SPRING 2015

SOUND UPDATE

NEWSLETTER OF THE LONG ISLAND SOUND STUDY

Experts Meet to Discuss Tidal Wetland Loss

By Victoria O'Neill

Tidal wetlands, specifically salt marshes, are composed of waving green fields of smooth cordgrass (*Spartina alterniflora*) and saltmeadow cordgrass (*Spartina patens*), and can be found throughout Long Island Sound in protected bays and harbors. These wetland habitats serve as the interface between the marine and the terrestrial environments, providing buffers to storm surges, filtering the water of pollutants to improve water quality, and serving as spawning, nursery, and feeding grounds for fish, invertebrates, waterfowl, and wading birds. Tidal wetland ecosystem benefits were not fully understood or appreciated until the mid-twentieth century, and until this time, suffered from years of dredging and filling related to land and port development.

By the 1970s, legislation was initiated in New York and Connecticut to protect tidal wetlands from destruction. Despite these protections, in 1999, New York State Department of Environmental Conservation (NYSDEC) and Connecticut Department of Energy and Environmental Protection (CTDEEP) noted consistent and continued wetland loss. To bring together experts to investigate this phenomenon, the Long Island Sound Study (LISS) Management Committee funded a Long Island Sound Tidal Wetland Loss Workshop in 2003. The workshop determined that the causative factors of marsh loss were largely unknown and that more research, monitoring, restoration, and management were needed.

Another major recommendation of the 2003 workshop was to reconvene for a follow-up workshop at a later date to discuss recent developments in the study of wetland loss. On October 22-23, 2014, approximately 70 professionals in tidal wetland research, monitoring, restoration, and management came together for the 2014 Long Island Sound Tidal Wetlands Loss Workshop, held at Danfords Hotel and Marina in Port Jefferson, NY. The primary goal of the 2014 workshop was to have an engaging learning experience and discussion among leading marsh managers, researchers, practitioners, and regulators regarding tidal wetland loss and change in Long Island Sound and the region over the last decade.

The 2014 workshop was organized into theme topic presentations and breakout sessions. Presenters at the workshop updated attendees on recent projects occurring in and around Long Island Sound and the region that focused on key theme topics, such as submergence, sudden vegetation dieback, marsh modelling efforts, ecological indicators, surface elevation tables, trends analyses, marine transgression, and innovative restoration and monitoring efforts. During breakout sessions, attendees identified the factors that cause marsh loss and changes and how these factors impact marsh health. Attendees also identified data gaps surrounding marsh loss and created a new set of research, monitoring, restoration, and management recommendations for Long Island Sound and the region. These recommendations have been summarized into official workshop proceedings and are also incorporated into Implementation Actions in the revised version of the LISS Comprehensive Conservation and Management Plan (CCMP). The 2014 workshop proceedings and presentations, along with other workshop materials, are posted on the LISS website: *http://longislandsoundstudy.net/issues-actions/habitat-quality/2014-lis-twl-wksp*.

Amy Mandelbaum

EXPERTS DISCUSS TIDAL WETLAND LOSS during a breakout session.

This newsletter highlights the topic presentations that were included in the 2014 workshop. The articles are intended to serve as a summary of the workshop presentations, not as a synthesis of the research and monitoring conducted.

—O'Neill is the New York Long Island Sound Study Habitat Restoration Coordinator at NYSDEC

CONTENTS

Sound Update provides readers with news about the Sound and the Long Island Sound Study.

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Topic 1: Submergence

Changes Since the Late 1800s

By Ron Rozsa

This session addressed evidence of submergence in western Long Island Sound. Submergence is the multi-decadal gradual conversion of tall smooth cordgrass (*Spartina alterniflora*) in the low marsh to mudflat. To the west of New Haven Harbor, on the north and south shores of Long Island Sound, the low marsh zone of tidal wetlands is converting to intertidal flats over the course of two to three decades. The dominant plant in this zone is smooth cordgrass, a grass with a height often exceeding two meters in western Long Island Sound. Smooth cordgrass experiences a gradual stunting and reduction in density until the low marsh is devoid of any emergent vegetation. As stunting progresses, the canopy height remains constant and the leaf tips show evidence of stress, a condition called 'burn necrosis' by plant pathologists.

Ron Rozsa

STUNTED AND DIFFUSED smooth cordgrass at the Fivemile River, Darien, CT. At this location, the substrate is a thin layer of marsh peat over estuarine mud. Today, the peat is absent and the underlying mud forms the substrate of the intertidal flat. Inset photograph shows the characteristic leaf tip of stressed smooth cordgrass at submerging sites.

To quantify the wetland change, the Coastal Management Program of CTDEEP received funds from LISS to contract with the National Wetland Inventory program of the U.S. Fish and Wildlife Service (USFWS). The USFWS mapped vegetation changes through photointerpretation of aerial photography from 1974 to 2004 at six embayments in western Long Island Sound. At all locations, the vegetation analysis shows gains in intertidal flat at the expense of low marsh habitat. Therefore, this analysis provides evidence that submergence is occurring in these areas.

