Dataset Description: Ecological Assessment Data for Living Shorelines in GTM Reserve, Florida

This document provides detailed information about four datasets that were generated through a 2015-2019 collaborative research project titled *Re-engineering Living Shorelines for High-Energy Coastal Environments.* 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Data access and archival: The datasets for this project have been archived with the NERRS Centralized Data Management Office and will be made publically available in fall 2020 through a request form accessible on this page: nerrssciencecollaborative.org/resource/living-shoreline-data-gtm-reserve Prior to fall 2020, individuals may reach out to the project lead to discuss potential applications and access to the data.

Four related datasets are described in this document:
1. Ecological data for living shorelines in GTM Reserve
2. Oyster data for living shorelines in GTM Reserve
3. Invertebrate data for living shorelines in GTM Reserve
4. Hydrodynamic data near living shorelines in GTM Reserve

About the Associated Project

Project title: Re-engineering Living Shorelines for High-Energy Coastal Environments
Name of reserve(s) involved in project: Guana Tolomato Matanzas National Estuarine Research Reserve
Project Period: January 2016 – September 2019
Science Collaborative project page:
http://www.nerrssciencecollaborative.org/project/Angelini15

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Project abstract:
Estuaries worldwide face an alarming loss of salt marsh and oyster reef, especially along high-energy shorelines where there is significant boat wake and wave action. Living shorelines, a form of natural bank stabilization, offer coastal managers a promising approach to dampen boat wake and wave stress, mitigate erosion, and restore oysters. However, typical living shoreline designs have been largely unsuccessful under high-energy conditions. This project tested a new hybrid method that integrates engineering and ecological approaches. The project's "gabion-break" design uses two lines of defense to reduce erosion along the marsh edge - porous wooden breakwalls placed in front of structures that will foster oyster growth. An in-depth study monitored boat wake and wave energy, oyster reef development, and salt marsh edge movement to evaluate the effectiveness of gabion-breaks in protecting and enhancing coastal habitat in areas with high boat traffic. The project team incorporated findings into training

activities for restoration practitioners and coastal managers and interpretive exhibits for reserve visitors.

Information about All Four Datasets

The collaborative research project *Re-engineering Living Shorelines for High-Energy Coastal Environments* conducted field research at six shoreline sites bordered on the landward edge by salt marsh habitat consisting mainly of smooth cordgrass, located in the Guana Tolomato Matanzas National Estuarine Research Reserve in northeast Florida. Along this portion of the Intracoastal Waterway, waves generated by boat wake are thought to be a primary driver of shoreline erosion.

At each of the six study sites, the project team installed experimental living shoreline treatments that involved two lines of defense to reduce erosion – (1) a semi-permeable breakwall made of wooden fence posts and tightly-packed tree branches, placed in front of (2) structures to foster oyster growth consisting of cages (gabions) filled with oyster shells or biodegradable BESE materials. Between November 2015 and June 2019, several physical and biological variables were routinely monitored to evaluate the performance of the living shoreline installations, measure their ability to dissipate the energy of incoming boat wakes, and track ecological changes.

Coordinates: Latitude Longitude

Site 1:	30.095868	-81.364308
Site 2:	30.081437	-81.365007
Site 3:	30.070747	-81.369638
Site 4:	30.056708	-81.369838
Site 5:	30.054407	-81.367689
Site 6:	30.039635	-81.363316

Coordinate System: WGS 1984

Map of experimental sites within Guana Tolomato Matanzas National Estuarine Research Reserve in northeast Florida, between Ponte Vedra Beach and St Augustine, FL

About Each Dataset

1. Ecological data for living shorelines in GTM Reserve

General description of the data: These data were collected to monitor possible ecological responses to the presence of breakwalls constructed to dissipate the erosional energy of incoming boat wakes. Six types of ecological data were collected:

- Shoreline data: Measurements of the proximity of the vegetated marsh edge to semi-permanent reference markers.
- Vegetation and invertebrates: Percent vegetation cover, stem counts of smooth cordgrass, number of mussels, snails, and crab burrows.
- Percent cover: Estimates of the percent cover of ground cover, including live oyster, shell hash (shells of dead oysters), root mat (exposed mats of *S. alterniflora*), peat, and sand cover classes.
- Wall heights: Measurements of the front and back sides of breakwall branches.
- Wall biofouling: Number of barnacles, live oysters, and estimated percent cover of algae on breakwall branches.
- Post biofouling: Number of barnacles, live oysters, and estimated percent cover of algae on fence posts.

Data collection period: November 2015 to June 2019

Geographic extent: Six shoreline sites located along the Intracoastal Waterway within the Guana Tolomato Matanzas National Estuarine Research Reserve in northeast Florida

File format: Excel spreadsheet (658 KB)

2. Oyster data for living shorelines in GTM Reserve

General description of the data: These data were collected to monitor possible effects of breakwalls on oyster and invertebrate communities that developed on experimental substrates placed behind the breakwalls. Two types of substrate were monitored and compared: gabions (shell-filled wire cages), and BESE-elements (organic, fully biodegradable substrates). Data were collected related to:

- Sediment location and depth
- Oyster percent cover
- Oyster vertical height, measured as the distance the oysters grew out beyond the gabion surface
- Oyster density and size
- Live oyster size frequency, measured for oysters growing within gabions
- Oyster size frequency and condition on BESE

Data collection period: November 2015 to June 2019

Geographic extent: Six shoreline sites located along the Intracoastal Waterway within the Guana Tolomato Matanzas National Estuarine Research Reserve in northeast Florida.

File format: Excel spreadsheet (525 KB)

3. Invertebrate data for living shorelines in GTM Reserve

General description of the data: These data were collected to monitor possible effects of breakwalls on invertebrate communities that developed within the wire-wrapped and oyster shell-filled gabions placed behind them. The number of invertebrates by species and invertebrate density within the gabions was monitored at six shoreline sites.

Data collection period: September 2017 to June 2019

Geographic extent: Six shoreline sites located along the Intracoastal Waterway within the Guana Tolomato Matanzas National Estuarine Research Reserve in northeast Florida.

File format: Excel spreadsheet (68 KB)

4. Hydrodynamics data near living shorelines in GTM Reserve

General description of the data: Hydrodynamic data were used to analyze boat wakes, tides, sediment processes, and wave dissipation performance of breakwalls. Water levels were sampled at 8 Hz using velocimeters.

Data collection period: March to April 2018

Geographic extent: Three locations across the Tolomato River channel near living shoreline breakwalls at GTMNERR Site 5 (see map and coordinates above).

File format: Data are available as a text file (3 KB). Pressure data (in dbar) at different locations across the cross-channel transect are provided within a text file in ASCII format. The data can be easily imported into data processing programs to view and analyze using software such as Matlab, Python, R, etc., and can also be copied into standard spreadsheet file formats.