branca

Reflections

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It was late autumn in 1971, time for fall fishing, closing summer cottages or getting boats secure for winter. Some of us were listening to John Lennon’s new single “*Imagine*” while the federal government was imagining a new player on the New York environmental research landscape. With funding to study the impacts of power plants, contaminants in our waterways, and the health of fisheries, New York became part of the infant **National Sea Grant College Program**.

Reflecting on 35 years of research, extension and educational successes relevant to New York’s marine and Great Lakes resources is impossible to cover in a few pages. So to mark our 35th anniversary, we’ve told our *Coastlines* stories through the perspective of some of the people who live, work and play along New York’s shores. We also thought it would be a good time to debut some new elements of *Coastlines* that echo our redesigned Web site, www.nyseagrant.org, to be launched later this winter.

Coastlines



Sound Reflections

Working down in the muck of Long Island Sound (LIS) is what hooked **Karen Chytalo** on the wonders of being a marine scientist. As an ambitious grad student under **Jerry Schubel**, then Dean and Director of Marine Sciences at Stony Brook University, Karen studied contaminants—PCBs specifically—in LIS with funding from a very young NYSG program. It was the decade of the 1970s, when the environmental movement was gaining momentum and new Sea Grant programs were growing along the nation’s coasts. Soon the NYSG offices would move from the state capital in Albany to the state university campus at Stony Brook on Long Island.

Hypoxia in Long Island Sound

According to Chytalo, now director of the NYSDEC’s office of Marine Habitat Protection, back in the 1950s people started documenting changes occurring in LIS, one of the nation’s most economically and ecologically significant estuaries. By the late 1970s, scientists said hypoxia, the reduction in the Sound’s dissolved oxygen (DO) content, was the greatest threat to LIS’s health. Says Chytalo, “By the 1980s, conditions of low DO coupled with winds caused numerous ‘jubilee’ hypoxia events in LIS embayments.”



Researcher Larry Swanson is also an advisor to the Head of the Harbor/Nissequogue Joint Coastal Commission. He’s pictured here with Suffolk County Legislator Vivian Viloria-Fisher during Harbor Day, a day when non-polluting kayaks and canoes dot Stony Brook Harbor.
Photo by Barbara Branca

These jubilees were no cause for celebration, but they did galvanize the community into action. A bi-state effort to learn more about hypoxia helped form the Long Island Sound Study (LISS), authorized by Congress in 1985 and sponsored by the US Environmental Protection Agency (EPA) and the states of Connecticut and New York. Says Chytalo, who was the LISS coordinator in 1986, “There was a realization that it would take a regional effort to address and correct conditions in LIS. Citizens thought this would happen quickly, but scientists had to first develop models—still in their infancy—and figure out what could actually be done that was cost effective.”

Scientists had ascertained that low DO levels get even lower with the input of excess nutrients from the surrounding watershed. By controlling nitrogen inputs, like those from sewage, DO levels could be better controlled. They could see the direct effects of low oxygen levels on fisheries and other marine resources through trawl surveys done across the Sound. In 1990, New York and Connecticut developed a phased approach to limit sewage treatment plant discharges of nitrogen into LIS. These limits are set according to EPA approved Total Maximum Daily Load (TMDL) for nitrogen discharges from sewage treatment plants as mandated by The Clean Water Act.

Later that decade at Stony Brook University’s Marine Sciences Research Center, **Larry Swanson**, director of the Waste Reduction and Management Institute and **Bob Wilson**, a physical oceanographer, found that physical and climatic



Examining the muck at the bottom of Long Island Sound are Karen Chytalo and William Wise when they were Sea Grant funded graduate students at Stony Brook University’s Marine Sciences Research Center (MSRC) in the 1970s. Wise, who was an acting director of New York Sea Grant in the mid-1980s, is now MSRC’s Associate Director.

Photo courtesy of New York Sea Grant

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Sound Reflections



This 1980s menhaden fish kill was due to hypoxic conditions at a Long Island Sound dock. Photo by Rick D'Amico, NYSDEC

factors play an important role in controlling dissolved oxygen levels in LIS. With funding from NYSG, they examined historical NYC data from a monitoring station near Hart Island in western LIS where oceanographic data have been recorded since 1914. They found that DO data from the 1990s showed declining summertime DO concentration in bottom waters over the past five decades. The pair also examined the hydrography, salinity, temperature and seasonal stratification and concluded that DO levels are controlled, in part, by physical and climatic factors which are beyond human control. Hart Island, a hotspot for hypoxia, lies near the mouth of the East River close to the outflow of many NYC sewage treatment plants and is hemmed in by the Hempstead sill,

a relatively shallow region that serves to isolate it from the deeper waters of the Sound. The research suggests that this particular hydrology is what may cause the onset, severity and duration of hypoxia. In other words, a predictor of hypoxia is “location, location, location.”