The cause of submergence continues to baffle wetland scientists. While low marsh habitat is declining, the increases of intertidal flat, a highly significant estuarine habitat providing numerous ecological services, offsets historic human-caused loss of flats from activities such as dredging and placement of fill.

—Rozsa is retired from CTDEEP

Wetland Loss in Long Island Sound: The Role of Nitrogen

By Troy Hill

This session addressed tidal wetland loss in Long Island Sound and nitrogen's role in the process. Human activities release large amounts of nitrogen to downstream coastal environments, and Long Island Sound is no exception. Nitrogen pollution has broad environmental impacts, stemming from nitrogen's role as a key ingredient for plant growth. Concern about nitrogen in coastal ecosystems was initially driven by the desire to prevent algal blooms and the oxygen-starved conditions created when those algae decay. But the influence of nitrogen extends to salt marsh plants, leading to recent efforts to determine the impacts that nitrogen has on the intertidal grasslands fringing our coastline.

There is concern that nitrogen causes belowground changes that lead to marsh submergence. The logic is clear: plant roots mainly serve to gather nutrients from the environment. If nitrogen is abundant, there may be less need for plants to build nutrient-scavenging roots. On an ecosystem scale, fewer plant roots can cause unstable peat and wetlands that may erode more easily or be less resilient to sea level rise. This intuitive sequence has been observed in Massachusetts, but elsewhere in New England, and in Long Island Sound in particular, root growth and marsh stability do not seem to be a simple function of nutrients.

Understanding the role of nitrogen in wetland stability is partially a question of gathering data to answer critical questions: Are nitrogen concentrations in submerging marshes at levels that might trigger collapse? Are the mechanisms of nitrogen-induced loss, such as reduced roots or unstable peat, accumulation of partially decayed vegetation or organic matter, found in submerging wetlands? And are the spatial patterns and time trends of vegetation loss consistent with those caused by nitrogen?

Some of these questions require fieldwork, but for others, there is ample data already available, waiting for analysis. In these cases, reducing barriers to data access and analysis should be a priority.

Data will be important to resolving the nitrogen question, but real advances in our understanding of coastal ecosystems require synthesis and conceptual work. We need to understand why rigorous research projects come to disparate conclusions about the effects of nitrogen on wetland stability. We also need a better understanding of how wetlands respond to combinations of stressors, such as reduced sediment supply, abundant nutrients, and rising sea levels.

—Hill is a doctoral candidate at the Yale School of Forestry and Environmental Studies

Troy Hill

BELOW THE SURFACE, salt marsh peat is often a dense mat of roots and rhizomes, as shown in this sediment core. With fewer roots to hold the peat together, marshes may erode more easily.

Topic 2: Ecological Indicators of Wetland Change

Sudden Vegetation Dieback

By Roman Zajac, PhD

This session addressed vegetation loss in salt marshes. Over the past decade, a variety of phenomena have been observed across Long Island Sound salt marshes. These include marsh drowning, erosion of marsh fronts and along creek banks, increasing pools and ponding, shifts in vegetation structure, and loss of vegetation. Collectively, these phenomena can be referred to as salt marsh change. Significant loss of vegetation, usually smooth cordgrass (*Spartina alterniflora*), is known as sudden vegetation dieback (SVD). SVD generally occurs along low marsh areas and the low to high marsh transition. It is characterized by the relatively rapid loss of vegetation over several years with varying patterns of regrowth.

The causes of SVD are enigmatic. Diebacks in Louisiana and Georgia are associated with drought, but not in the mid-Atlantic or northeast states. Other suggested causes are changes in soil chemistry, increased tidal inundation, pathogens, and herbivory. Research by Wade Elmer at the Connecticut Agricultural Experimental Station suggests that certain pathogens are not the direct cause of SVD. Based on the work of Mark Bertness and others at Brown University, herbivory by the purple marsh crab (*Sesarma reticulatum*) causes vegetation loss along creek banks in many Cape Cod salt marsh systems and in Narragansett Bay. They also found evidence of the crabs' impact in two salt marsh systems in Connecticut as well as on Long Island.

It is not clear at this time as to the extent and severity of SVD in Long Island Sound salt marshes, what marsh characteristics make them prone to this type of salt marsh change, and what the direct causes are. Current work at the University of New Haven shows patterns of SVD consistent with crab herbivory in a number of marshes along the central coast of Connecticut, suggesting this type of vegetation loss is increasing in Long Island Sound marsh systems. Other analyses indicate that SVD is not necessarily sudden, as vegetation loss along creek banks has been evident since 1999-2000 and has progressively increased since 2004. Although pathogens may not be a direct cause of vegetation dieback, continuing work by Wade Elmer suggests that pathogens may make smooth cordgrass more susceptible to herbivory by the purple marsh crab. This may be just one component of a suite of complex interactions acting in concert that lead to the patterns of SVD on Long Island Sound salt marshes. Such interactions may also include the geomorphic setting of the marsh relative to coastal development, changes in tidal inundation and sediment supply, and the geomorphology and hydrology of tidal creeks.

