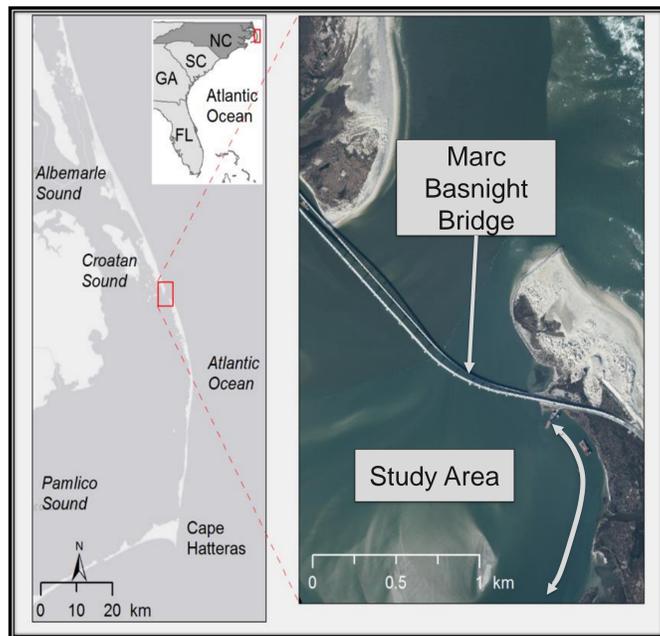


# Estuarine shoreline erosion driven by flood channel proximity at Pea Island, NC

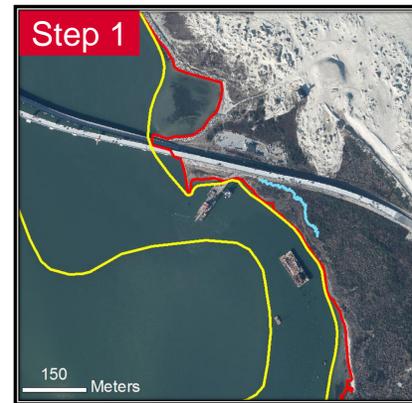
Michael Dunn, Dr. Elizabeth Sciaudone, Dr. Liliana Velásquez-Montoya

## Motivation

- Pea Island is a barrier island in the Outer Banks of North Carolina that makes up one side of the tidal inlet, Oregon Inlet.
- The Marc Basnight Bridge and connecting NC 12 is the only land route and the primary evacuation route for Pea Island, and the more populated Hatteras Island.
- The position of a natural tidal inlet channel in proximity to the estuarine shoreline may lead to increased erosion in certain areas and potential for breaching of the NC 12 highway.
- Drivers of erosion such as flow velocities and locally-generated waves in this area have not been studied in detail.



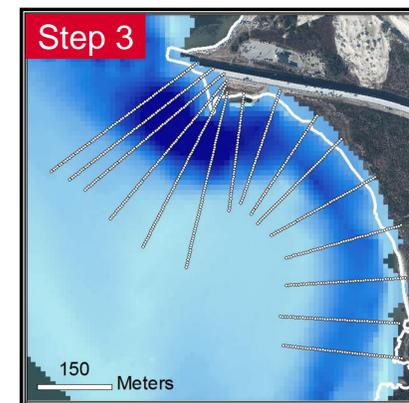
## Methods



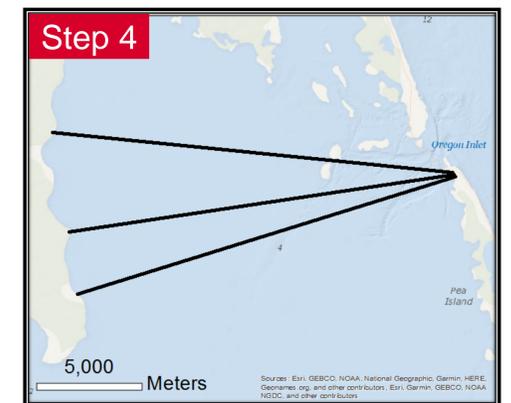
Channel boundaries, estuarine shorelines, and wrack lines were digitized using aerial photographs from NCDOT and ArcGIS to track changes.



Shoreline regression rates and channel migration rates were calculated using the Digital Shoreline Analysis tool provided by US Geological Survey.



