National Estuarine Research Reserve System Science Collaborative

Dataset: Modeling, monitoring and meeting data generated by the project *From Past to Present: Ecosystem Services and People of the Guana Peninsula*

This document provides detailed information about data that were generated through a 2021-2023 collaborative research project titled *From Past to Present: Ecosystem Services and People of the Guana Peninsula*. 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.

7 related datasets are described in this document:

1. GTM NERR SLAMM archaeological triage assessment
2. People of Guana survey data
3. Community Conversations data
4. HMS Scout Report Data
5. Shoreline Mapping data
6. 3D shoreline models
7. 3D artifact models

About the Associated Project

Project title: From Past to Present: Ecosystem Services and People of the Guana Peninsula

Name of reserve(s) involved in the project: Guana Tolomato Matanzas, FL

Project Period: October 2021 - June 2023

Project lead and contact information:
Sarah Miller, Florida Public Archaeology Network (FPAN), semiller@flagler.edu

Purpose:
As climate change and development threaten the natural and cultural resources of the Guana Peninsula, this 2021 collaborative research project used a combination of archaeological investigations and applied anthropological methods to increase understanding of how people past and present have used the resources to inform their future management.

Abstract:
For over 6,000 years, people have called the Guana Peninsula home, largely due to the bountiful resources of the estuary. These resources, both natural and cultural, are at risk now more than ever due to threats from climate change impacts and development. The GTM Research Reserve directly manages the southern portion of the Guana Peninsula, providing stewardship, visitor access, and, along with the Gullah Geechee Cultural Heritage Corridor Commission and the National Park Service's Timucuan Ecological and Historic Preserve, education and interpretive programming. This project aimed to better understand how resources were used in the past and how they currently are being used by communities to

ensure responsive resource management and relationship building with visitors, descendants, and other community stakeholders and for program development to expand the narrative of the Gullah/Geechee in northeast Florida.

The project used a combination of archaeological investigations and applied anthropological methods and is the inaugural case study of the North American Heritage at Risk (NAHAR) research pipeline for addressing heritage at risk and engaging a variety of stakeholders. The project produced predictive models of climate change impacts, 38 site assessments for 19 archaeological sites, five new archaeological sites documented, stakeholder survey and follow up interview analysis, a technical report that describes the results of fieldwork, engagement of the public and outreach products, and three-dimensional models of artifacts, shorelines, and point cloud comparisons of shorelines over time. The modeling, monitoring, meeting, and methodizing data are available for further interpretation of the ecosystem services of the Guana Peninsula and to inform management strategies for cultural and environmental resources to best fit the needs of the Reserve and the surrounding community.

About the Project Datasets

1. GTM NERR SLAMM archaeological triage assessment

General description of data:
The overarching data are a collection of raster-based expectations of shoreline change over time given certain sea level rise scenarios. This dataset includes all input data: DEM, Slope, Aspect, NLCD Impervious Surfaces, GTM NERR property boundaries, and SLAMM boundaries for this project. The purpose of the dataset was to use the open source Sea Levels Affecting Marshes Model to estimate the impact of climate-driven shoreline change to archaeological cultural heritage sites within the NERR. The product here includes both the SLAMM datasets produced as well as the Archaeological Triage Assessment. The latter dataset uses all known archaeological sites within the GTM NERR to estimate which cultural heritage sites are currently safe, threatened, damaged, destroyed, or likely to be safe, threatened, damaged, or destroyed in 5 year increments from 2006-2100 given a 1.5m GMSLR and a 2m GMSLR. In addition to raw input data and processed datasets and graphics, the file package also includes a narrative report detailing methods, findings, and implications of this study.

Search keywords:
SLAMM, Sea Level Rise, Climate Change, Shoreline Change, GTMNERR, NERR, Guana River Wildlife Management Area

More about the data:
This model was created using the open source program Sea Levels Affecting Marshes Model (SLAMM). The data input are: DEM/LiDAR, slope, and wetland characteristics of an AOI from the National Wetlands Inventory (NWI). St. John's County has excellent quality Lidar-derived DEMs available at a 1.5 meter interval. To obtain a more nuanced result from SLAMM that may better incorporate impacts from larger physiographic and geological influences, the SLAMM model was extended 4km beyond the GTM NERR property boundary. The program uses three types of data to create estimates of wetland reallocation at user-generated time intervals based on sea level changes estimated from the Intergovernmental Panel on Climate Change (IPCC). The start date of the model was predated from 2006 and run until 2100 at both 5- and 25-year intervals (2006, 2025, 2050, 2075, 2100). Results from the 25-year interval model for a 2-meter SLR are presented in this report; full data are available in the data package.

