Identifying Impacts of Sea Level Rise on Coastal Archeological Sites, a Project of the Southeast Florida Regional Climate Compact

Alanna L. Lecher* & April Watson
Natural and Applied Sciences, Lynn University, Boca Raton, FL, *alecher@lynn.edu

1. Southeast Florida Regional Climate Compact

- Agreement across 4 counties on the southeastern peninsula of Florida
- The goal is to coordinate efforts to mitigate and adapt to climate change
- Addresses environmental, social, and economic disruptions
- Check out southeastfloridaclimatecompact.org for more info!

2. Archeology in South Florida

- Native American archeological sites are ubiquitous in South Florida
- Site ages typically exceed 1,00 years, but can exceed 4,000
- Most sites are comprised of mounds (man-made dirt piles) or middens (trash heaps)
- Humans remains are present at most sites (Figure 2)
- Some ancient burial sites are already submerged under the sea, e.g. Manasota Key (7,000 yr old) is now 100 ft from shore[1]
- The Palm Beach County is current working to prioritize sites for preservation under various sea level rise scenarios
- Rapid wetting of sites causes artifact destruction[2]

Figure 1: An excavated unit on a barrier island site

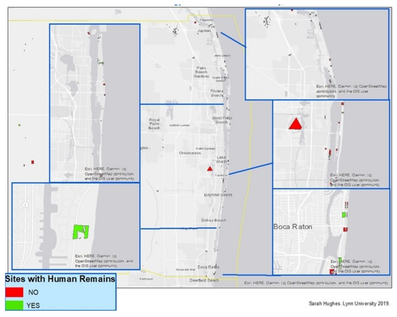

Figure 2: All sites in Palm Beach County at risk of submergence due to sea level rise[3*]

*Under Florida Statute Chapter 267 archeological sites are protected and not to be disturbed without appropriate permitting.

Acknowledgements

This work could not have occurred without assistance from many people, including the Palm Beach County Office of Resilience and Sustainability, the County Archeologist Chris Davenport, the Florida Public Archeology Network (Sara Ayers-Rigsby & Micheline Hilpert), and Lynn University Undergraduates Sarah Hughes, Jack Meyers, Cheree' Faulk, and John McDowell.

Take Home Points

- Archeological sites on Florida barrier islands are at risk of destruction due to sea level rise
- Increased moisture due to sea level rise has already been observed at low elevation barrier island sites
- Site preservation and excavation plans must be adjusted to account for current impacts

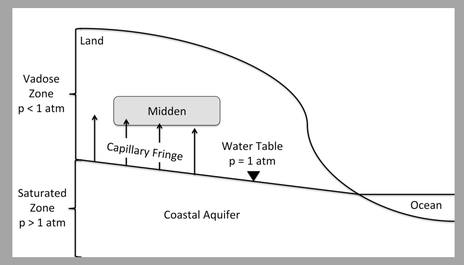

Figure 5: A conceptual model showing how the capillary fringe of sea water intrusion is wetting low-elevation archeological sites

3. This Project

- A barrier island archeological site was excavated in 2018 and 2019 as commissioned by the climate compact
- Shovel tests were used to determine site extent
- Three habitation sites were discovered and excavated a 1 x 1 x 1 m units.
- Units were excavated in 10 cm layers
- Artifacts (bone, shell, pottery) were retained for analysis

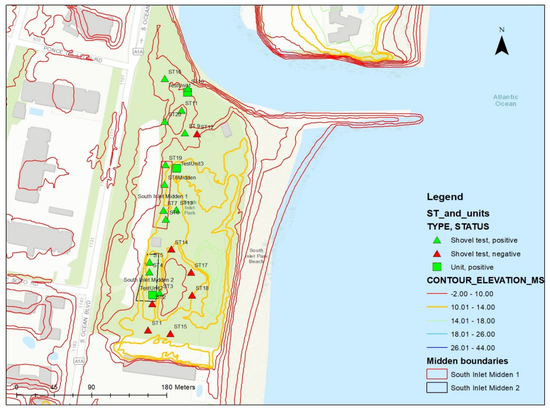

Figure 3: Location of shovel test and full 1 x 1 x 1 m unit excavations[4]

- After excavation ~600 g of sediment was sampled from the most intact unit wall
- Sediment was dried and sieved to attain moisture and grain size

4. Results

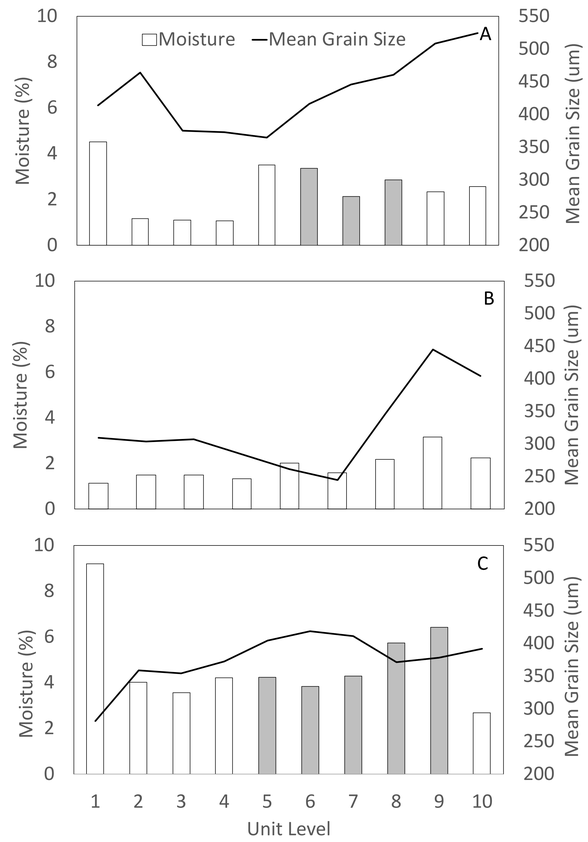

Figure 4: Moisture content and geometric mean grain size of every level for each unit. (A) the lowest elevation Unit 1 with a bone midden contains lower levels that are significantly wetter than the upper levels ($p < 0.05$), possibly indicating of rising sea water within the island. (B) the highest elevation Unit 2 contained no midden and had similar moisture content throughout. (C) The middle elevation Unit 3 was a shell midden with similar moisture throughout, possibility indicating the shells trapped moisture within the midden. Shell artifacts were found throughout all layers at that site. Grain size was medium-coarse sand throughout all levels of all units. Grey bars indicate a midden layer.

References

[1]Florida Division of Cultural Resources (2019) Manasota Key Offshore, Florida Department of State, Retrieved from: https://dos.myflorida.com/historical/archaeology/projects/manasota-key-offshore/
[2]Conard, N. J., Walker, S. J., & Kandel, A. W. (2008). How heating and cooling and wetting and drying can destroy dense faunal elements and lead to differential preservation. Palaeogeography, Palaeoclimatology, Palaeoecology, 266(3-4), 236-245.
[3]Hughes, S. (2019) Low Archaeology Sites Found In Palm Beach County
[4]McDowell, J., Meyers, J., Lecher, A.L., Watson, A. (2019) Examining the Effects of Screen Size on Archaeological Data Collection, Lynn University College of Arts and Sciences Student Symposium, *Poster*