A Winning TEAM

Research platform studying SMIIL projects.

SMIIL Scientists studying Gull Island Project.

Seven Mile Lab Partners are Advancing the Science of Marsh Restoration

By Dr. Lenore Tedesco, Executive Director of The Wetlands Institute

For more than 50 years, The Wetlands Institute (TWI) has worked tirelessly to understand and act to address the challenges affecting the health and well-being of our area tidal marshes and the wildlife that depend on them.

Our work started when the institute's founders purchased more than 6,000 acres of these marshes and protected them in perpetuity. In the late 1960s, the threat came from unchecked, rampant development consuming vast acreage of marsh. Today, the threats to these marshes are again acute. The onslaught of rapidly rising seas is at the forefront of issues affecting the entire back-bay system, our beaches, and our island communities. The change is already here. You can see it in the notable increase in flooding of bayside streets on sunny days; in the never-ending cycle of eroding beaches; in the number of days each month that the marshes are underwater. These are all visual reminders that sea level has risen.

For our scientists studying these marshes and the widlife that depend on them, there is more concern. The rate of sea-level rise is faster than our marshes can keep pace with. Marshes are flooding too frequently for marsh-nesting birds to successfully nest and rear their young, and critical questions emerge about the changing roles of the wetlands for storm protection and as a life-support system for fisheries and migratory birds. Without intervention, our marshes, beaches, and the back bay itself will be dramatically different.

A promising intervention lies in the beneficial use of clean dredged material as a tool to restore wetlands, slow wetland loss, and create and enhance habitat for wildlife that are losing habitat to rising seas. Sediment is a critical asset to marshes, and a key tenet of beneficial use projects is to keep this sediment in the system – while using a combination of engineering and natural processes to enhance and protect marshes. This relatively new approach involves developing new engineering tools, understanding the environmental needs of the marshes and their response to interventions, and a new regulatory framework to permit the activities.

To address these challenges, in spring 2019, the U.S. Army Corps of Engineers (USACE) Philadelphia District partnered with the State of New Jersey, TWI, and the USACE Engineer Research and Development Center to create the Seven Mile Island Innovation Laboratory (SMIIL). The initiative is designed to advance and improve dredging and marsh-restoration techniques in coastal New Jersey through innovative research, collaboration, knowledge sharing, and practical application. The lab is based on a Dutch concept, and effectively created a think tank that brings together the key expertise needed to be innovative and effective.

SMIIL has brought significant resources to our island's marshes and back bays and is driving on-the-ground projects that bring direct benefits to our marshes, our communities, and the wildlife that we all value. In the short time it has been in existence, it has grown in scale, importance and reach, and in July, SMIIL received the first-ever USACE award for the advancement of beneficial use practices.

SMIIL encompasses about 24 square miles of tidal marshes, coastal lagoons, tidal channels, and bays between the Middle Township mainland and our barrier island communities. The New Jersey Intracoastal Waterway (NJIWW) – a federal channel maintained by the USACE – bisects the SMIIL and is a major source of clean dredged sediment being used for projects. TWI sits at the center of the laboratory's significant area of publicly managed lands (Cape May Wetlands Wildlife Management Area), provides an ideal base of operations for scientists and practitioners, and maintains several research and monitoring programs that support SMIIL projects.

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Blocks of marsh collapsing due to boat wakes.

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Drone view of Wetlands Institute and SMIIL marshes.

Drone image of Great Flats nesting habitat.

Sunny day flooding is an indicator of sea level rise.

Fair weather flooding of tidal marsh near The Wetlands Institute.

To date, there have been eight proj-ects constructed here, and additional placements are slated for this fall. SMILL beneficial use projects include a wetland restoration project to raise marsh eleva-tion and fill expanding marsh pools over a 35-acre marsh island near Avalon. Two additional projects utilized dredged sand to build elevated nesting habitats for co-lonial beach-nesting bird species on Ring Island and Great Flats, two marsh islands near Stone Harbor. These include several state endangered and threatened species like black skimmers, common and least terns, and American oystercatchers that are losing suitable nesting habitat to flooding, development, and recreational use conflicts on area beaches. These birds like to nest in open, wind-swept sand with little vegetation, similar to their beach-front nesting areas like Stone Harbor Point.

After a few years, the sandy habitat loses some of the elevation and vegeta-tion starts to encroach, making it less de-sirable for these species. This provides an opportunity for refurbishment with new, clean sandy dredge material and gives the USACE the appropriate number of sites to match dredging needs to manage the shifting sand shoals that clog the channel near the Free Bridge and Nummy Island. The birds benefit, project design and planning is manageable and sustainable, costs are reduced, and the channel can be maintained. These projects have also ben-efited diamondback terrapins and horse-shoe crabs that quickly found the sites and use them for nesting.

In March 2020, SMIIL partners began an elevation enhancement project on Sturgeon Island, a marsh island owned by TWI in Great Sound. The island hosts a wading bird nesting colony that has been utilizing the shrubby habitat created by dredge material placement prior to the 1970s. Sturgeon Island, along with neigh-boring Gull Island, are the nesting sites for more than one-quarter of the state's wading birds. These include many of our favorite marsh birds like great and snowy egrets, little blue and tricolored herons, and glossy ibis.

Habitat degradation is re-sulting in decreased nesting success and both islands are drowning.

Sturgeon Island was a test bed for the development of several new dredg-ing and material placement tools that were then implemented in fall 2021, when work resumed at Sturgeon and Gull Islands.

The Gull Island project enhanced marsh resilience through elevation en-hancement, restored portions of the island that had gotten so low that marsh grass could no longer be found there, and created sandy marsh edge protec-tion features – an experimental approach to try to intercept breaking waves (pre-dominantly from boat wakes) from dam-aging the marsh edge. Nearly 65,000 cubic yards of clean dredged materi-als were used to enhance more than 30 acres of marsh, helping clear the shoal-ing that is affecting navigation in "the football field" area of the NJIWW behind Avalon.

To help monior the project effectiveness, SMIIL projects partners installed seven marsh and waterway research platforms. Each platform includes data collection instruments that will help researchers study waterways and wetlands, and monitor recent dredging and marsh restoration projects. If you see them, please be respectful of the research and stay clear of them.

These are exciting times for the ad-vancement of beneficial use and I am proud to be a co-project lead with my collaborators at the New Jersey Depart-ment of Environmental Protection and USACE.

SMIIL is addressing the seminal issue of our time and is nationally recog-nized as helping to lead development of these important concepts. The Wet-lands Institute is extremely pleased to take on a leadership role studying, pre-serving, and conserving these marshes and coastal ecosystems now and well into the future.

To learn more, visit wetlandsinstitute.org/smiil or https://www.nap.usace.army.mil/Missions/Civil-Works/Coastal-Dredging-Beneficial-Use/