

## Response of Intertidal Oyster Reefs to Increasing Rates of Sea-Level Rise

### **Abstract**

Oyster reefs are integral to estuarine ecosystems and their potential for use in living shorelines is being explored. Previous studies on restored reefs have shown that they can accrete more rapidly than the rate of sea-level rise (SLR) when placed low in the tidal frame, but little is known about how they will respond to changes in the rate of SLR over longer time scales. This study examined the responses of intertidal oyster reefs ranging in age from 1861 to 1566 years old in two different North Carolina estuaries, the Newport River and White Oak River, to the late 19th-century acceleration in the rate of SLR. We cored three reefs from each estuary, and examined the percent shell and grain size in 5-cm increments from the surface to the base of the reefs. We radiocarbon dated one reef from each estuary and built age-depth models from the data using OxCal. We found an acceleration in reef accretion rate around the time of the increase in SLR, and found that the reefs had been consistently outpacing SLR since their genesis. The rapid accretion of the reefs after the acceleration in SLR was mainly isolated to reef crest areas and increased the relief of the reefs. We determined that the reef in the Newport river estuary was resilient to changes in sediment load. The results of this study suggest that intertidal oyster reefs are a viable addition to living shorelines and may offer shoreline protection for long periods of time.