



NORTH
CAROLINA



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NC Sentinel Site Cooperative

Greetings, partners and stakeholders!

The North Carolina Sentinel Site Cooperative (NCSSC) was established in 2012 as part of a [National Oceanic and Atmospheric Administration \(NOAA\) effort](#) to provide coastal communities and resource managers with information on the potential impacts of sea level rise on coastal habitats and communities.

NCSSC/NC Sea Grant Graduate Fellowship

Reminder: Applications are due June 14. See more information [here](#).

Contact NCSSC coordinator [Sarah Spiegler](#) if you have articles or events that you would like to include in the next quarterly issue.

Previous NCSSC quarterly newsletters are available on the [N.C. Department of Environmental Quality's](#) web site.

Research and Updates from the NCSSC



Dunes at Fort Macon State Park. Photo by Sarah Spiegler.

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Dune Morphology and Offshore Sand Research on the Outer Banks

Ian Conery, a Ph.D. student in the Eastern Carolina University (ECU) Department of Coastal Studies and an intern with the U.S. Army Corps of Engineers (USACE) Pathways program, is conducting research on the dynamics of beach morphology, or morphodynamics, and offshore sand resources in North Carolina.

Conery's dissertation work incorporates geosciences, economics and policy to develop a comprehensive assessment of two contrasting coastal sites on the Outer Banks. The goal of his research is to create an integrative modeling framework; provide a better understanding of beach and dune morphology under human and natural influences; and inform policy and management decisions.



Ian Conery stands in front of a dramatic scarp following a July 2018 erosion event at his study site in Nags Head. Photo courtesy of Ian Conery.

This work, supported in part by the U.S. Bureau of Ocean Energy Management (BOEM) and the USACE, has three main focal areas:

1. Analyzing beach and dune landscape changes at two Outer Banks sites over time;
2. Locating and cataloging offshore sand resources along North Carolina's Outer Continental Shelf that are available for prospective beach nourishment projects; and
3. Examining the economics of local nourishment funding and decision-making in the face of coastal change.

Conery is studying the morphology of an undeveloped, unmanaged stretch of beach at the USACE Research Pier in Duck and comparing it to a developed, nourished section in the nearby town of Nags Head. He uses remote sensing to detect and record large and small-scale changes to the dune systems at both sites across the same timescale.

By comparing the natural site to a human-managed system, Conery hopes to identify ways that management decisions are influencing the natural forces of change. Conery has worked with BOEM to analyze existing and newly collected offshore sand data to create an inventory of the resource along the entire North Carolina coast. The quantity, quality and accessibility of offshore sand resources are critical considerations in determining the feasibility and cost of future beach nourishment.

Conery is working under the mentorship of J.P. Walsh, now at the University of Rhode Island, and Reide Corbett, dean of ECU Integrated Coastal Programs and executive director of the Coastal Studies Institute.



Battleship North Carolina: Living with Water



Aerial view at high tide of the flooded parking lot at the Battleship North Carolina. The Cape Fear River and downtown Wilmington are in the background. Photo by Battleship North Carolina.

Just across the Cape Fear River from downtown Wilmington floats the [USS North Carolina](#), a former World War II battleship and now a memorial to veterans and the 11,000 North Carolinians who died during the war. Dedicated as a memorial in 1962, the battleship is no stranger to the impacts of extreme weather events and flooding. The vessel and its facilities faced hurricanes Matthew (2016) and Florence (2018) and have endured regular flooding since their dedication. The parking lot area adjacent to the southern shoreline has been experiencing [nuisance flooding](#) with increasing frequency. In fact, the battleship and surrounding site have seen more flood-stage events in the past decade than in the previous 60 years.

Capt. Terry Bragg, the executive director of the battleship and a retired Navy captain after 30 years of service, and his assistant director, Lt. Cmdr. Chris Vargo, are committed to protecting the memorial, which annually receives 300,000 visitors. Bragg and Vargo teamed up with engineers at Moffatt & Nichol and scientists at NOAA National Centers for Coastal Ocean Science (NCCOS) to think about how to address flooding and accessibility challenges.



Photo by Battleship North Carolina.

They reached the conclusion that instead of fighting the water, they should learn to live with it. From that discussion came the “Living with Water Master Plan.”

The partners in this project are currently seeking funding to implement the plan, which will replace the site's hardened shoreline with 800 feet of a restored living shoreline. It will also convert a flood-prone section of the paved parking area with two acres of tidal marsh habitat. Once completed, this ecosystem-based approach will provide habitat, storm-water filtration and flood water storage

functions. The site will also serve as a model for “living with water” in flood-prone areas and as an “outdoor classroom” to educate visitors about the benefits of natural approaches to shoreline stabilization.



Existing condition of the shoreline at low tide. The Living with Water Master Plan includes restoring this shoreline by removing rip rap and creating a living shoreline using native tidal wetland plants. Photo by Battleship North Carolina.

