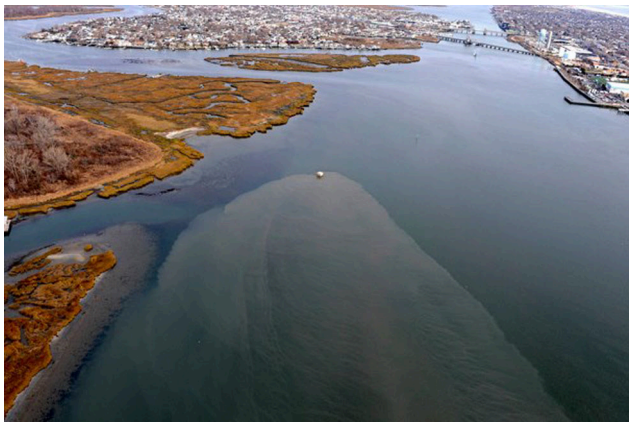
New York Sea Grant technical expertise with coastal processes helps New York cope with the continuing impact of Superstorm Sandy

Sandy's Harsh Legacy: New York Sea Grant Helps New Yorkers Understand and Mitigate Its Impacts

For seven days in the Fall of 2012, Sandy pounded the Caribbean and U.S. East Coast with punishing rain, wind, and waves, at some points named a hurricane and at others a superstorm or post-tropical cyclone. Along its entire East Coast path, Sandy's force caused 140 deaths and accounted for more than $62 billion in economic losses—especially for coastal businesses and infrastructure.



Partially-treated sewage was apparent for weeks in the western Long Island South Shore Estuary ecosystem following the failure of a treatment plant in East Rockaway, photo: Doug Kuntz/Newsday.

NYSG Responds with Research and Outreach

Shortly after Superstorm Sandy's storm surge and high winds inflicted extensive damage along New York's coastline, New York Sea Grant (NYSG) funded two rapid response research projects: one to study how the largest of three breaches that Sandy opened in Fire Island evolve and affect the tidal dynamics and ecosystem of Long Island's eastern Great South Bay, and another to measure how well Long Island's south shore estuary handled the additional sewage from a Sandy-compromised treatment plant that serves 40% of Nassau County's 1.35 million residents.

NYSG Coastal Processes Specialist Jay Tanski and NYSG's Fisheries Specialist Antoinette Clemetson were asked by partner agencies to come to the aid of businesses hardest hit by Sandy. NYSG helped survey business owners in the marina and recreational fisheries industries as they assessed the storm's harsh economic impacts.

One of the many Long Island marinas inundated during Hurricane Sandy, photo: J. Baroni

Assessing $85 Million in Damage to NY Marinas

Tanski worked with industry associations and leaders to assess the damages suffered by marina facilities as a result of Sandy. With their assistance, he developed a survey to document losses due to damaged facilities and reduced revenues as well as the amount of insurance available to cover those losses. Survey results from 250 marinas show the average marina suffered over $350,000 in damages with 72% of the losses uninsured, representing a total loss of over $85 million to New York's downstate marinas.

Tanski presented the survey results to federal, state and local officials leading the recovery effort and industry representatives, including NYS Community Renewal, Small Business Development Center, Empire State Development Corp., NY Rising and the Department of Financial Services, South Shore Estuary Reserve. This information helped ensure the marina industry was included in special storm recovery grant programs initiated by the state. Tanski also helped organize and conduct several workshops and meetings in conjunction with regional marine trade associations that attracted 158 participants who learned about state disaster recovery grant programs and how to apply for funds. NYSG continues to work with these audiences to help marina facilities recover from Sandy.

NYSG Responds Quickly to Sandy Aftermath

Infrastructure Failed; Salt Marsh Delivers
Perhaps no greater example of coastal infrastructure devastation was the failure of the Bay Park Sewage Treatment Plant in East Rockaway, NY, where Sandy's storm surge sent nine feet of saltwater into the facility, causing the damaged plant to allow an estimated 68 million gallons of raw sewage to flow into the Western Long Island South Shore (WLISS) estuary.

Researchers took water and sediment samples from salt marshes near the failed sewage treatment plant, photos: Barbara A. Branca/NYSG

While repairs were being conducted, partially treated sewage continued to be released into the estuary. The plant is capable of only secondary treatment, leaving high nitrate levels in the wastewater effluent and contributing to deteriorating water quality.

Over a year later, media attention continues and has further increased public pressure to improve the aging facility and protect the estuary.

A NYSG-funded research project led by Dr. Chester Zarnoch has provided data to show the extent to which the ecosystem could handle the additional sewage. The researchers compared the amount of nitrogen, hydrogen sulfide and dissolved oxygen from samples taken from salt marshes within sight of the plant and at a control site.