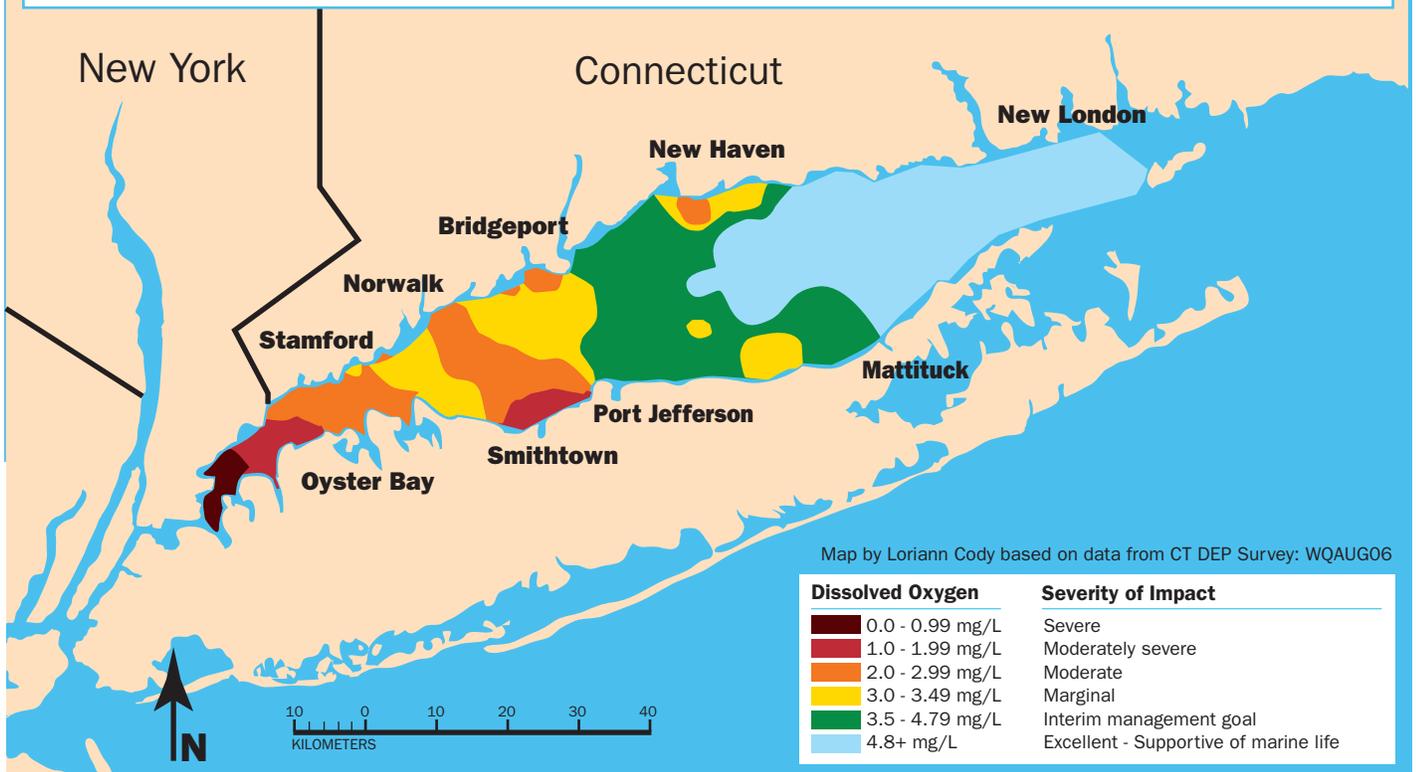
Results from this project may limit the anticipated effectiveness of implementing mandated TMDLs at sewage treatment plants. Says Swanson, “This precise analysis of hypoxia’s cause is of great importance especially when municipalities and managers propose upgrades from secondary to tertiary sewage treatment.” Upgrading sewage treatment at great cost will not necessarily relieve hypoxic conditions.

