

Dataset: Evaluation of living shoreline techniques in different settings in South Carolina

This document provides detailed information about three datasets that were generated through a 2015-2019 collaborative research project titled *Evaluating Living Shorelines to Inform Regulatory Decision-Making in South Carolina*. This document also provides information [about the project](#). 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. ***Requests to view or use this data should be directed to the project team as explained below.***

Three related datasets are described in this document:

1. Monitoring data for pre-existing oyster-based shoreline sites
2. Performance data for new experimental shoreline sites
3. Spatial and elevation geodatabase for living shoreline sites

About the Associated Project

Project title: Evaluating Living Shorelines to Inform Regulatory Decision-Making in South Carolina

Name of reserve(s) involved in the project: ACE Basin and North Inlet-Winyah Bay National Estuarine Research Reserves

Project Period: September 1, 2015 – May 31, 2019

Science Collaborative project page:

<http://www.nerrssciencecollaborative.org/project/Sanger15>

Project lead and contact information:

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Project abstract: Living shorelines have been a part of the South Carolina Department of Natural Resources' coastal management, conservation, and education strategies for over 20 years, but permitting projects adjacent to private land has been difficult. Based on property owners' increasing interest in living shorelines and the benefits to the coastal environment, the South Carolina Department of Health and Environmental Control is pursuing a regulatory pathway to easily and effectively permit them. To ensure that the resulting regulations and project standards developed are based on sound science, the state

partnered with ACE Basin and North Inlet-Winyah Bay National Estuarine Research Reserves to conduct a multi-year project to evaluate the effectiveness of a variety of greener living shoreline technologies under a number of coastal environmental conditions. This collaborative research effort included monitoring older, pre-existing living shorelines, as well as installing and monitoring new and previously used technologies under a range of environmental conditions. The results and guidance are intended to provide agency partners with the science-based information for creating a regulatory pathway and developing project standards for living shorelines in South Carolina.

About Each Dataset

1. Monitoring data for pre-existing oyster-based shoreline sites

General description of data:

Over the last two decades, multiple organizations have implemented oyster-based living shoreline installations in South Carolina. A subset of these previously constructed living shorelines was assessed to better understand their long-term performance in the context of shoreline stabilization. This dataset includes monitoring results from 62 pre-existing living shoreline projects that used different techniques to support the development of oyster reefs. The reefs were distributed across 29 sites of varying shoreline geomorphologies, salinities, and sediment types, and were monitored for a variety of site characteristics and performance metrics. The preexisting reefs were constructed in 2001-2016, independent of the 2015-2019 Science Collaborative project, and the newly collected monitoring data from these reefs provide insight into reef performance over longer time scales, in different physical settings, and, in a few cases, for reef materials not included among the experimental treatments used in the new experimental installations. Figure 1 provides a map of reef sites monitored.

More about the data:

- These existing reef installations used bagged oyster shell, repurposed crab trap reefs, and oyster castle reefs, and ranged from newly built to over 15 years old.
- The projects and a reference area adjacent to each pre-existing site were monitored once in 2016 or 2017.
- In addition to spatial point data, data include: measurements of bank width at low tide; distance to the nearest wild oysters; substrate firmness (determined from the sink depth of a dropped cinder block); escarpment measurements (if an escarpment was present); composition of surface sediment (% silt/clay); % oyster cover on oyster-based treatments; marsh plant taxa present; plant density data along transects extending from the upslope edge of each treatment to the marsh edge; and a single set of photos of each treatment.
- Figure 2 illustrates where measurements were taken at each pre-existing reef and adjacent reference area.

2. Dataset name: Performance data for new experimental shoreline sites

General description of data:

This dataset includes pre-installation and post-installation monitoring data for 16 experimental living shoreline sites spread along the South Carolina coast (Figure 3). Each site consists of a stretch of intertidal shoreline on a coastal waterway and include both experimental treatment plots and a negative control area. Monitoring encompassed physical attributes of the bank and sediment, biological attributes of the adjacent marsh and the condition of the treatment material over time.

