



# Collaborative Research to Manage Stormwater Impacts on Coastal Reserves

## Overview

Stormwater that discharges into coastal waters has negative impacts on human and ecosystem health. This runoff often results in elevated levels of bacteria, viruses, nutrients, sediment, and turbidity, which can lead to fishing and swimming closures, illnesses, and negative impacts on coastal ecosystems. The Rachel Carson Reserve is a component of the North Carolina National Estuarine Research Reserve and includes a series of islands and surrounding waters adjacent to the town of Beaufort, North Carolina. Beaufort is a historic coastal town experiencing rapidly increasing development but lagging in stormwater and wastewater infrastructure. Recent research on stormwater outfalls in North Carolina, including those discharging to the Rachel Carson Reserve, shows dramatic delivery of contaminants during storm events. However, most decision makers and stakeholders concerned with water quality are unprepared to address long-term water quality issues related to stormwater discharge.

This project will 1) quantify pathogens, nutrients, and sediment delivery to the Rachel Carson Reserve; 2) create predictive models for shellfish and recreational waters in the North Carolina Reserve by using this information, along with decades of historical data; 3) engage stakeholders and end users to prioritize management options; and 4) engage coastal decision makers, community members, K-12 students, and teachers in hands-on education on stormwater runoff and its impacts.

### Project Location

Rachel Carson Reserve, North Carolina National Estuarine Research Reserve

### Project Duration

November 2016 to October 2019

### Project Lead

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### Project Type

Collaborative Research – generating science that informs decisions

### Project Partners

- Rachel Carson Reserve, North Carolina National Estuarine Research Reserve
- Town of Beaufort, North Carolina
- University of North Carolina at Chapel Hill, Institute of Marine Sciences

## Anticipated Benefits

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- The Rachel Carson Reserve will benefit from new, collaboratively designed predictive modeling.
- Stormwater mitigation strategies will include rainfall-based advisories, stormwater discharge reduction, and best management practices.
- Coastal decision makers and community members will be engaged in and more educated on stormwater impacts.
- Teachers, students, and professionals will be more knowledgeable about stormwater impacts and water quality assessment techniques.

## Project Approach

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The project team worked with partners and stakeholders to select seven sampling locations within the North Carolina Reserve. These sites include a control site located further away from the town of Beaufort, sites that are known sources of major stormwater discharge, and sites that are recreationally important. Water quality data will be collected from these sites during storms and dry weather to determine the quantity, magnitude, and sources of stormwater contaminants in the reserve, based on storm size, duration, and intensity. These data, along with historical records, will be used to develop predictive models that help managers make recreational and shellfish harvesting management decisions and protect public health. The project team will also engage the academic community, public and K-12 students and teachers, in the development of a suite of educational and outreach products that include outreach events, curriculum, and lesson plans. The capstone event of the project will be a Stormwater Summit that will bring together coastal decision makers to highlight why stormwater is a problem and demonstrate how the project's outputs can be applied to develop management strategies.

## Targeted End Users and Anticipated Products

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- Managers and decision makers will have access to detailed stormwater data and information to help them make critical management and public health notification decisions.
- Predictive models for both recreational waters and shellfish harvesting will provide coastal managers with real-time water quality estimates.
- Training, curriculum and lesson plans, and field trips will give educators the skill sets and tools needed to educate students and community members on stormwater impacts.

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### About the Science Collaborative

*The National Estuarine Research Reserve System's Science Collaborative supports collaborative research that addresses coastal management problems important to the reserves. The Science Collaborative is managed by the University of Michigan's Water Center through a cooperative agreement with the National Oceanic and Atmospheric Administration (NOAA). Funding for the research reserves and this program comes from NOAA. Learn more at [coast.noaa.gov/nerrs](http://coast.noaa.gov/nerrs) or [graham.umich.edu/water/nerrs](http://graham.umich.edu/water/nerrs).*