The data file includes:

1. GIS Project Package that contains all processed data and SLAMM inputs (SLAMM, ATA, ATA-Buffer, At Risk Site List) [NAD8317N, NAVD88]
2. Project graphics and gifs for 5 year intervals at various scales (AOI, SLAMM, ATA)
3. Tables derived from GIS statistics (e.g. Archaeological Triage Assessment, At Risk Sites in 25 year increments for project area and GTM)
4. SLAMM input .txt and environmental SLAMM inputs
5. Written summary report of the above information

Data collection period:
August 2022 to April 2023

Geographic extent:
The extent of this model is based on the northern portion of the GTM NERR with a 4 km buffer around the northern property boundary.

West_Bounding_Coordinate: -81.388504
East_Bounding_Coordinate: -81.197280
North_Bounding_Coordinate: 30.161326
South_Bounding_Coordinate: 29.601119

File format:
The total file size is compressed into a 8.26 GB .zip file. It includes:

1. GIS package is an ESRI ArcGIS Layer Package contained within a .zip file.
2. Graphics are .png, .jpg, and .giff files
3. Tables are Excel spreadsheet .xls and .xlxs files
4. SLAMM input data are .txt, .xls, and ESRI project files
5. Summary report is a Word document (.docx)

File name(s): People_of_Guana_Modeling_Cochran_public.zip

Data access and archival:
A public version of these files with sensitive information redacted can be found at https://osf.io/mgu7f. Request the original, unredacted data by contacting: Lindsey Cochran, Assistant Professor of Anthropology, Department of Sociology and Anthropology, East Tennessee State University, Email: COCHRANLE@mail.etsu.edu.