More about the data:

- Living shoreline treatment sites were established over several years: 11 sites were established in May-August 2016, 2 new sites were installed in February 2017, and 3 were established in August 2017. The sites were selected to be representative of typical shoreline conditions occurring in coastal South Carolina.
- Each site includes between two and six experimental treatment plots and a negative control plot (unmodified). Treatments include bagged oyster shell, manufactured wire reefs, coir logs, and Curlex® Blocs.
- In addition to spatial point data, data include: measurements of bank width at low tide; distance to the nearest wild oysters; substrate firmness (determined from the sink depth of a dropped cinder block); escarpment measurements (if an escarpment is present); sediment accretion monitoring (distance from top of a PVC pole to sediment surface); composition of surface sediment (% silt/clay); % oyster cover on oyster-based treatments (bagged oyster shell and manufactured wire reefs); marsh plant taxa present; plant density data along transects extending from the upslope edge of each treatment to the marsh edge (to enable detection of marsh expansion); and repeated fixed point photos of each treatment.
- The project team collected pre-installation and immediate post-installation monitoring data for all 16 installations, post-Hurricane Matthew monitoring data (post-storm baseline) for all of the 2016 installations, 1-year post installation monitoring data for all sites, 2-year post-installation monitoring data for all reefs installed in 2016 that survived intact through summer 2018, and post-Spartina planting monitoring for 5 sites.
- The schematic below (Figure 4) indicates where parameters were measured at each treatment and negative control area.

3. Dataset name: Spatial and elevation geodatabase for living shoreline sites

General description of data:

This geodatabase was designed to help analyze changes in position and elevation of key features around living shorelines to help determine the relative success of various types of living shoreline materials. Data included horizontal position and elevation data at specific locations at living shoreline installation at various times. These data are ideally viewed and analyzed in Geographic Information System (GIS) software. Data from the two tabular datasets described above can be joined to the point geo-dataset using standard relational database methods to enable different types of analyses.

More about the data:

- The geodatabase includes latitude, longitude, and elevation data at a series of locations, including treatment locations, elevations adjacent to the upslope and downslope edges of each treatment, elevations at the midslope-top of each treatment, and multiple points to indicate the location of the marsh edge.
- Spatial point data were collected using a survey-grade Trimble R8 Global Navigation Satellite System (GNSS) RTK system.
- Additional details on field methods, datums and coordinate systems are outlined in the metadata.

Information about All Three Datasets

Data collection period: May 23, 2016 to September 24, 2018.

Geographic extent: Study sites were located all along the South Carolina coast (see Figures 1 and 3).

File format: The existing and new experimental monitoring data are maintained in MS Access databases. Metadata is included within each Access database for all parameters collected and calculated. The geodatabase is ideally viewed and analyzed in Geographic Information System (GIS) software. The geodatabase includes five separate tabular datasets containing narrative field notes and descriptions of data attribute classes. These tables each contain a unique field that can be linked to fields in the feature class dataset.

Data access and archival: Due to the complexity of the sample design and adaptive management that occurred during this project, these datasets will be available by request instead of posting as flat files on a website. People interested in viewing or using the data should contact the staff member listed below from the South Carolina Marine Resources Research Institute. Project staff will guide individuals to obtain the most useful set of data for their needs and will help users of the data fully understand how, when, where, and why each parameter was measured in order to prevent misinterpretation. All data will also be archived at the Centralized Data Management Office and access information is explained on the project webpage: www.nerrssciencecollaborative.org/project/Sanger15

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For data access requests:

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Maps and Schematics for Data Collection