Additional information on SVD can be found at *http://tinyurl.com/svd-in-ct*.

—Zajac is a professor at the University of New Haven

Roman Zajac

VEGETATION DIEBACK PATTERNS at Pleasant Point, Branford, CT are consistent with herbivory by the purple marsh crab (inset). As noted by the red arrows, a loss of vegetation was observed from 2008 to 2013.

Wildlife and Plants

By Roman Zajac, PhD

The session addressed how salt marsh changes affect wildlife and plants. Long Island Sound salt marshes are changing in a variety of ways. Both marsh plants and fauna are being studied as indicators of the patterns and pace of such changes, and to assess potential implications for the ecosystem dynamics of these valuable, but increasingly vulnerable, environments. Plants, in large part, form the salt marsh landscape mosaic, and changes in plant composition and patch structure are more readily discernable than the responses of marsh fauna to salt marsh change. Based on surveys conducted in 2002, 2004, and 2013 along the entire Connecticut coast, Chris Field and Chris Elphick from the University of Connecticut found that high marsh elevation plant species, such as saltmeadow rush (*Juncus gerardii)* and saltmeadow cordgrass (*Spartina patens*), are disappearing, whereas low marsh elevation plant species, such as smooth cordgrass (*Spartina alterniflora*), are increasing. The overall pattern of change is consistent across marsh complexes. Analyses of historical aerial images between 1934 and 2010 of a marsh complex in Branford, CT are consistent with these results, indicating that there has been an almost complete shift from saltmeadow cordgrass to smooth cordgrass on the high marsh over this time period.

Field and Elphick also conducted extensive studies of salt marsh bird species, such as the saltmarsh sparrow (*Ammodramus caudacutus)*. The results of the studies show that many of the salt marsh bird species are declining. For example, the nesting area of the saltmarsh sparrow, located in the high marsh, is being impacted due to increasingly higher tides.

Chris Elphick

A SALTMARSH SPARROW at Barn Island, CT.

In addition to the decline in bird species, invertebrates are also showing changes in their populations and behaviors. Yui Chuan Luk and Roman Zajac at the University of New Haven found that the fiddler crab (*Uca pugnax*) is expanding its distribution across marsh systems. Previously found primarily in low marsh habitats, large numbers now occupy high marsh habitats, and in a few areas, they have established burrows in lawns that are adjacent to marshes. Other invertebrate species, such as the coffee bean snail (*Melampus bidentatus*) appear to be sustaining populations in some marsh habitats. However, where tidal inundation has increased considerably, the snail suffers high rates of predation by foraging fish.

Although a number of faunal indicators are being studied, there are several important groups for which there is little information on their responses to salt marsh change. Among these are fishes that reside in marshes and other species that use marshes as feeding areas and/or nurseries. Overall, our knowledge of how fauna are responding to salt marsh change is rudimentary and, as such, more research is needed in this area.

—Zajac is a professor at the University of New Haven

Topic 3: Wetland Elevation Changes

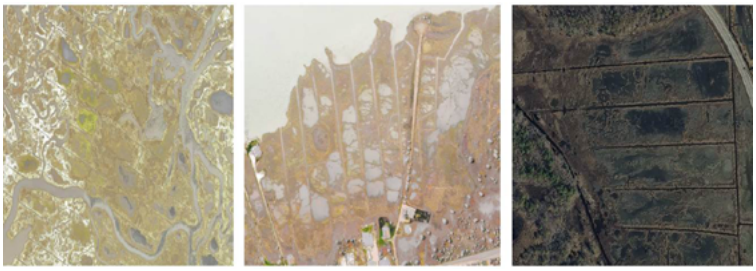
Expansion of Pannes

By Elizabeth Burke Watson, PhD

This session addressed the expansion of pannes in salt marshes. Pannes are bare or water-filled depressions in a marsh. For the Long Island, New Jersey, and southern New England region, one facet of marsh drowning as a result of accelerated sea level rise is the expansion of salt marsh ponds and pannes. Over the past century, marsh ponds and pannes have formed and expanded in areas of poor drainage, behind blocked mosquito ditches, and in the centerpoint of grid-ditched marsh islands. Mosquito ditching is a practice that was routinely conducted in the early 1900s where narrow channels were created to allow for the upper reaches of a marsh to drain and prevent standing water, and therefore control the growth of mosquito larvae.

