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Ecological and physical performance data for plantings and offshore breakwaters at Weeks Bay National Estuarine Research Reserve, Alabama

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Dataset: Ecological and physical performance data for plantings and offshore breakwaters at Weeks Bay National Estuarine Research Reserve, Alabama

This document provides detailed information about a dataset that was generated through a 2015-2018 collaborative research project titled *End-user derived research to improve the effectiveness, sustainability, and prevalence of coastal restoration projects*. 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.

About the Dataset

Dataset name:

Ecological and physical performance data for plantings and offshore breakwaters at Weeks Bay National Estuarine Research Reserve, Alabama

Collection period:

January 2017

May 2017

August 2017

December 2017

March 2018

May 2018

September 2018

December 2018

February 2019

Geographic extent:

Data was collected along the eastern shore of Bon Secour Bay, located in the southeast corner of Mobile Bay, in the area known as “Swift Tract”. Swift Tract is a naturally eroding shoreline within the Weeks Bay National Estuarine Research Reserve.

General description of data:

The performance of different coastal restoration designs were measured at the Weeks Bay National Estuarine Research Reserve. More specifically, vegetation, fish, and environmental data were collected at plots with nursery grown plugs of vegetation and plots with natural marsh, both with and without offshore breakwaters. The data are made up of a series of datasets as follows:

- **Plant Percent Cover:** This dataset contains the percent of each experimental plot for each sampling period that is covered by a plant and indicates what plant species it is.

- Porewater nutrients: This dataset contains the porewater nutrient concentration of samples taken at two spots within each experimental unit at each sampling period along with several upland samples that were collected. The nutrients reported within this dataset include the concentrations of nitrogen oxides, phosphates, nitrogen dioxide, ammonium, nitrates, and total dissolved inorganic nitrogen.
- *Spartina alterniflora*_Biomass Regression Data: This dataset contains the lengths and masses of stems collected from the study site, but outside of the experimental plots. These data were used to derive a biomass regression that is used in the *Spartina alterniflora*_Biomass dataset.
- *Spartina alterniflora*_Biomass: This dataset contains the biomass data for stems measured within each experimental plot. The biomass was determined using stem heights (*Spartina alterniflora*_Stem Heights dataset) and a biomass regression (*Spartina alterniflora*_Biomass Regression Data dataset). That regression formula is used within the individual Stem Biomass cells.
- *Spartina alterniflora*_Patch Data: This dataset includes a variety of *Spartina alterniflora* patch data per section of shoreline including the number of patches, average patch area, and total patch area. These data were derived using RTK GPS technology and QGIS software, which generated the *Spartina alterniflora*_RTK Polygon Data dataset.
- *Spartina alterniflora*_Stem Heights: This dataset includes the height of all stems sampled within a 25cm x 25cm quadrat for each experimental plot. These data were then used to determine total plot biomass (*Spartina alterniflora*_Biomass dataset).
- *Spartina alterniflora*_RTK Polygon Data: This dataset contains the location data for all points used to create our *Spartina alterniflora* polygons in QGIS. These data used the WGS84/UTM zone 16N coordinate system. Data are separated into worksheets based on the sampling date in which it was collected.
- Faunal Abundance: This dataset includes the abundance data for our fish and invertebrate portion of the study. Data are separated into worksheets based on the capture method used.

More about the data:

- The project collected local *Spartina alterniflora* (SPAL) stem lengths and mass to derive a biomass regression (*Spartina alterniflora*_Biomass Regression Data dataset). Following, a quadrat was used at each sampling to collect SPAL stem heights (*Spartina alterniflora*_Stem Heights dataset) that were then used to determine the biomass (*Spartina alterniflora*_Biomass dataset) within each plot. Metadata records are provided for the initial SPAL stem lengths and mass combined. Metadata records are also provided for SPAL stem lengths and biomass separately.
- The project also created SPAL polygons using the *Spartina alterniflora*_RTK Polygon Data dataset. The RTK GPS generated a .csv file that was used in QGIS (an open source software) to create a map from which calculations were done. Metadata are provided separately for the .csv file and the summary data that was generated from QGIS.

- Other datasets generated from this project that have individual metadata records and were not used to generate any other datasets include: plant percent cover, porewater nutrients, and faunal abundance.

Data Quality Control / Quality Assurance Procedures:

All data have been manually checked by at least two people as they were transferred from hard to digital copy. Once digitized, they were checked by at least two people for errors.

Contact information:

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Data access and archival link:

<https://ir.library.msstate.edu/handle/11668/14869>

File format:

Excel spreadsheets

About the Associated Project

Project title:

End-user derived research to improve the effectiveness, sustainability, and prevalence of coastal restoration projects

Project lead and contact information:

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Name of reserve(s) involved in the project: Weeks Bay National Estuarine Research Reserve

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

Project abstract:

To restore the ecosystem services lost through coastal habitat degradation, restoration projects have been conducted. Most of these projects are associated with little to no monitoring and evaluations. Limited monitoring and evaluation prevents comparisons across designs to determine which are the most functional sustainable, and cost-effective. Additionally, information regarding the advantages of and how to perform restoration projects is currently limited. The combination of limited comparisons across restoration designs and the sparse information on how to conduct restoration projects significantly hinders the implementation of projects. We have collaborated with a team of researchers, environmental managers, stakeholders, and end-users to address some of these issues with restoration projects. For this project, we quantified the functionality, sustainability, and cost-effectiveness of several coastal restoration designs at the Weeks Bay National Estuarine Research Reserve. The designs compared plots planted with nursery grown plugs with plots comprised of standing natural marsh both with and without offshore breakwaters. Our study has found that offshore breakwaters enhanced natural plant growth, but not nursery grown plants. However, it is possible that this effect is time dependent as the positive effect on natural plant growth was seen beginning six years after breakwater installation while the nursery plants had only been planted two and a half years ago. Information gained from this research and the regulatory knowledge of our collaborative team have been combined with pre-existing literature to create user friendly outreach materials such as living shorelines two-pagers for homeowners, living shorelines permitting guides and workshops, and a living shorelines workshop for consultants, landscapers, and marine contractors. This research and outreach will improve the effectiveness and ease of implementation of coastal restoration projects.

Project links:

- Science Collaborative project page:
<http://www.nerrssciencecollaborative.org/project/Sparks15>
- Project record in national catalog:
<https://inport.nmfs.noaa.gov/inport/item/47706>