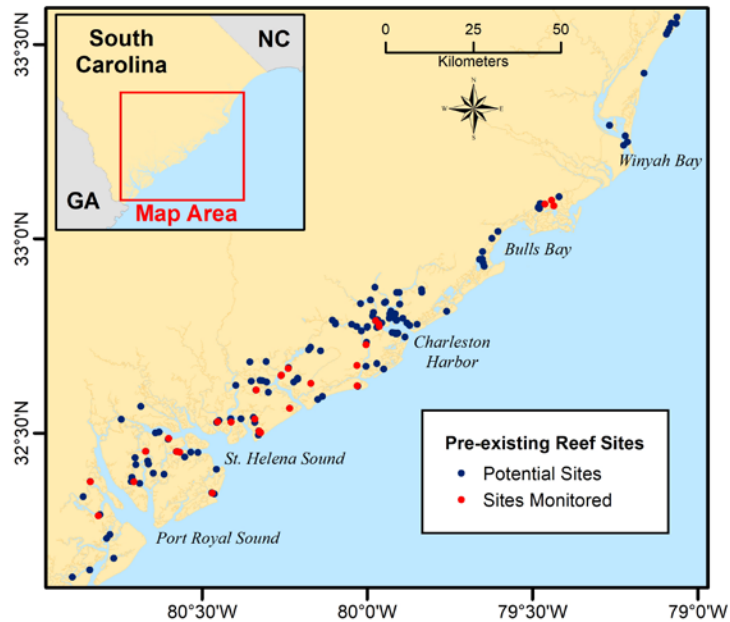


Figure 1. Map of existing South Carolina reef locations from 2001-2016 (blue and red symbols). A subset of reefs were selectively monitored for this project (red symbols), representing a range of reef ages (0 to 16 years).

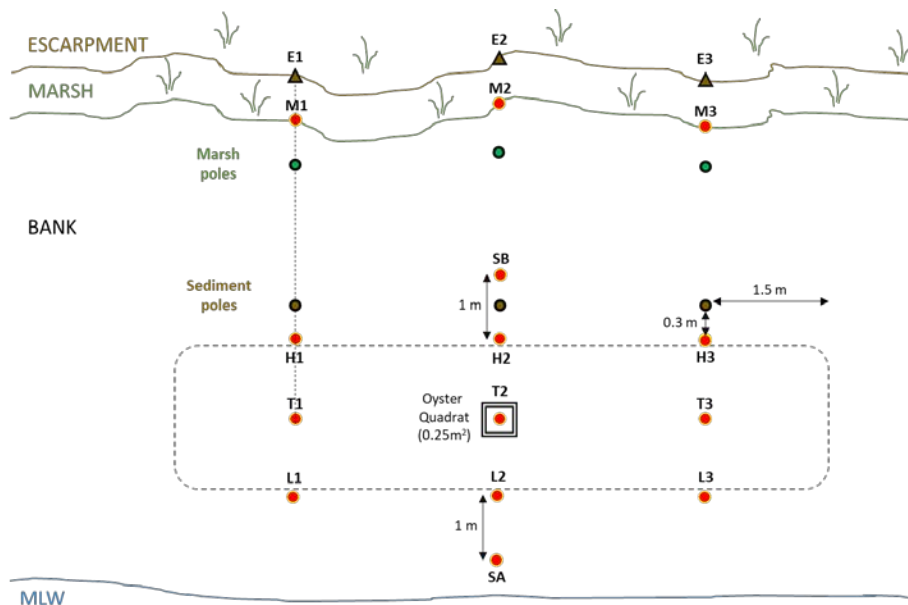


Figure 2. Diagram of a pre-existing reef treatment or reference plot (gray dashed line), indicating locations where samples or data were collected to assess site characteristics and living shoreline performance metrics. Temporary PVC sediment poles (brown points; 1 on the left, 2 in the center, and 3 on the right) and PVC marsh poles (green points) were used as reference points to identify locations of RTK GPS points (red points) and other field data collection; marsh escarpment height measurements (brown triangles); and oyster quadrat photo locations (taken at T1, T2, and T3). Sediment samples were collected adjacent to each sediment pole.