The main processes thought to be responsible include accelerated sea level rise and the abandonment of mosquito ditch maintenance. Where tidal flooding is increasing rapidly, locations closer to tidal channels (less than about 30 meters) are able to respond more robustly. Accumulation of sediment is focused along tidal creeks and better drainage allows marsh plant growth to build marsh peat. Conversely, for the marsh interior, both sediment accumulation and plant productivity are limited, which contributes to the formation of shallow depressions and marsh drowning. The shift from mosquito ditch maintenance to open water marsh management is also implicated in pond and panne formation and expansion. Where channels become blocked, or shift

U.S. Geological Survey



IMAGERY OF SHALLOW PONDING in northeastern salt marshes where berms along mosquito ditch edges are impeding drainage. Left to right: Captree Island, Great South Bay, NY; Winnapaug Pond, Charlestown, RI; and Ocean Gate, Barnegat Bay, NJ.

from facilitating to preventing drainage, areas of stagnant water develop, and plants become stunted or die.

Pond and panne expansion are concentrated in areas with low tidal range (less than 1 meter). Where tidal range is greater, channel incision leads to the cyclic formation and draining of such features with creek incision. While published studies indicate that interior ponding and rapid expansion are the largest contributor to contemporary marsh loss in the region, interior ponds are also common features and an ecologically valuable component of marsh landscapes, making it important to develop a distinction between stable ponds and those contributing to long-term and directional marsh vegetation loss.

—Watson is a wetland scientist and assistant professor with the Academy of Natural Sciences of Drexel University

Elevation and Sediment Accumulation – Surface Elevation Tables

By Victoria O'Neill

This session addressed the monitoring of Surface Elevation Tables (SETs). SETs measure the relative elevation change of tidal marsh sediments to provide insight into the processes that cause marsh loss and change. To record this sediment change, SETs are temporarily attached to permanent benchmark rods installed in the wetland complex. Surveyors lower pins through the SET and onto the marsh surface and then measure the height of the pins to record marsh elevation. Essentially, the SET provides information on the belowground processes, occurring from the base of rod benchmark to the top of the marsh surface. Marker horizons, permanent markers composed of feldspar and placed on the marsh surface, are often paired with SETs to help collect sediment accumulation data, which captures the surface/aboveground processes. SETs and marker horizon are measured annually and the data is used in year-to-year comparisons with a focus on long-term monitoring over decades.

SETs and marker horizons have been installed throughout the Mid-Atlantic and New England region and are monitored by various academic, government, and non-profit organizations. New York SET monitoring stations can be found in Long Island Sound marshes in Suffolk, Nassau, Queens, and Bronx counties. In Connecticut, SETs are found in the marshes along the central and eastern shoreline. Many of these SETs and marker horizons are fairly new and have only been installed within the last 10 years. Despite being new installations, they are already producing interesting information regarding marsh accretion and elevation change. Stations in the Bronx show a definite increase in accretion within the marsh post-Superstorm Sandy, but, despite these increases, the marshes are still subsiding and having trouble keeping pace with sea level rise. Stations in Connecticut vary site by site. Some sites seem to be doing relatively well in terms of accretion rates, despite a drastic increase in inundation over the last few decades caused by sea level rise.

The take home message is that SET data are very powerful, but it is important to remember that they provide relative elevation measurement over a long period of time. So, time will tell what is truly happening to our marshes. It can take five to ten years to finally be able to make useful comparisons with the data.

—O'Neill is the New York Long Island Sound Study Habitat Restoration Coordinator at NYSDEC

Amy Mandelbaum

A SURVEYOR MEASURES the height of the pins to record marsh elevation, providing information on belowground processes (above). Marker horizons are measured to collect information on surface/aboveground processes (below).

NYSDEC

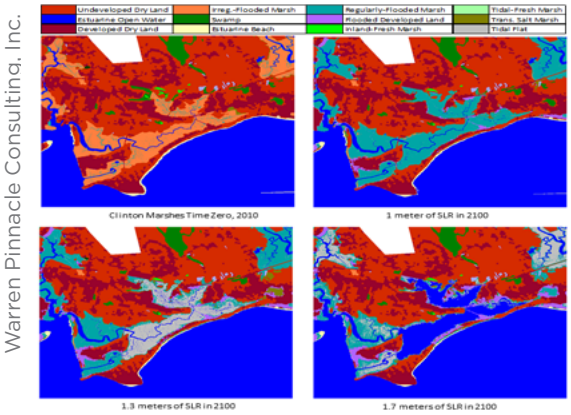
Topic 4: Marsh Migration

SLAMM Migration Modeling

By Amy Polaczyk, PhD

This sesssion addressed the Sea Level Affecting Marshes Model (SLAMM) work being done in Long Island Sound.

SLAMM simulates the dominant processes affecting shoreline modifications during long-term sea level rise. The model uses a complex decision tree incorporating geometric and qualitative relationships to predict changes in coastal land cover classes. A unique feature of the model is its ability to incorporate uncertainty: results can be provided not only as single-point estimates but also as probability distributions accounting for the effect of input and model uncertainties.



Warren Pinnacle Consulting, Inc.