Maps and schematics for data collection

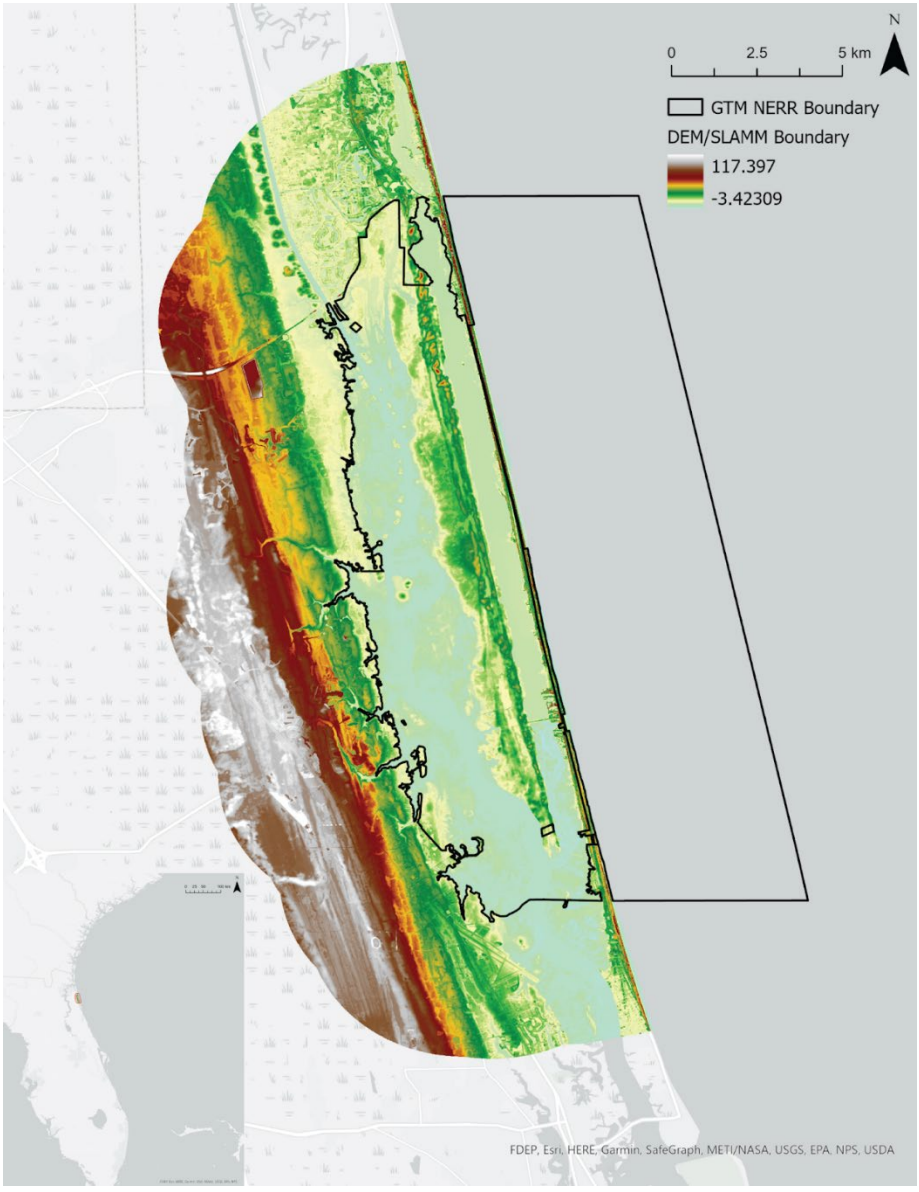

Figure 1: SLAMM model extent based on a 4km buffer around the northern GTM NERR boundary.

2. People of Guana survey data

General description of data:
The data are de-identified responses to an online survey. The survey included 64 questions and received 48 responses. The data include basic demographic variables of the respondents, and their answers to questions about how people have utilized and expressed value for ecosystem services historically, how they continue to use them today, and how they can respond to future threats.

More about the data: The survey responses were collected using Qualtrics software, and analyzed using the R programming language. As per IRB review, identifiable information was not collected from participants.

Search keywords: Climate change, survey, GTMNERR, GTM NERR, NERR

Data collection period: October 2022 through March 2023

Geographic extent: Responses were submitted through an online link so the survey has no geographic extent.

File format: CSV file

File name(s): People of the Guana Peninsula Survey_October 3, 2022_12.36.csv

Data access and archival: Survey csv available on the People of Guana project OSF page at https://osf.io/75b2c. Full data and analysis are available online at http://doi.org/10.17605/OSF.IO/BPWZR.

3. Community Conversations data

General description of data:
Survey responses, notes, and transcriptions from two community focus groups on heritage at risk

Search keywords:
Community, heritage at risk, coastal heritage

More about the data:
Community conversations events asked small focus groups 6 questions about heritage at risk in the project area. These included: What is significant about the First Coast's coastal heritage? What are the threats facing the coastal heritage? If we can't take action at every site, how should we decide which ones to prioritize? What are your aspirations for the First Coast's heritage by 2023 and what needs to happen to get there? In order to achieve aspirations, where do roles and responsibilities lie (local community, local authority, national heritage agencies, other)? What would be the impact on the First Coast if we lost the coastal heritage?

Data collection period:
May 2022 to September 2022

Geographic extent: Workshops were held at the GTM Research Reserve.

File format: PDF files (.pdf)

File name(s): Community Conversations

Data access and archival:
Data are available on the People of Guana project OSF page at https://osf.io/hf8j5/ in the "Community Conversations at Risk" folder.

4. HMS Scout Report data

General description of data:
Data gathered from in-field monitoring of archaeological sites within the GTM NERR.

More about the data:
Monitoring activities were conducted using Florida Public Archaeology Network's (FPAN) Heritage Monitoring Scouts (HMS) program site assessment form supported by the HMS Florida Monitoring Database, referenced as Scout Reports. The Scout Report form includes verification of site location, condition assessment, assessment of cultural and environmental threats, observed artifacts, and recommendations for future monitoring and is submitted along with in-field photos. Data was collected by project team members with the help and assistance of GTM NERR land managers and volunteers. Scout Reports and associated photos are uploaded to the HMS Florida Monitoring Database as they are created. Database users who have a login and access to the archaeological sites that were monitored can view the Scout Reports and photos there.