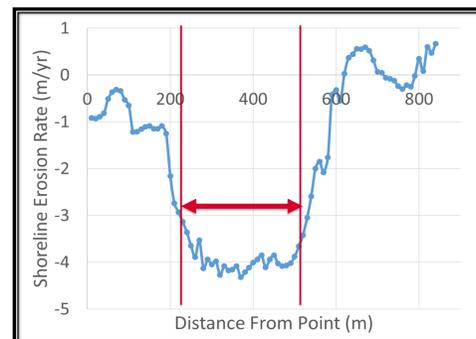
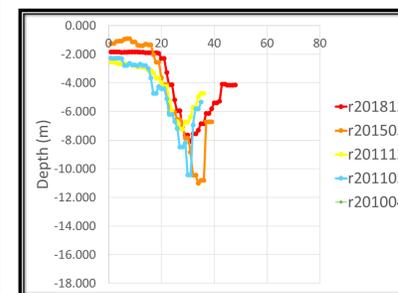
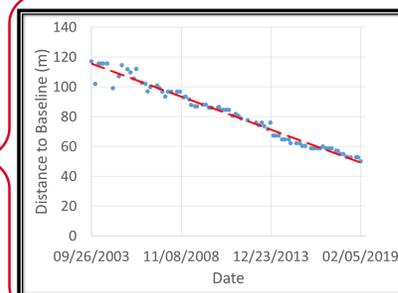
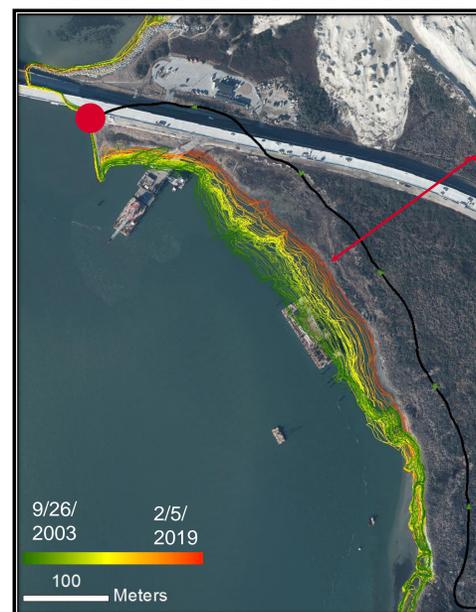
Channel depths were monitored over time using bathymetry data provided by the US Army Corps of Engineers.



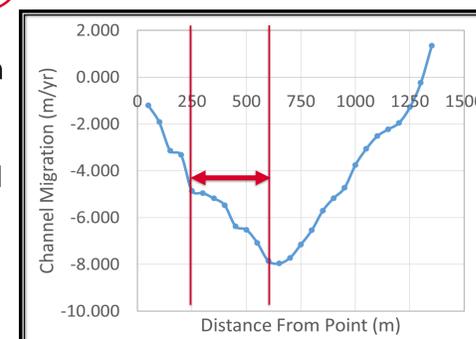
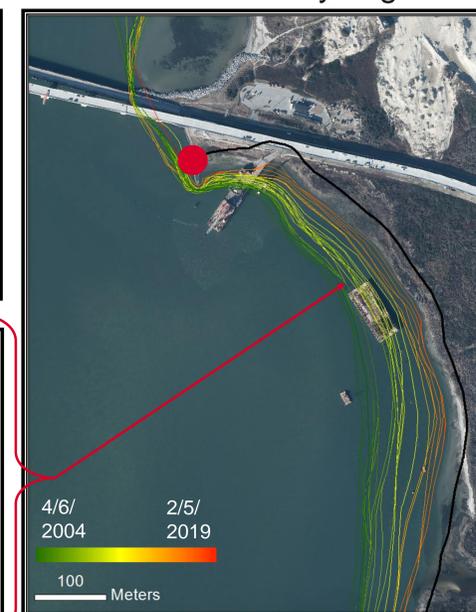
The locally generated wave characteristics were analyzed using CEDAS, a coastal engineering design tool provided by Veri-Tech.

## Results

### Estuarine Shoreline Erosion



### Channel Boundary Migration



## Conclusions

- The rate of estuarine erosion is nearly the same as the rate of channel migration at similar transects and clearly demonstrates a relationship between channel migration and estuarine shoreline erosion.
- Locally generated waves and water levels do not have a significant effect on erosion.
- Channel migration is the primary driver for estuarine shoreline erosion.

## Acknowledgements

Special thanks to the CCEE RISE program, NCDOT, and my advisors Dr. Sciaudone, and Dr. Velásquez for their support and guidance.



## Core Questions

1. What is the relationship between channel characteristics and estuarine shoreline erosion?
2. What are the erosive effects of locally-generated waves on the estuarine shoreline?

- Red band shows where maximum shoreline erosion occurred along both baselines.
- Distance from point derived from distance along its respective baseline (black) beginning from its reference point (red).