

Dataset Description: Water quality measurements for stormwater outfalls into Taylor's Creek, Beaufort NC

This document provides detailed information about three datasets that were generated through the 2016 - 2020 collaborative research project, *Collaborative Research to Manage Stormwater Impacts on Coastal Reserves*. The project was supported by the National Estuarine Research Reserve System (NERRS) Science Collaborative, which is funded by the National Oceanic and Atmospheric Administration. All Science Collaborative supported projects that collect new data adhere to federal data sharing and archiving requirements.

Data access and archival: The datasets for this project have been archived with the NERRS Centralized Data Management Office. During 2021, the datasets can be requested by contacting the project lead directly. Starting in 2022, the datasets can be downloaded by potential users after they complete a data request form on the Science Collaborative project page: <http://www.nerrssciencecollaborative.org/project/Noble16>.

List of project datasets

Two datasets are described in this document

1. Water chemistry and nutrient data for storms and dry weather for six stormwater outfalls in Beaufort, NC
2. Microbiological water quality database for grab and automated samples from outfalls in Beaufort, NC

About the Associated Project

Project title: Collaborative Research to Manage Stormwater Impacts on Coastal Reserves

Name of reserve(s) involved in the project: North Carolina NERR

Project period: November 2016 – September 2020

Science Collaborative project page: www.nerrssciencecollaborative.org/project/Noble16

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Purpose

Stormwater outfalls that discharge into coastal waters can have detrimental impacts on human and ecosystem health worldwide. Elevated levels of pathogenic bacteria, viruses, nutrients, sediment, and turbidity are associated with coastal stormwater outfalls, leading to fishing and swimming closures, illness, and negative impacts on estuarine ecosystems. The Rachel Carson Reserve, a component of the North Carolina National Estuarine Research Reserve, includes a series of islands

and surrounding waters proximal to the Town of Beaufort, NC, a historic coastal town experiencing a rapid increase in development while lagging behind in stormwater and wastewater infrastructure. This project conducted applied research using a multi-faceted collaborative approach that directly engaged the Town of Beaufort in an array of efforts to understand the impacts of stormwater discharge.

Abstract

The project team worked to quantify stormwater discharge inputs such as fecal indicator bacteria, nutrients, sources of fecal contamination, and sediment delivery to the receiving water system. The project team used the quantitative information generated to develop a predictive model of the impact of tidal inundation on coastal systems, and an understanding of the applicability of coliphage-based quantification as a tool for understanding fecal indicator viruses. Through storm sampling, the team identified important aspects of water quality monitoring and nutrient dynamics that are valuable for the advancement of related research going forward. The application of the information generated will help tidally-influenced coastal plain towns manage water quality issues in the face of climate change.

About the Project Dataset(s)

1. Water chemistry and nutrient data for storms and dry weather for six stormwater outfalls in Beaufort, NC

General description of data:

Data were collected to assess water quality in Taylor's Creek adjacent to the Rachel Carson Estuarine Research Reserve, specifically to investigate the contribution of stormwater runoff from two urban sub-watersheds in Beaufort, NC. Measurements were taken under a range of weather and tidal conditions. In addition to grab samples collected every two weeks, automated water samplers were employed to obtain higher resolution of water quality parameters during rain events. Additional measurements were taken the day following rain events (> 1 in.) in different seasons.

More about the data:

- Parameters measured: salinity, total suspended solids (TSS), dissolved inorganic nutrients (including nitrate-nitrite, ammonium, orthophosphate), total dissolved nitrogen and dissolved organic nitrogen (by difference). Approximate distance from the outfall and precipitation amount and duration are also included for each grab sample.
- Sampling in August 2018 included two post rain events, one of which included additional samples collected three days after event at approximately 1 and 5m from outfalls to investigate storm plume attenuation.
- Hydrologic bounds to water quality were characterized by high frequency (30 minute) water level and velocity measurements at watershed stormwater outfalls subjected to tidal

influence. During high tides, sea water regularly flows up into stormwater pipes. Instruments were not set up to measure this reverse flow and so velocity is recorded as “0” during these time periods. Because water level and water velocity data can be challenging to interpret, these hydrologic data variables are not included in the datasets available for download, but can be requested by contacting the project lead directly.

- The timeframe and measurements included in this dataset file (**BFT WQ database 2.xlsx**) overlap with the second dataset presented in this dataset description (**BFTMicrobialWQDatabasev1.xlsx**).

Search keywords: Stormwater, water quality, coastal watershed, urban

Data collection period:

Continuous (automated) monitoring using an ISCO-based autosampler occurred from June 2017 to September 2018. Since September 2018, the automated system was dismantled and grab samples were collected approximately every two weeks through March 2020.

Post-rain event data were collected at low tide, seasonally in January, April, August and November of 2018 on the day after precipitation events that exceeded 1 inch of rainfall.

Geographic extent:

Figure 1 illustrates the general locations of sites in Beaufort, NC. Latitude/longitude for each site are provided in the database.

File format:

Database is an excel file **BFT WQ database 2.xlsx**

Metadata (column parameter descriptions) are in the first sheet of excel file

NobleNERRSFinalMetadata-BFT metadata.xlsx

Data Access and Archival:

During 2021, this dataset can be accessed by contacting the project lead directly and discussing potential applications of the data. Beginning in 2022, potential users will be able to access the data after completing a data request form on the Science Collaborative project page:

<http://www.nerrssciencecollaborative.org/project/Noble16>.