Search keywords: HMS Florida, monitoring, assessment, heritage at risk, Shell Bluff Landing, Wright's Landing, GTM NERR, GTM Research Reserve, archaeological sites

Data collection period: November 2021 through May 2023

Geographic extent: the Guana Peninsula within the GTM NERR

File format: Excel spreadsheet .xlsx file

File name(s): Monitoring Scout Report data.xlsx

Data access and archival: Scout Reports and associated photos are uploaded to the HMS Florida Monitoring Database as they are created. Database users who have a login and access to the archaeological sites that were monitored can view the Scout Reports and photos there.
The monitoring scout report spreadsheet is available on the People of Guana project OSF page at https://osf.io/kd2fb.You can also request full data by contacting: Sarah Miller, Northeast Director, Florida Public Archaeological Network, Email: semiller@flagler.edu.

Maps and schematics for data collection

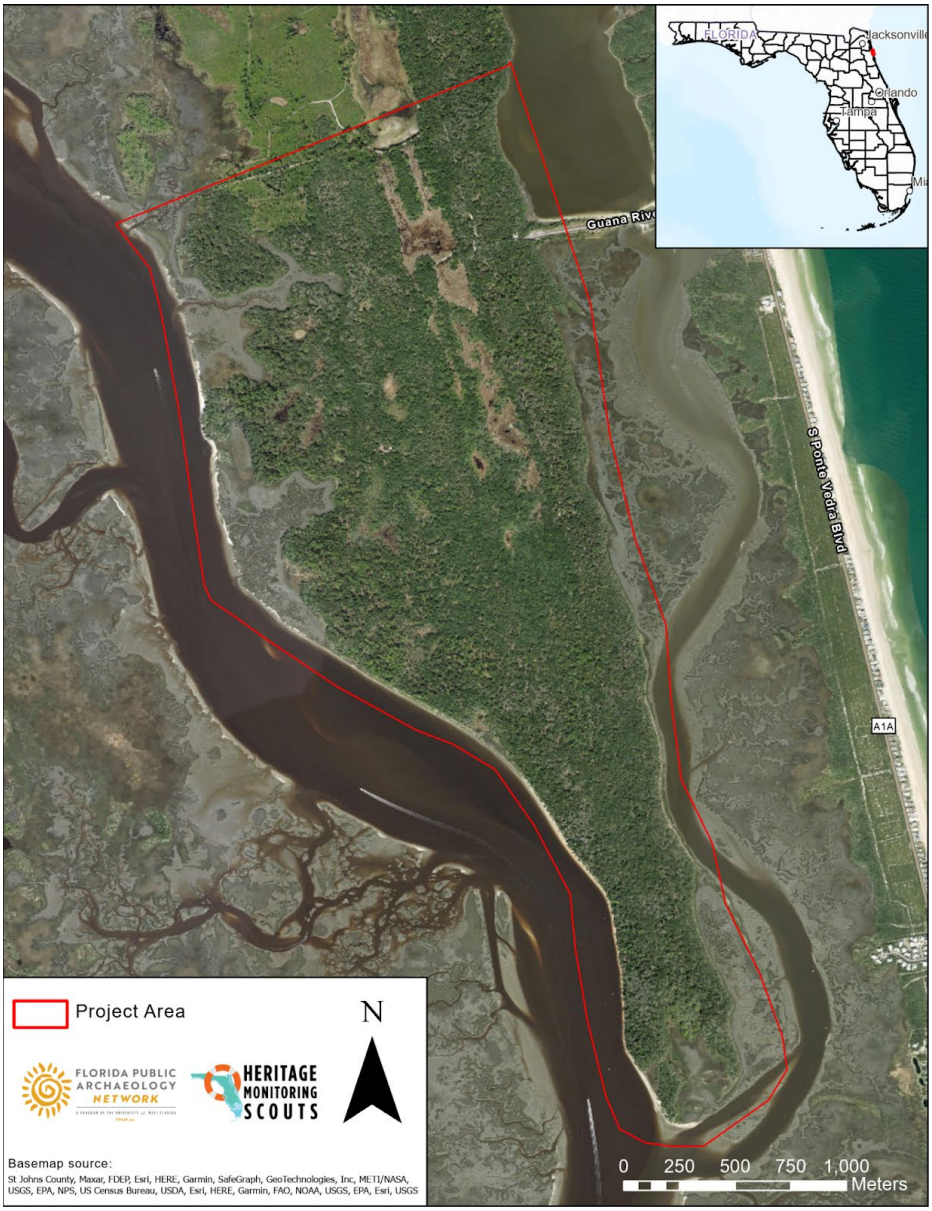

Figure 2. Monitoring activities were limited to the Guana Peninsula within the GTM NERR

5. Shoreline mapping data

General description of data:
This dataset includes vector-based data for shoreline analysis of the Guana Peninsula. This includes two shapefile lines collected at archaeological sites representing the upland erosional edge of each site, an arbitrary baseline, transects, and original and adjusted transect files which calculated the estimated rate of change between the two shapefile lines. Measurements were taken between these lines to calculate shoreline change which are also provided.

More about the data:
The shoreline data was gathered using an Arrow Gold GNSS receiver and the ArcGIS Field Maps application to collect points along the upland erosional edge of each archaeological site. The GNSS receiver was connected to the Florida Permanent Reference Network (FPRN) to receive real-time

kinematic position (RTK) corrections to achieve the most accurate data possible, sometimes down to sub-centimeter accuracy. Lines of data were collected as individual points, rather than a continuously tracked line. This method allowed the team to collect points at the shoreline while safely navigating unstable shorelines, heavy vegetation, and other obstacles. The data were downloaded from ArcGIS Online and cleaned by removing erroneous points. Lines of data for each site were combined into one file for each year of the project.

