

Spatial and Temporal Assessment of Back-Barrier Erosion on Cumberland Island National Seashore

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Abstract. Many studies have been conducted to better understand erosion and accretion processes for the seaward zones of coastal barrier islands. However, on Cumberland Island National Seashore, the greater management concern is the effect that erosion is having on the resources of the island's western shoreline, or back barrier. Catastrophic slumping and long-term erosion rates across large areas in excess of one meter (m) per year threaten important ecological habitats, historic and pre-historic resources, and modern infrastructure on the island. Prior research has helped the Park identify the most severe and vulnerable areas, however, in order to develop effective management actions, information is needed on the causes of the erosion and the conditions under which it is occurring. In February 2012, the U.S. Geological Survey (USGS) in cooperation with the National Park Service constructed monitoring stations at four locations that were identified as erosional hotspots. Innovative techniques such as continuous measures of erosion position and acoustic recordings of underwater sound were used to investigate under what conditions erosion occurred through May 2013. Further, the magnitude of erosion at each location was quantified to elucidate the relative influence of causative agents. Results indicate that erosion is, in general, highly variable within and among these locations. Observed erosion ranged from a maximum of 3 meters of bluff-line retreat to no net erosion for the entire study period. Three of the four sites displayed punctuated, mass wasting events that were coincident with above average high tides and storm events. The fourth site exhibited steady, low magnitude retreat throughout the study period. Boating activity was acoustically detected at all sites during the study and occasionally occurred prior to measured erosion, however ascribing a degree of causation was not possible. While it is difficult to precisely attribute certain amounts of erosion to specific agents, this study provides insight into the mode of erosion among sites and the interac-

tion among factors that are leading to the alteration of the back barrier of Cumberland Island. Estimates of sea-level rise predicted to be in place by the end of the 21st century were incorporated into the monitoring data to forecast tidal position with respect to the current erosional margin.