Maps and Schematics for Data Collection

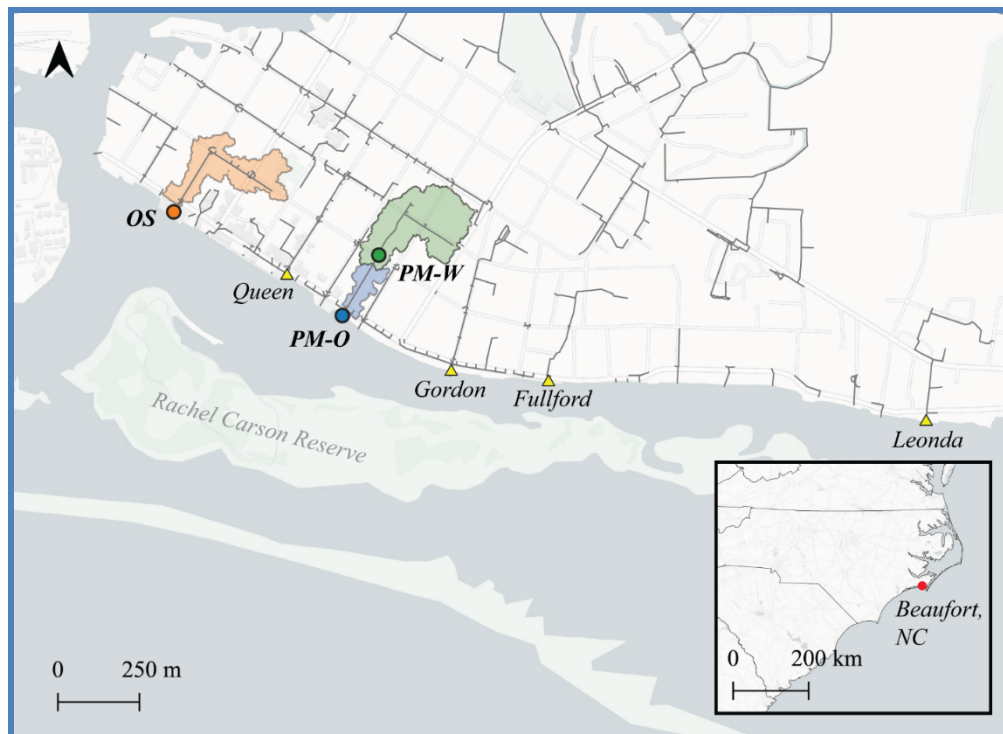


Figure 1. Sampling locations within Beaufort, NC. Orange Street (OS) and Pollock/Marsh Watershed (PM-W) are sub-watersheds with stormwater outfalls into Taylor's Creek. Yellow triangles show the locations of additional outfall sites sampled seasonally, post-storms.

2. Microbiological water quality database for grab and automated samples from stormwater outfalls in Beaufort, NC

General description of data:

Data were collected to assess water quality in Taylor's Creek adjacent to the Rachel Carson Estuarine Research Reserve, specifically to investigate the contribution of stormwater runoff from two urban sub-watersheds in Beaufort, NC. Both automated and grab sampling approaches were conducted over a period of 4 years to capture a range of events including dry, wet, extreme, and tidal inundation. In addition to grab samples collected every two weeks, automated water samplers were employed to obtain higher resolution of water quality parameters during rain events and after.

Search keywords:

Stormwater, water quality, fecal contamination, fecal source, microbial source tracking, coastal watershed,

More about the data:

Data collected include:

- **Microbiology parameters:** Total Coliform, E. coli, Enterococcus, Enterococcus via qPCR, BacHum fecal marker, HF183 human fecal marker, Verified tidal height: meter (m). Microbiology concentrations are reported as log10 transformed.
- **Meteorological parameters:** Wind speed (meters/second), wind direction (degrees) and wind gusts (meters/second), Water Temp: Celsius (C), Air Temp: Celsius (C), Barometric Pressure: millibars (mb), Water level and velocity: meter (m) and meter/second (m/s), Salinity: parts per thousand (ppt)
- **Water quality parameters:** Total suspended solids (TSS): milligrams/liter (mg/L), Nitrate+nitrite (NOx), ammonium (NH4), orthophosphate (PO4), total dissolved nitrogen (TN) and dissolved organic nitrogen, (ON): micro moles per liter (uM),
- **Precipitation event:** inches (in.), Dissolved oxygen (percent), conductivity (microsiemens per centimeter), turbidity (nephelometric turbidity units), salinity (parts per thousand).

Note: This dataset includes water chemistry data that is included in the first dataset described in this dataset description as well as additional microbiology parameters.

Data collection period:

July, 2017 to November 2019 with extensive data collection completed for the purpose of microbial analysis during major events.

Geographic extent:

Figure 1 illustrates the general locations of sites in Beaufort, NC. Latitude/longitude for each site are provided in the database.

File format:

Database is in excel file **BFTMicrobialWQDatabasev1.xlsx**

Metadata (column parameter descriptions) are in the second sheet of excel file

NobleNERRSFinalMetadata-BFT metadata.xlsx

Data Access and Archival:

During 2021, this dataset can be accessed by contacting the project lead directly and discussing potential applications of the data. Beginning in 2022, potential users will be able to access the data after completing a data request form on the Science Collaborative project page:

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