The field team attempted to capture the last place where intact archaeological deposits could be found which was often an upland erosional edge where present. In areas with gentler slopes, the upland shoreline was determined by soils and types of vegetation present. This line often reflects the extent of the archaeological resources and the areas most vulnerable to impacts like erosion and boat wake action.

The lines of data were compared visually, and changes were calculated using the Digital Shoreline Analysis System v5.1 (DSAS). DSAS is an add-on tool in ESRI's ArcMap created by the U.S. Geological Survey to measure shoreline change. All shoreline data were compiled into a single file in a geodatabase and projected in WGS 1984 Mercator Auxiliary Sphere. General parameters were defined as suggested in the DSAS manual, and the uncertainty of the shoreline placement was set to 1 m given the accuracy of the GNSS receiver. Transects were calculated at 25m apart, and some were adjusted to ensure they did not cross where shorelines cut back. The DSAS tool calculated the estimated rate of change between the 2022 and 2023 shoreline lines at each transect in meters. Transects were calculated at 25m apart, and some were adjusted to ensure they did not cross where shorelines cut back. Outliers in the transect calculations were omitted from the analysis to provide more accurate numbers since many were in marshy areas where the shoreline was harder to define. The team also omitted measurements showing attrition since the project goal was to measure loss. The adjusted and original rates of change are provided in the geodatabase file. The results of these calculations are provided in spreadsheet format.

Search keywords: shoreline analysis, heritage at risk, GTM NERR, GTM Research Reserve, archaeological sites, DSAS

Data collection period: October 2022 through May 2023

Geographic extent: Guana Peninsula at the GTM NERR

File format: The shoreline data is in a zipped ESRI ArcGIS file geodatabase (.zip folder of a .gdb file). The shoreline analysis calculations from the DSAS tool are provided in an Excel spreadsheet (.xlsx file).

File name(s): Guana_Shoreline_Analysis.gdb.zip and DSAS Shoreline Analysis Data.xlsx

Data access and archival: The DSAS Shoreline Analysis excel data are available on the People of Guana project OSF page at https://osf.io/zsd2j.

The shoreline geodatabase data are associated with archaeological site locations which are protected by law in the state of Florida. These data are available by request only. Request data by contacting: Sarah Miller, Northeast Director, Florida Public Archaeological Network, Email: semiller@flagler.edu.