SLAMM PREDICTIONS for Hammock River marshes in Clinton, CT in 2100 compared to initial conditions.

The model was applied to the entire coast of Connecticut and New York in two separate projects, one led by New York State Energy Research and Development Authority (NYSERDA) and the other led by the United States Environmental Protection Agency (USEPA), managed by the New England Interstate Water Pollution Control Commission (NEIWPCC) with additional funding from CTDEEP. The NYSERDA project focused on applying the model to Suffolk and Nassau counties, New York City (NYC), and the lower Hudson Valley, while the USEPA project focused on Westchester County and coastal Connecticut. Four accelerated sea level rise scenarios were simulated, ranging from 72 centimeters to 1.7 meters by 2100. Reports and results are available for download at *http://warrenpinnacle.com/prof/SLAMM/LISS* and *http://warrenpinnacle.com/prof/SLAMM/NYSERDA*.

In SLAMM, tidal marshes are subdivided into high and low marsh. In both New York and Connecticut, high marsh is the most prevalent coastal wetland type and is also the most vulnerable to sea level rise, with predicted losses ranging from 50% to 97% by 2100 in Connecticut and from 41% to 96% in New York. Some of these losses are offset by conversion to low marsh and by new marsh areas occupying previous upland zones. Other vulnerable habitats include tidal swamps, tidal fresh marshes, and estuarine beaches. In addition, up to 8.8% of developed coastal areas in Connecticut and up to 10.4% in New York are predicted to become flooded regularly due to sea level rise. Uncertainty analyses provide probabilities of future land cover. Results of uncertainty analyses indicate that sea level rise has the greatest effect on the variability of predicted land cover.

These results form the basis for identifying areas where proper land use management can assist marsh maintenance and migration, providing increased resilience of coastal zones to future stresses due to accelerated sea level rise.

—Polaczyk is a research associate at Warren Pinnacle Consulting, Inc.

Marine Transgression

By Shimon Anisfeld, PhD

Chris Elphick

This session addressed the process of marine transgression, in which marine ecosystems, such as tidal wetlands, move landwards in response to sea level rise.

Ron Rozsa opened the session with a discussion of the sea level fen, dominated by switchgrass (*Panicum virgatum*) and the forested seepage wetland, dominated by black tupelo (*Nyssa silvatica)*. Both of these wetland types are transitional between marine and upland, and may thus play a role in marine transgression. Rozsa suggested that replacement of the switchgrass fen with saltmeadow rush (*Juncus gerardii)* and movement of the switchgrass fen uphill is an important part of the transgression process, and that this replacement is episodic, timed by the 18.6 year metonic cycle of the tides.

Chris Elphick questioned the assumption that tidal marsh migration into forests is currently happening at detectable or ecologically relevant rates. He presented data from aerial photo analysis of 27 Long Island Sound marsh edges, which showed no evidence of widespread retreat of the forest-marsh boundary. In addition, he presented data from 182 transects extending from the marsh edge into the forest. Transect data suggested that trees at the marsh edge were not succumbing to the stress of increased tidal inundation, as one would expect under the standard marine transgression model. In fact, trees at the marsh edge were larger, on average, than more inland trees, presumably because of increased light availability. Continued monitoring of these transects over the long term will provide very useful information on plant and bird response to sea level rise at the upland border.

Shimon Anisfeld presented preliminary results from studies of marsh migration at Sherwood Island and Hammonasset State Parks in Connecticut. Both of these sites have extensive areas of mowed lawn bordering tidal marsh, and park managers have agreed to institute “no-mow” zones to determine if this would facilitate marsh migration. The data so far suggest that marsh plants are currently growing in both mowed and “no-mow” lawn areas, though they are of course taller in “no-mow” zones; some marsh indicators, such as foraminifera, appear to have migrated more rapidly into lawns compared to adjacent wooded areas of the same elevation.

In the big picture, it seems clear that, over geologic timescales, tidal wetlands do adjust to sea level rise by migrating upslope, as long as sea level rise is not too rapid. But will this happen in time to save marsh-dependent birds? Will it be impeded by the hardscapes that we have built up on marsh borders? Or, will it be facilitated by the lawns that we have cultivated, especially if we are now willing to let them go? The next few decades will give us the answers, whether we are ready for them or not. Hopefully we will have the tools to manage this transition wisely.