NOAA NCCOS scientists are providing site-specific analyses of water level, elevation and vegetation necessary for the living shoreline design and will also implement a long-term monitoring plan to evaluate changes at the site. There is currently very little data on the development of living shorelines in brackish settings in North Carolina.

Once implemented, the Living with Water Master Plan will better prepare the Battleship North Carolina for future weather and sea level rise challenges. This effort, in turn, supports the Battleship’s mission to honor veterans and those who died during WWII, while also supporting tourism and the Wilmington area economy.

Please contact [Jenny Davis](#) or [Dawn York](#) for more information.

Newest NCSSC Management Team Member Speaks at Resilience Workshop

The NCSSC is pleased to welcome Reide Corbett, dean of [ECU Integrated Coastal Programs](#) and executive director of the [Coastal Studies Institute](#), as the newest member of the NCSSC core management team.

With the expansion of the NCSSC to the 20 N.C. coastal counties and Jones and Martin counties, Corbett will help represent the northern region.

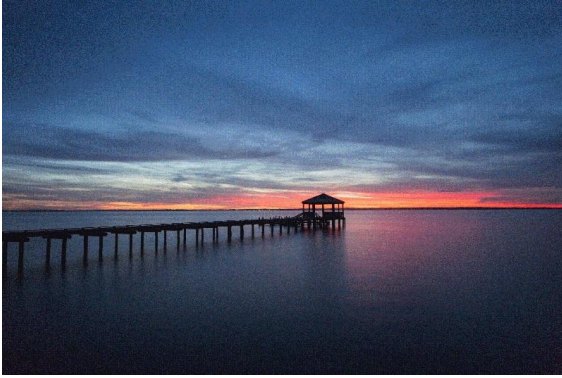
The NCSSC core management team is made up of representatives from federal, state and local agencies, as well as non-profits and universities. These include NOAA’s National Ocean Service and National Weather Service, the N.C. Division of Coastal Management, the Town of Jacksonville, SECOORA, North Carolina Sea Grant, Duke University Marine Lab, and the University of North Carolina at Chapel Hill’s Institute for Marine Sciences.



On May 2, Corbett spoke at the [Northeast N.C. coastal resilience workshop](#) in Elizabeth City, hosted by the N.C. Division of Coastal Management and intended for local government staff. Corbett gave an overview of how the low-lying geology and dynamic setting of the N.C. coast make it vulnerable to coastal hazards. He also spoke about the impacts that climate change, sea level rise and a growing population will have on coastal North Carolina. Photo by Sarah Spiegler.

Nags Head Featured in US Climate Resilience Toolkit and on Climate.gov

The Town of Nags Head in the Outer Banks is featured nationally in the [U.S. Climate Resilience](#)



[Toolkit](#) and on [Climate.gov](#) for its efforts to make the town more resilient to coastal hazards, including sea level rise. The Toolkit, a federal inter-agency initiative, is a website that offers tools, information and subject matter expertise to help people build climate resilience.

Photo courtesy of Holly White.

The Nags Head [case study](#) in the Toolkit describes how the town used a process called [Vulnerability Consequences and Adaptation Planning Scenarios](#) (VCAPS) to help community members better understand the town's vulnerabilities to coastal hazards. Jessica Whitehead, formerly the N.C. Sea Grant communities hazards adaptation specialist, worked with Nags Heads town staff, including town planner Holly White, to lead the VCAPS process in 2015.

Former NCSSC coordinator Jennifer Dorton and current coordinator Sarah Spiegler partnered with Whitehead and White to develop this case study for the Toolkit.

New Streamlined Permit for Living Shorelines

A general permit for marsh sills, a type of "living shoreline," is now available to people in coastal North Carolina who want to stabilize estuarine shorelines using natural materials. The N.C. Coastal Resources Commission approved the general permit in April, allowing the N.C. Division of Coastal Management to issue general permits for marsh sills without a case-by-case federal review.

Read more from the N.C. Division of Coastal Management [here](#).



Marsh sill at the N.C. Aquarium at Pine Knoll Shores. Photo by Carolyn Currin.

Upcoming Events

[North Carolina Coastal Resilience Summit](#), Havelock

- June 11 to 12 at Havelock Tourist and Event Center

SECOORA workshop: [Data Access for the Southeast U.S. Coasts and Oceans](#), Morehead City

- June 20 at NC State University's Center for Marine Sciences and Technology

NOAA Office for Coastal Management training: [Social Science Basics for Coastal Managers](#), Beaufort

- July 11 at the NOAA Beaufort Lab

The NOAA Sentinel Site Program leverages existing research and monitoring resources to ensure resilient coastal communities and ecosystems in the face of changing conditions. The program's place-based approach focuses on issues of local, regional and national significance that impact habitats and species managed by NOAA and surrounding coastal communities.