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

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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 1,000 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
   - 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

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
   - 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
   - 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 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

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

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References

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

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.

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