



Cape Romain

National Wildlife Refuge

Climate Change Impacts

Pete Wallack



American Oystercatcher

Steve Hillebrand



Lack of sand dunes on Cape Island subjects Loggerhead Sea Turtle nests to extensive inundation. Without relocating nests the success rate would plummet to below 25%.

Steve Hillebrand



Low tide reveals roots from a remnant salt marsh on the beach highlighting the erosion impacts on Cape Island as the beach retreats and rolls over the marsh.

Cape Romain NWR is 66,287-acres and extends 22 miles along South Carolina's Atlantic Coast. The Refuge's low-lying barrier islands, salt marsh, tidal flats, and rich aquatic habitats have long supported large concentrations of migratory birds in the Atlantic Flyway. Originally established in 1932 for migratory birds, the refuge's purposes were later expanded to include managing for threatened and endangered species, protecting the 29,000 acres of Class 1 Wilderness Area, and preserving the Bulls Island and Cape Island forests and their diverse plant communities. The Refuge supports the largest population of nesting Loggerhead Sea Turtles north of Florida, 22 species of shorebirds including the American Oystercatcher and threatened Piping Plover.

The effects of a changing climate on Cape Romain NWR will mostly be from rising seas that promote accelerated beach erosion, submergence of extensive salt marsh habitats (45% of the Refuge), and the conversion of habitats from salt marsh to tidal flats and then open water. As sea level rises more turtle and bird nests will be subjected to inundation. However, the response of coastal areas to sea-level rise is more complex than simple inundation. Erosion is produced by wind, waves, ocean currents, intense storms, and rising sea levels; destabilizing and fragmenting vital beach habitat that supports shorebirds, sea birds, and nesting sea turtles.

Maritime forest on Bulls Island has been affected as the beach retreats inland, and a levee around the Refuge's most significant brackish water impoundment is at risk from rising sea levels. Loss of the impoundment will reduce wintering habitat for several waterfowl species and foraging habitat for wading and colonial nesting shorebirds. Tropical storms and strong prevailing winds can push water over islands or create escarpments that cut into the fragile dunes, thus reducing the overall available habitat for vulnerable species.

Under normal conditions salt marsh can keep pace with a moderate level of sea-level rise due to sediment inputs and the amount of detritus that builds within the marsh. As the rate of sea-level rise increases, salt marsh will not be able to keep pace and gradually degrade and become submerged. Three key determinants of future tidal marsh acreage are: (1) the capacity of the marsh to raise its surface to match the rate of rising sea level, (2) the rate of erosion of the seaward boundary of the marsh, and (3) the availability of space for the marsh to migrate inland. A recent study determined that headward erosion within tidal creeks in the salt marsh is occurring at a rate of 1.9 meters per year [Hughes et al., 2009]. Where tidal marsh become submerged or eroded, the loss of habitat would negatively affect numerous wetland-dependent species. Bird species that rely on island habitat for protection from predators would be forced to abandon key nesting areas.

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A recent study of marsh creeks in Cape Romain NWR revealed a headward erosion rate of nearly 6 feet per year and a deepening of the creek channel.

Steve Hillebrand



Boneyard Beach on Bulls Island illustrates the loss of Maritime forest due to coastal erosion.

Citation of Scientific Literature in the footnote.

Hughes et al (2009), Rapid headward erosion of marsh creeks in response to relative sea level rise, *Geophys. Res. Lett.*, 36, L03602, doi:10.1029/2008GL036000.

Accelerated rates of sea-level rise will also inhibit some of the major functions of salt marsh and coastal beaches. Coastal development, hardened barriers and dredged boat channels now prevent landward migration of these coastal habitats. However, there are many tidal creeks, and wetlands on adjacent lands that may provide future habitat for wildlife to adapt to these changing conditions. Many vulnerable species rely on these habitats including several species of migratory birds such as the American Oystercatcher, and commercially important fish and shellfish.

Climate change has been described as the most compelling conservation challenge of our time. While many species will continue to thrive, some populations may decline and in some instances, go extinct. Other species may require direct and continuous intervention by managers for their very survival. This presents a defining challenge for the conservation community and requires the USFWS to join with partners to apply their collective skills, determination, creativity and commitment.

The USFWS Climate Change Strategic Plan establishes a basic framework for its employees to work with the entire conservation community and employs Adaptation, Mitigation, and Engagement to address climate change. Adaptation involves planned management actions the Service will take to help reduce the impacts of climate change on fish, wildlife, and their habitats. Mitigation involves reducing our “carbon footprint” by using less energy, consuming fewer materials, and altering our land management practices. Engagement involves reaching out to Service employees; local, national and international partners in the public and private sectors; key constituencies and stakeholders; and the broader citizenry of this country to join forces and seek solutions to the challenges to fish and wildlife conservation posed by climate change.



Historical shoreline of Bulls Island shows severe erosion since 1852. The current rate of erosion is approximately 20 feet per year.

Cape Romain NWR
5801 Highway 17 North
Awendaw, SC 29429
Phone: 843/928-3264
<http://www.fws.gov/caperomain>