6. 3D Shoreline modeling

General description of data:
This dataset includes the raw scan files and photographs, as well as final processed point clouds, models, and associated imagery for the shorelines of four sites on the Guana Peninsula: Wright's Landing (SJ00003), Shell Bluff Landing (SJ00032), South of Wright's Landing (SJ00033), and Little Orange

(SJ02548). The project team aimed to track shoreline changes using a 3D digital heritage toolset. Point clouds of shorelines were created using terrestrial laser scanning and photogrammetry, and compared in Cloud Compare software. Each shoreline was scanned at least twice to allow for a comparison of coastal change over time. The project team used a FARO Focus 350s to capture scans and a Canon Rebel DSLR camera to take photographs.

More about the data: Individual scans were aligned in FARO's Scene software and then exported as individual files (.ptx). These scans were then aligned in Reality Capture with the photographs, from which final models and point clouds were exported. Models were uploaded to SketchFab for viewing online. Point clouds were compared using CloudCompare to utilize the software's distance calculator.

Search keywords: 3D digital heritage, heritage at risk, Shell Bluff Landing, Wright's Landing, GTM NERR, GTM Research Reserve, archaeological sites

Data collection period: March 2022 through March 2023

Geographic extent: Guana Peninsula at the GTM Research

File format:
Unprocessed scan files are in .fls folders. Aligned scans are in .ptx or .e57 format. Unprocessed photographs are in .jpg or raw (.cr2) format. Project files are in Reality Capture proprietary format (.rcproj) and associated file folder. Text files (.txt) contain GIS data. Finished models include an object file (.obj), texture (.jpeg, .jpg, or .png), a material file (.mtl), and a Reality Capture information file (.rcinfo). Orthomosaic images are in various image formats: .tiff, .png, and .jpg.

File name(s): People of Guana Shorelines

Data access and archival:
The 1.75TB of data are stored on an external hard drive located in the FPAN Northeast Regional Center office at Flagler College. Files are organized by site, then date. These raw data are available by request. Request data by contacting: Sarah Miller, Northeast Director, Florida Public Archaeological Network, Email: semiller@flagler.edu. Final models have all been curated and available for download on Sketchfab in the People of Guana Collection (https://skfb.ly/oySQp).

7. 3D Artifact modeling

General description of data:
This data set includes the photographs and processed models of artifacts found at four archaeological sites on the Guana Peninsula including Wright's Landing (SJ00003), Shell Bluff Landing (SJ00032), South of Wright's Landing (SJ00033), and Little Orange (SJ02548). During monitoring activities, the project team collected photographs of artifacts in lieu of the physical objects. These photographs were rendered into 3D models of the objects, to be curated digitally as assemblages for each site. The photographs were collected in lieu of the physical artifacts to provide more information about each artifact.

More about the data:
The project team used a Canon Rebel DSLR camera to take photographs. Photographs were processed using Reality Capture to generate the textured 3D models.

Search keywords: 3D digital heritage, 3D models, artifacts, GTM NERR, Shell Bluff Landing, Wright's Landing, archaeological sites

Data collection period: November 2021 through March 2023

Geographic extent: artifacts modeled came from archaeological sites on the Guana Peninsula within the GTM NERR

File format:
Unprocessed photographs are in .jpg or raw (.cr2) format. Project files are in Reality Capture proprietary format (.rcproj) and associated file folder. Finished models include an object file (.obj), texture (.jpeg, .jpg, or .png), a material file (.mtl), and a Reality Capture information file (.rcinfo). A catalog of all artifacts is included as a Microsoft Excel file (.xlsx).

File name(s): Catch and Release Artifacts

Data access and archival:
The excel of Catch and Release Artifacts is available on the People of Guana project OSF page at https://osf.io/xyrct.The 1.75TB of data are stored on an external hard drive located in the FPAN Northeast Regional Center office at Flagler College. Files are organized by site, then date. These raw data are available by request. Request data by contacting: Sarah Miller, Northeast Director, Florida Public Archaeological Network, Email: semiller@flagler.edu. Final models have all been curated and available for download on Sketchfab in the People of Guana Collection (https://skfb.ly/oySQp).