From 1994 to 2004 municipalities along the Sound have improved sewage treatment and successfully reduced nutrient loadings by 24 percent according to the *Sound Health 2006 Report* published by LISS. Yet summer hypoxia persists. Since Swanson’s NYSG funded project, he was asked by NYSDEC to look at the hydrology of Long Island Sound embayments that exhibit hypoxic conditions each year. In one such analysis, Swanson found that



... for more of the Long Island Sound Study’s water quality report for 2006.

Dissolved Oxygen in Long Island Sound Bottom Waters August 1 - 7, 2006



“Community groups and government share issues, money and resources,” observes Eric Swenson of the Hempstead Harbor Protection Committee. Community volunteers learned how to monitor water quality and the Town of Oyster Bay contributed to their efforts by supplying a water monitoring boat and providing laboratory services.

Photo of Hempstead Harbor by Eileen Keenan.



Eatons Neck and Crane Neck on either side of Smithtown Bay set up a gyre that reduces the water’s flow and keeps the bay sluggish. In this case, moderately severe hypoxia is likely caused by currents and density of the water column rather than nitrogen inputs from waste treatment.

Working together to address stormwater runoff

NYSG’s **Eileen Keenan** is the manager of the NY NEMO program which educates municipal officials about nonpoint source pollution. Says Keenan, “Tremendous advances have been made to clean up the aquatic environment by controlling pollution from point sources such as industries and sewage treatment plants. Unfortunately, we have not done enough to control runoff from diffuse, or nonpoint, sources. Today nonpoint source pollution, or runoff, remains a primary cause of water quality problems. Runoff from urban areas is a major cause of water quality impairments to estuaries such as Long Island Sound.”

In Keenan’s work with municipalities in Nassau and Suffolk Counties, she has emphasized the watershed approach. “Watershed boundaries are irrespective of governmental boundaries. Effective protection and restoration of our waterways necessitates multi-jurisdictional partnerships and collaboration.” Her nonpoint source pollution education program began with north shore community groups such as the Hempstead Harbor Protection Committee (HHPC) and the Manhasset Bay Protection Committee (MBPC), Long Island’s first and second watershed-based inter-municipal coalitions to follow the watershed model.

The HHPC, founded in 1995, represents a success story. **Eric Swenson**, its current Executive Director, has spent the last 24 years in government in Nassau’s Town of Oyster Bay and has seen many changes. “In the 1970s,” says Swenson, “community groups and governmental organizations were often distrustful of each other. There were unimproved sewage treatment plants which caused beach closures. The NYS Department of State and the federal governmental kicked off the water clean up. Those problems are largely resolved now but the cleaner harbor faces now intense development pressure.”

In recent decades, citizen and environmental groups have matured and found that they can work well with government. **Aldona Lawson**, the Town of Oyster Bay’s representative to the HHPC from its inception, says, “In Glen Head, Glenwood Landing, and Sea Cliff, the committee worked closely with community groups that had a real interest in acting as stewards of their waterfront. This was the first time that different municipalities and community groups from the same watershed worked together to coordinate their efforts and support one another.”

NYSG’s Keenan also has provided stormwater education for the Manhasset Bay Protection Committee (MBPC). **Patrice Benneward**, its director, grew up in Glenwood Landing and has been active on both committees. “When I was small,” recalls Benneward, “even though Hempstead Harbor was just down the street, we had to travel to Mill Neck to see egrets and other shorebirds.” Birds rarely frequented the harbor in those days and abandoned barges marred the view of the western shore.



... for more on water quality, stormwater runoff and other NY NEMO publications.

Sound Reflections

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Since then, the municipalities surrounding Hempstead Harbor and Manhasset Bay have completed cooperative water quality improvement plans, as well as many clean up and restoration projects. “Now shorebirds abound; even ospreys and Peregrine falcons nest and feed in and around both embayments,” Benneward says. “Although there is still much to be done to restore habitat and reduce stormwater runoff, water quality in both embayments is generally quite good.”