—Anisfeld is a senior lecturer and research scientist at Yale School of Forestry and Environmental Studies

Topic 5: Tidal Wetlands Trends and Conditions Assessment

Long Island

By William Bowman, PhD

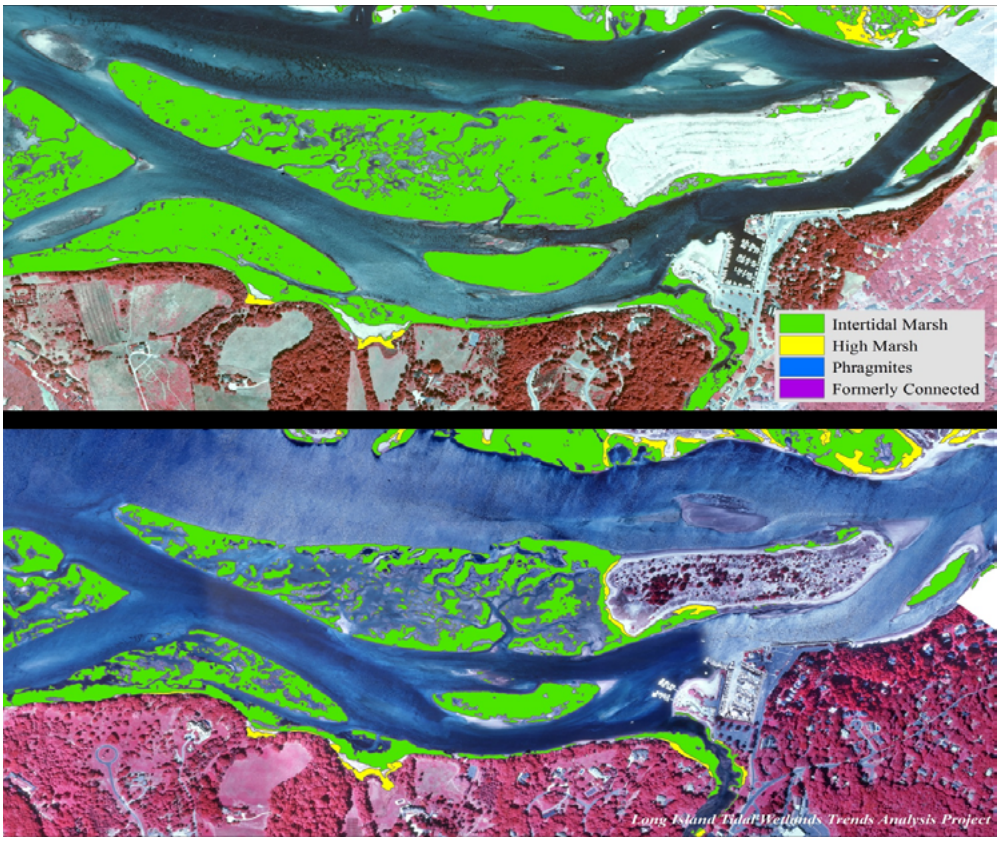
This session addressed the Long Island Tidal Wetlands Trends Analysis Project. This project aims to quantify the magnitude of tidal wetlands loss and changes in marsh condition in the southern and western Long Island Sound (Suffolk, Nassau, and Westchester Counties and portions of New York City). This work was funded by NEIWPCC, USEPA, NYSDEC, and The Nature Conservancy (TNC), and was completed by Cameron Engineering & Associates, LLP and Land Use Ecological Services, Inc.

Trends in wetland area were assessed using spectral analysis and supervised classification of infrared aerial imagery from 2005 and comparing 2005 wetlands area to wetlands area derived from 1974 infrared aerial imagery. The results indicate substantial loss of tidal wetlands area has occurred over the past forty years with, on average, 23.2% of intertidal and high marsh area lost. Typical indicators of marsh loss observed include retreat of the seaward edge of the marsh, loss of marsh islands, widening of tidal creeks and ditches, the conversion of high marsh to low marsh, panne/mudflat and pond formation, and encroachment of invasive common reed (*Phragmites australis*).

Several large wetland complexes have lost 50-90% of high marsh and intertidal marsh area between 1974 and 2005. The marsh islands in Porpoise Channel and Stony Brook Harbor (Stony Brook, Suffolk County) have lost 57.6 acres of marsh (53.9%) due to panne formation, widening of creeks, and retreat of the marsh's seaward edge. The smaller wetland complex at Sheets Creek (Manorhaven, Nassau County) was 10.4 acres in 1974, but lost 89.3% of its marsh area by 2005. There were no clear geographic trends observed, as some wetland complexes in the less developed eastern Long Island Sound exhibited high rates of marsh loss. Baiting Hollow Marsh (Riverhead, Suffolk County) has lost 100% of its native high marsh and intertidal marsh due to encroachment of invasive common reed and panne formation.

