



An Oyster Catcher installed at Carrot Island. Photo credit: Rachel Gittman

## Oyster-based Natural and Nature-based Infrastructure Projects: Beaufort, North Carolina

### Project Overview

This project was located at the Carrot Island marshes within the Rachel Carson National Estuarine Research Reserve (Beaufort, North Carolina, USA; 3442012.9600 N, 7637033.9600 W). Dr. Gittman's team assessed the relative success of Oyster Catcher and shell bag substrates, piloted the use of a novel biodegradable substrate consisting of concrete and burlap (an Oyster Catcher), and measured their effectiveness in creating habitat and providing structural integrity in a high-energy wave environment compared to traditional oyster shell bags. The team analyzed the structural stability, as well as oyster and ecosystem function, in restoration projects, and assessed both high-energy ramp shorelines and low-energy creeks at Carrot Island. They also measured taxonomic complexity and oyster recruitment in newly created reefs constructed out of novel Oyster Catcher substrate and oyster shell. Information collected included erosion rates and local populations of oysters.

### Key Takeaways

- Assessing the ecological function of smaller-scale pilot projects can inform the design of larger-scale projects.
- Parasites are a promising tool for quantifying biodiversity and ecosystem health.
- Monitoring is important, but funding for monitoring is rare. Most grants for practitioners don't include or allow for monitoring in the budget beyond pre/post-construction.

### Project Context

Historically, bags of oyster shells have been used as stabilization structures and to promote natural oyster recruitment, but these bags could be displaced during storms. Furthermore, the height of the structures that are often used are not ideal for habitat. The North Carolina barrier islands, where this study takes place, face an increasing tidal range and high levels of ambient erosion.

**Kathleen M. Fallon, Ph.D.**

*Sr. Coastal Processes and Hazards Specialist* | email: [kmf228@cornell.edu](mailto:kmf228@cornell.edu) | 631-824-4746

This fact sheet is a product resulting from the U.S. Coastal Research Program's Translating Coastal Research to Application, funded under award NOAA-OAR-SG-2022-2007298 from the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce to Cornell University on behalf of New York Sea Grant.

December 2025



## Results

- The Oyster Catcher structures recruited and supported adult oyster populations and facilitated vertical and horizontal oyster reef growth during the study period.
- While traditional shell bags were not as effective for shoreline erosion, they promoted higher taxa richness than Oyster Catchers.

## Implications for Practice

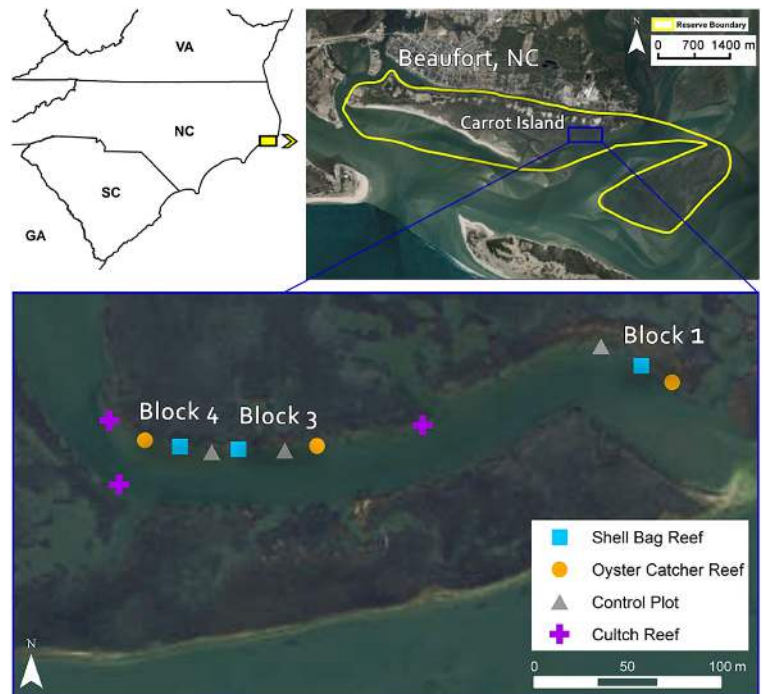
The results of this study suggest that novel biodegradable substrates can serve as viable habitat for oysters and associated fauna. Future research should focus on understanding the long-term performance of novel substrates, particularly under changing environmental conditions.

## Featured Researcher: Dr. Rachel K. Gittman

Dr. Rachel K. Gittman currently serves as an Associate Professor in the Department of Biology and is jointly appointed in the Coastal Studies Institute at East Carolina University. In 2020, Gittman received funding from the U.S. Coastal Research Program for “Evaluating the Coastal Protection and Ecological Co-Benefits of Novel Marsh-Oyster Restoration Approaches,” and presently works with a team of researchers aiming to develop an evidence map for the performance of nature-based solutions in biogenic, shallow ecosystems.

## Project Funding & Partners

- East Carolina University
- UNC Institute of Marine Sciences
- NSF
- NOAA
- N.C. Coastal Reserve and National Estuarine Research Reserve
- North Carolina Coastal Federation
- U.S. Fish and Wildlife Service



The Rachel Carson National Estuarine Research Reserve, Beaufort, NC, and sample area showing the experimental design within each of the three blocks. Reserve boundaries are outlined in yellow.

Photo credit: N.C. Coastal Reserve and National Estuarine Research Reserve

## Relevant Links

What evidence exists on the performance of nature-based solutions interventions for coastal protection in biogenic, shallow ecosystems? A systematic map protocol. <https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/s13750-023-00303-4#Sec25>



**About SRIJB** (<https://srijb.org/>): The SRIJB is a CUNY-wide institute created through a partnership amongst the National Park Service, the City of New York, and the City University of New York (CUNY). Our mission is to produce integrated knowledge that increases biodiversity, well-being, and adaptive capacity in coastal communities and waters surrounding Jamaica Bay and New York City. The Institute is hosted and supported by Brooklyn College and works closely with member organizations including NY Sea Grant, the Jamaica Bay Rockaway Parks Conservancy, and the Jamaica Bay Ecowatchers.

**New York Sea Grant** (NYSG) ([www.nyseagrant.org](http://www.nyseagrant.org)) is a partnership program of the State University of New York, Cornell University, and the National Oceanic and Atmospheric Administration that delivers science-based solutions for environmental stewardship, economic vitality, and resilience across New York’s Marine and Great Lakes regions.