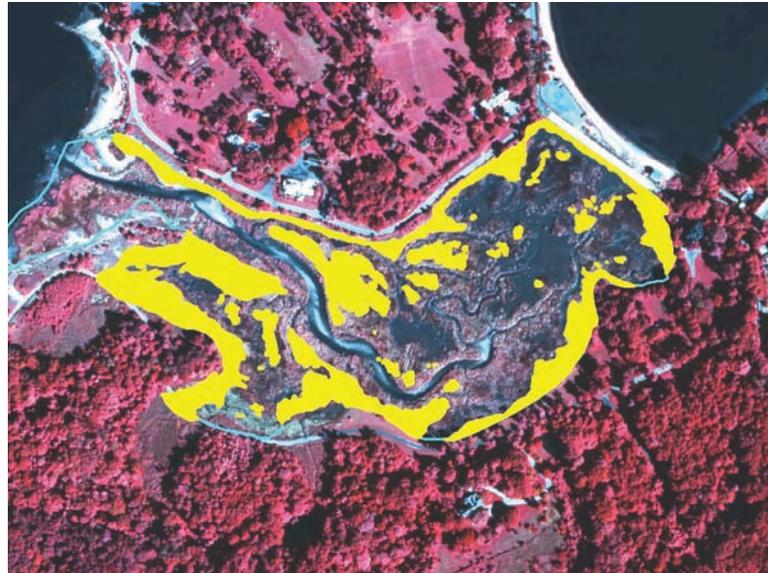
Tidal wetland loss

But while contaminant and sewage input have been reduced, conditions of accessibility improved, and some habitats restored, the tidal wetlands that support estuarine life have deteriorated. According to **Fred Mushacke**, a biologist from the NYSDEC, throughout the 1950s and 1960s thousands of wetland acres throughout NYC, Nassau and Suffolk Counties were drained, dredged and filled. Those practices abated with passage of NY’s Tidal Wetland Act of 1973. “Using infrared aerial photography, the NYSDEC began a wetland inventory in 1974. Infrared aerial photographs are taken in early fall at low tide to better identify zones of vegetation,” explains Mushacke.

As he pores over photo series of LIS wetlands, Mushacke can see areas of subsidence and changes in marsh plants. “If plants are overfertilized with nitrogen or waterlogged,” says Mushacke, “the soil becomes toxic and marsh plants lose their root systems causing the plants to weaken and die.” Mushacke points to maps from the Glen Cove area, not too far from where Patrice Benneward grew up. Aerial photos indicate that the 21.8 acres of intertidal marsh seen in the early 1970s have been reduced to a mere 8.6 acres, a 60 percent loss.

The Sound heats up

Changes in water chemistry and small increments in Long Island Sound’s temperature affect marine plants and animals. “Over the last three decades biologists have seen numerous changes in species,” says Chytalo. “Increasing water temperatures bring in more southern species and greater stress on the northern species.”



Yellow indicates a 60% loss of wetlands. In this infrared aerial photo near Glen Cove, NY, LIS is on the left and a tidal pond on the right. The red-pink mottled color represents the tidal wetlands in 1974. The yellow overlay represents the extent to which the wetlands have retreated as of 2005 based on photo interpretation and GIS trends analysis.

Composite photo courtesy of Fred Mushacke, NYSDEC

Perhaps the most dramatic example of the impacts of temperature increase is the toll taken on LIS lobsters. In their funded research project to address the causes of the lobster mortality event of 1999, Robert Wilson and Larry Swanson analyzed bottom temperature data for 50 stations throughout LIS. They found that bottom temperatures were the highest of the decade in the summer months preceding the September 1999 lobster dieoff and that a strong wind event caused by the vertical mixing of warm surface waters resulted in a rapid increase of bottom temperatures.



... for more on the causes of the LI lobster die off.

“We all know that you can’t try to correct just one problem at the expense of everything else,” says Chytalo about managing our marine resources. “You have to understand all the pieces: biology of the species, physics of the hydrology, chemistry of the water, and then finally the management piece of bringing it altogether and working with all the various stakeholder and governmental groups.”

Says NYSG’s **Kimberly Graff**, Long Island Sound Outreach Coordinator, “When results of a survey of public perception about the Sound are released later this year, we will see just how far such improvements in Long Island Sound’s health have resounded with the public.”

— **Barbara A. Branca**



... for more on Estuary Live, a live Web cast held on September 29 to raise awareness of the nation’s estuaries. That’s when scientists Fred Mushacke and Karen Chytalo as well as Sea Grant staff and graduate students shared their expertise with thousands of school children.