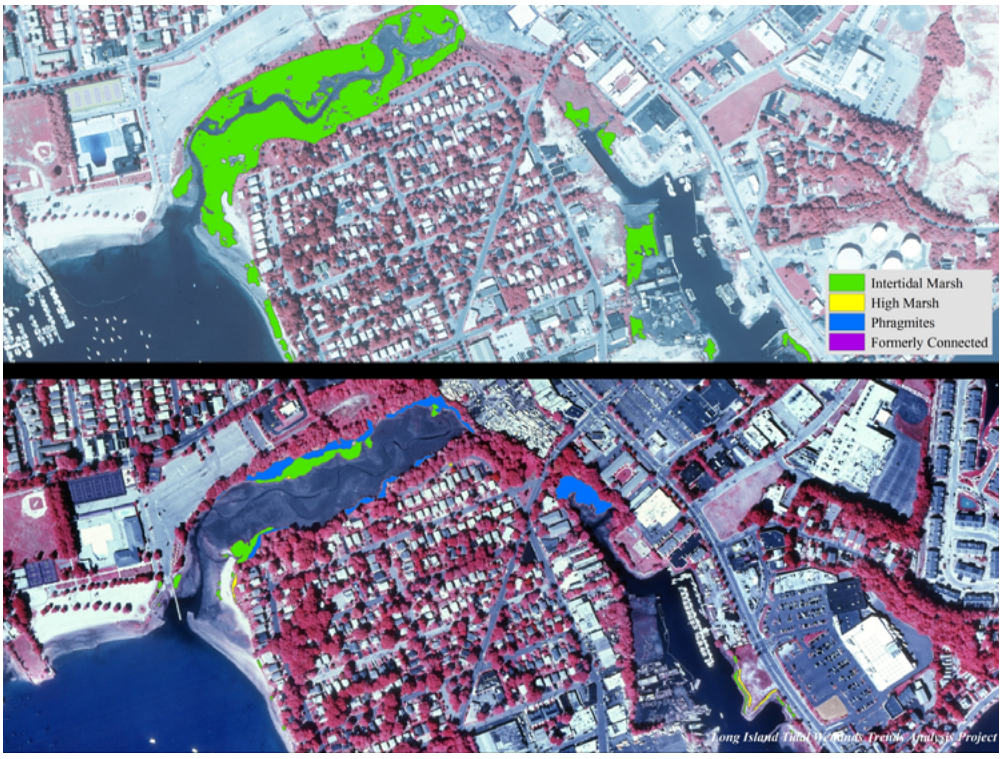
These results suggest a substantial loss of the ecosystem services provided by tidal wetlands over the past forty years and are troubling indicators of the potential future condition of Long Island Sound marshes if the observed marsh loss rates continue.

—Bowman is a senior scientist at Land Use Ecological Services, Inc.



Land Use Ecological Services, Inc.

TIDAL WETLANDS AREA in Porpoise Channel and Stony Brook Harbor in 1974 (above) and 2005 (below).



Land Use Ecological Services, Inc.

TIDAL WETLANDS AREA in Sheets Creek in 1974 (above) and 2005 (below).

New York City

By Chris Haight

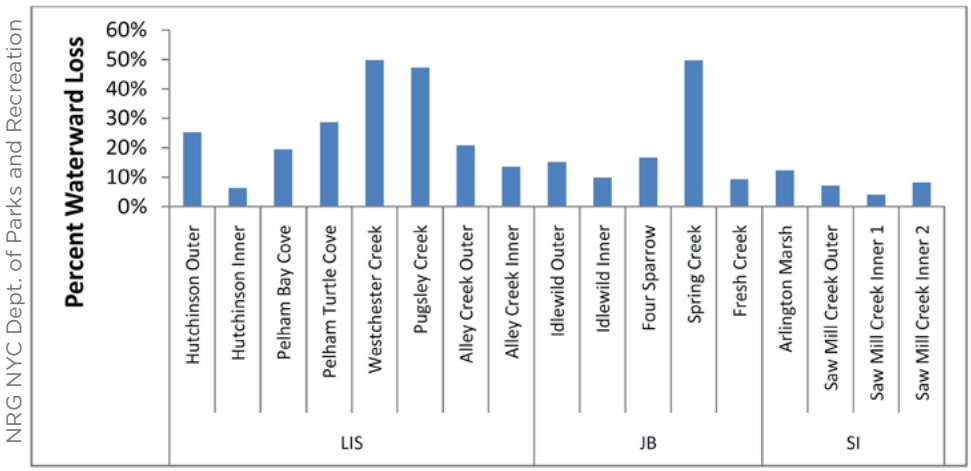
This session addressed the assessment of salt marshes in New York City. The Natural Resources Group (NRG) of the NYC Department of Parks and Recreation is conducting a multi-tiered assessment of NYC salt marshes. This project is in partnership with the Natural Areas Conservancy (NAC) and TNC with funding from the USEPA's wetland protection program. The assessment includes an examination of historic marsh loss trends and a conditions index based on ecological field data collected in 2013 and 2014. Please note that these are preliminary draft results.

The historic salt marsh loss trends analysis compares 25 salt marsh complexes in NYC from the 1974 NYSDEC Tidal Wetland Inventory maps, geo-referenced and digitized by Brooklyn College and NRG, to 2012 post-Sandy aerial imagery that was field-verified in 2013 and 2014 by NRG. The extent of the 1974 and 2012 data accounts for shoreline and upland tidal marsh change; internal marsh loss was not analyzed. Preliminary results from 17 sites assessed in 2013 show that waterward loss ranged from 6% to 50% with an average of 20% loss across all sites. By region, Long Island Sound had the greatest amount of waterward loss at 19% or 47 acres across eight sites. The remaining eight complexes will be incorporated into the conditions index once the analysis is complete.

