Scientists move to save LI's waning marshland

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Fred Mushacke hopped down from the causeway to the edge of West Pond in Glen Cove, his rubber boots sinking into gluey mud as he sketched out a landscape that no longer exists.

In the 1960s, lush meadows of cordgrass anchored a 21-acre marsh that sheltered foraging and nursery grounds for egrets, killifish and mussels. But over time more than half the tussocks vanished, and the springy peat where cordgrass grew has turned to viscous mire. In much of the marsh only a few clumps of spartina alterniflora remain, spindly stalks poking through mud littered with empty shells.

"They've just kind of melted away," said Mushacke, a marine biologist with the state Department of Environmental Conservation. "The ribbed mussels are dying, too."

The view from West Pond illustrates a quiet but widespread trend: Tracts of marshland around Long Island are shrinking at an average rate of one-half to three-quarters of an acre per year, according to Mushacke, and scientists don't know why. To calculate that rate, the DEC compared 1974 aerial photographs of vulnerable locations on the North Shore, South Shore and the Peconic estuary with more recent aerials and found that the marshes there had shrunk from 1,673 acres to 1,249 acres - a drop of 25 percent. That means less vegetation to filter pollutants, diminished habitat for wildlife and more coastline laid bare to wind and water.

The most dramatic example of this phenomenon is farther west, in Jamaica Bay in Queens. There, an estimated 734 acres of marsh - about 45 percent of what was there in 1974 - have given way to mudflats and open water. Scientists blame sewage, polluted runoff and dredging.

But a number of smaller marshes along Long Island's North Shore that are relatively insulated from such pressures are also dying, some at even faster rates. Frost Creek in Lattingtown has lost more than 46 percent of its historic vegetation, dwindling from about 96 to 51 acres; Cedar Beach Creek in Southold has lost more than 43 percent, going from 19 to 11 acres.

The losses have mystified researchers and spurred a new $546,000, multiyear study to determine its causes. Participants include scientists from the DEC, Stony Brook University's Marine Sciences Research Center and the United States Geological Survey.

Researchers hope the data they gather, along with measurements being taken at Fire Island National Seashore, will shed light on how Long Island's tidal wetlands sustain themselves. The project could also help scientists forecast how climate change - and the predicted rising sea levels that go along with it - might affect marshes already under pressure.

Life-and-death matter

At stake is the vital role coastal marshes play in sustaining life in the fertile margin where land meets tide.

Small fish such as mummichog and silversides thrive in the brackish water and sheltering vegetation of tidal wetlands. So do the young of the bigger, more valuable species that prey on them - striped bass, weakfish and bluefish. Ospreys and herons pluck their meals from these waters, while plankton nourishes the fiddler crabs whose burrowing helps aerate the marsh peat.

Wetlands also filter pollution. They soak up silt, chemicals and organic material such as nitrogen from sewage from upland areas before it washes out into bays and harbors.

And marshes buffer coastlines from storms and provide a measure of protection from erosion and flooding. The vegetation blunts the power of waves and and absorbs some of the excess water that piles up during hurricanes and nor'easters. "Look at Katrina," Mushacke said. "One of the reasons there was so much devastation in Louisiana was the loss of the wetlands."

For decades, tidal wetlands along Long Island's coast were drained and filled to make way for development. In the mid-1970s, a greater understanding of their habitat and protective value prompted laws designed to protect the marshes. A recent DEC analysis of wetlands regulations concluded that the rules, from the early 1970s to the late 1990s, had largely prevented physical destruction from "fill and build" activities.

But that wasn't enough to safeguard the marsh. Comparisons between current aerial photographs and images from 1974 show that even with those laws in place, extensive wetlands loss has occurred along the North Shore from Manhasset Bay to Mount Sinai Harbor, along the South Shore from Jamaica Bay to the Gilgo Islands, and around the rim of the Peconic Bay.

Multipronged battle

No single factor has been identified as causing the loss. Instead, researchers think it could be a combination of natural and man-made impacts that vary from site to site, such as past developments that added pollutants to the watershed, or natural changes to tidal flow that predate 1974 but whose effects are only now being seen. A leading suspected cause is rising sea levels. Yet another factor is the disruption of processes that deliver sediment to the marshes - through dredging or the buildup of deltas and beaches.

Mushacke thinks one such expanding delta at Flax Pond, in the village of Old Field, may account for the changes there. "It's like a cork in a bottle," he said. "It's slowing the drainage of water at falling tide. Plants are submerged for a longer period of time, and that's causing their demise."

Marshes maintain their elevation by trapping sediment and organic matter; the new material helps compensate for erosion and subsidence as the peat compacts. "The marsh needs to increase with sea level elevation, or it will drown," said Charles Roman, a coastal ecologist with the National Park Service.

For the past five years, Roman has been tracking the rise, fall and gradual inundation of three wetlands along the back bays of Fire Island.

Roman's data show those spots are piling up sediment, but not fast enough. The more time wetland vegetation spends under water, the weaker it becomes. Now, Roman said, the marshes "look fine," but if the trend continues, and no storm comes along to dump a big load of sediment, "then this marsh is going to get wetter and turn into mudflats."

By spring, DEC researches will begin building a similar body of information at four North Shore marshes: East Creek in Sands Point, West Pond, Frost Creek and Flax Pond in the Suffolk village of Old Field. East Creek, which is mostly intact, will serve as the control site.

While the DEC tracks marsh elevation and subsidence, the U.S. Geological Survey will compare water levels at the different sites. A Stony Brook researcher will look at historic levels of sediment accumulation and test the marshes to see whether runoff and sewage treatment plants that empty into the Sound have caused a buildup of hydrogen sulfide, which can poison marsh plants.

In a year or so, Mushacke hopes researchers will have a better idea of how those forces influence the marshes. The next step? Managing them to prevent new damage or undo historic loss. Remedies could include spraying layers of sediment over marshes like Cedar Beach, where dredging may have deprived the marsh of the material it needs.

On a recent visit to West Pond, Mushacke placed his hand about 18 inches above the mud. "In the 1960s, the marsh was probably about this high," he said. "The loss is reversible, but not without a lot of rehabilitative effort."

Vanishing marshes

Marshland acreage is dwindling at several spots across Long Island, threatening bird and marine habitats and leaving the area vulnerable to storm surges and other extreme weather.

Area	Year	Acreage		Year	Acreage	% Loss
JAMAICA BAY, QUEENS	1974	1,610		2003	876	45.6%
WEST POND, GLEN COVE	1974	21.8		2005	8.6	60.6%
FROST CREEK, LATTINGTOWN	1974	96.0		2005	51.1	46.7%
GILGO ISLANDS, SOUTH SHORE	1974	108.0		2001	70.0	35.0%
FLAX POND, OLD FIELD	1974	80.7		2006	63.2	21.6%
COREY CREEK, SOUTHOLD	1974	28.2		2002	20.4	27.7%
CEDAR BEACH CREEK, SOUTHOLD	1974	19.7		2002	11.2	43.2%

Note: Years reflect most recent measureable data.