Results showed the nutrients and decomposition associated with the sewage did not result in abnormal dissolved oxygen or nitrate concentrations at the impacted study site, suggesting that sewage and nutrients were likely flushed out of the estuary before degrading water quality. Alternatively, results suggest that this site, which is chronically enriched with nitrogen, may be influenced by other nitrogen inputs from nearby creeks and non-point sources rather than solely the plant's effluent.

By sampling in each season, the researchers determined that ecological impacts of the sewage release were likely moderated because Sandy struck in late October when water temperatures were relatively low and dissolved oxygen levels were high. If a similar event were to occur in late summer (as did Hurricane Irene), when water temperatures and sediment respiration rates are higher, there may have been more severe impacts on the ecosystem leading to hypoxia.

Evidence suggests that salt marshes play a significant role in nitrogen removal in the estuary. Any future management plans to upgrade the facility should include the conservation of existing marshes and restoration of degraded ones. The researchers have shared this information with the USGS in collaboration with their work with the EPA and will be presenting to stakeholders and researchers at an upcoming national conference.

NYSG Brings Coastal Processes Expertise to Meet Shoreline Communities' Needs

In a year's time, the north end of the breach in Fire Island has doubled in width. The south end has opened up to over 750 meters, November 2013, photo: C. Flagg

NYSG Provides Timely Efforts to Monitor Fire Island Breach

As remnants of Sandy slammed into the Long Island coast, breaching Fire Island in three locations, it was immediately apparent that information was needed to assess the damage and potential for further threats to portion of the mainland across Great South Bay containing 13,000 homes collectively valued at $10 billion. With NYSG support, Charlie Flagg of Stony Brook University's School of Marine and Atmospheric began aerial observations of the inlet.

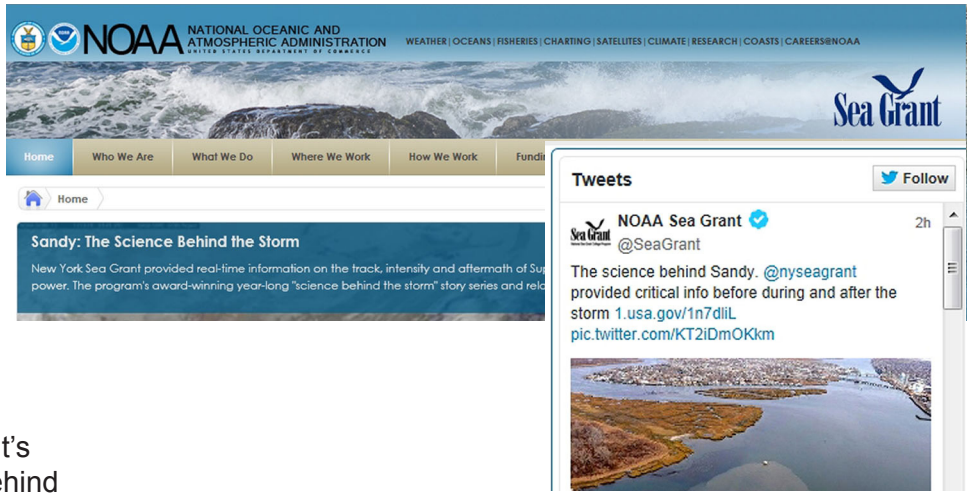
The overflight photos and water level data indicated that the breach was not very large and there were no significant tidal changes in the Bay. There has been a large increase in salinity in the eastern portion of the Bay, but this was not judged detrimental to the Bay's ecology. Rather, according to Flagg, the greater ocean-Bay exchange suggests net improvements to water quality. The breach has migrated westward while slowly rotating clockwise in the expected manner for breaches on this shoreline. The western shoreline has been significantly eroded while deposition along the eastern shore has not kept up.

As a result of Sea Grant's initial funding the monitoring of the breach continues with a follow-on grant from the National Park Service. NYSG's support of the early sampling was vital to provide managers with the critical information necessary to make science based decisions regarding the fate of the breach. The investigator and others have given a series of talks about the breach to numerous south shore communities as well as presentations to the South Shore Estuary Reserve, the NYSDEC's breach advisory panel, the 2013 American Geophysical Union, and another scheduled for the upcoming 2014 Ocean Sciences meeting.

Storm Information via Social Media

New York Sea Grant provided real-time information on the track, intensity and aftermath of Superstorm Sandy via social media when other outlets, including the Web servers hosting the data of Stony Brook University's Storm Surge Research Group, lost power.

Since Fall 2012, New York Sea Grant's award-winning year-long "science behind the storm" story series and related YouTube clips reached more than 14,300 visitors on Facebook alone.



The Sea Grant Focus Area for this project is Hazard Resilience in New York Coastal Communities.

New York Sea Grant is a joint program of Cornell University, the State University of New York, and NOAA.

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