The conditions index will be developed by NRG and TNC using data collected from the NAC/NRG ecological assessment, conducted in the summers of 2013 and 2014. The data consists of vegetation percent cover and other non-vegetation cover parameters. By region, Jamaica Bay had the lowest cover of total vegetation, common reed (*Phragmites australis)*, and saltmeadow cordgrass (*Spartina patens)*, and highest cover of smooth cordgrass (*Spartina alterniflora)* compared to other regions. These results indicate that Jamaica Bay sites are in a lower tidal frame due to the low total cover of vegetation and dominant presence of the low marsh species, smooth cordgrass. This data will be further analyzed by NRG and TNC to determine how metrics reflect site conditions and how they compare across NYC. A vulnerability index will also be developed based on future sea level rise projections using the SLAMM that Warren Pinnacle Consulting, Inc. applied to the region. The objective of this work is to use these indices to inform management decisions that benefit NYC coastal wetland habitat.

Troy Hill

—Haight is a project manager at the Natural Resources Group, NYC Department of Parks and Recreation



NYC TRENDS ANALYSIS net percent waterward loss for sites in Long Island Sound (LIS), Jamaica Bay (JB), and Staten Island (SI).

DIRECTOR
Mark Tedesco, EPA LIS Office

PROGRAM SPECIALIST
Joe Salata, EPA LIS Office

COMMUNICATIONS COORDINATOR
Robert Burg, NEIWPCC

CT COORDINATOR
Mark Parker, CTDEEP

NY COORDINATOR
Cassandra Bauer, NYSDEC

CT OUTREACH COORDINATOR
Judy Preston, CT Sea Grant

NY OUTREACH COORDINATOR
Amy Mandelbaum, NY Sea Grant

UPDATE EDITOR
A. Mandelbaum, ACB328@CORNELL.EDU

CONTRIBUTING EDITORS
M. Tedesco, V. O'Neill, C. Bauer, D. McReynolds, J. Preston, R. Burg

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EPA LIS Office
Stamford Government Center
888 Washington Blvd.
Stamford, CT 06904-2152
Phone: (203) 977-1541 / Fax: (203) 977-8102

New York Sea Grant
146 Suffolk Hall, Stony Brook University
Stony Brook, NY 11794-5002
Phone: (631) 632-9216 / Fax: (631) 632-8216

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Update of the Comprehensive Conservation and Management Plan

By Amy Mandelbaum

The LISS is updating its CCMP to re-energize partnerships around shared goals and inclusive management; set measureable ecosystem targets and management outcomes; incorporate new strategies such as sustainability, climate change resiliency, and environmental justice; maintain an integrated ecosystem perspective; expand public engagement and collaboration; and use strong science to continually adapt and improve management.

In 1994, the states of New York and Connecticut and the USEPA approved the CCMP for Long Island Sound. Since then, many emerging social and environmental issues, such as sea level rise, planning for community and ecosystem resiliency, and stormwater management, have come to the forefront.

In early 2012, LISS began the process of updating its CCMP. Since then, a bi-state effort has worked together to develop a framework for the update, solicit stakeholder and public input, and incorporate comments received into the updated plan.

During the public comment period in fall 2014, LISS partners worked together to hold webinars and in-person public input meetings in New York and Connecticut. Two webinars were held online, three public meetings were held in New York (Westbury, Bronx, and New Rochelle), and three public meetings were held in Connecticut (one in New Haven and two in Old Saybrook). In addition to webinars and public input meetings, stakeholders were engaged through LISS's social media networks.

Victoria O'Neill

STAKEHOLDERS DISCUSS the updated CCMP's goals and desired outcomes and targets at one of the New York public input meetings.

The public comment period was a great success, with over 250 comments received. A public responsiveness document was prepared that summarized and responded to all comments provided on the CCMP. In addition, LISS partners worked together to incorporate the comments received into the updated plan. The revised plan has been submitted to NYSDEC, CTDEEP, and USEPA for approval.

Once approved, we will need your help implementing the plan. Whether it be through volunteering with a local organization or joining the LISS Citizens Advisory Committee, your influence and actions can have a great impact on the health of the Sound. Together, we can work to protect and restore the Sound, and begin to realize our vision of a swimmable and fishable Long Island Sound for all.

For more information on the update of the CCMP, visit *http://longislandsoundstudy.net/Planupdate.*

—Mandelbaum is the New York Long Island Sound Study Outreach Coordinator at New York Sea Grant

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Long Island Sound Study
c/o New York Sea Grant
146 Suffolk Hall
Stony Brook University
Stony Brook, NY 11794-5002

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