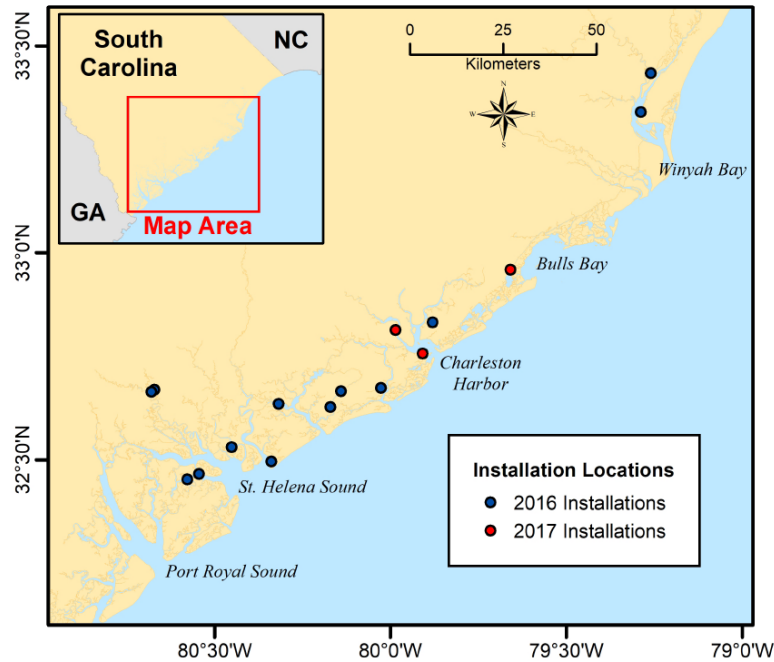


Figure 3. The 16 locations where experimental living shorelines were installed for this project.

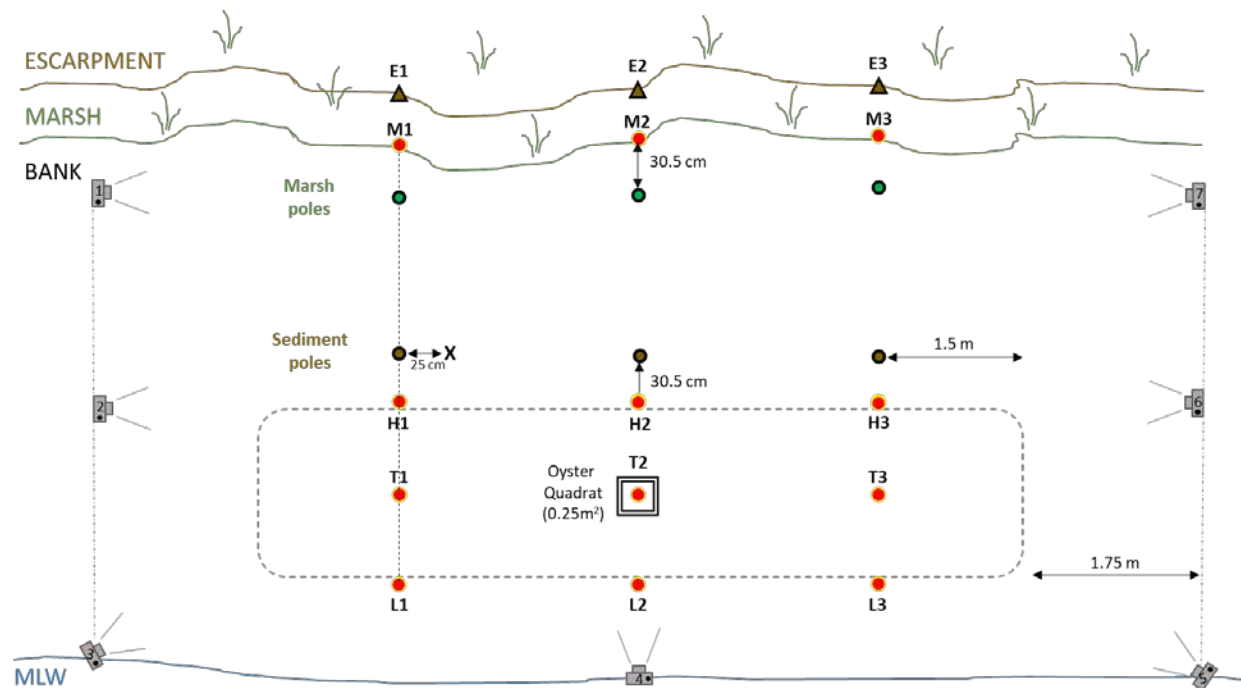


Figure 4. Diagram of an experimental treatment (gray dashed line); PVC sediment poles (brown points; 1 on the left, 2 in the middle, and 3 on the right) and PVC marsh poles (green points) used as reference points to identify locations for RTK GPS points (red points) and other field data collection; marsh escarpment height measurements (brown triangles), and oyster quadrat photo locations (taken at T1, T2, and T3); a representative sediment sample collection location ("X"; taken 25 cm to the left or right of each sediment pole); and fixed photo point locations (camera symbols).