

3.19 Virginia Eastern Shore of Chesapeake Bay

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Species and habitats of the Virginia Eastern Shore along Chesapeake Bay are potentially at risk because of sea level rise. This study region includes the bay side of Northampton and Accomack counties. Shorelines of the region contain important habitats for a variety of species, and a great deal is known about their ecology and habitat needs. Based on existing literature and the knowledge of local scientists, this brief literature review discusses those species that could be at risk because of further habitat loss resulting from sea level rise and shoreline protection (see Map 3.8). Although it is possible to make qualitative statements about the ecological implications if sea level rise causes a total loss of habitat, our ability to say what the impact might be if only a portion of the habitat is lost is more limited. A total loss of wetland habitat could occur if shores are protected with hard structures and the wetlands are unable to keep pace with sea level rise.

Northampton and Accomack counties have the greatest area of wetlands and dry land in Virginia that are vulnerable to sea level rise, estimated at 47,863 ha (184.8 mi²) and 53,923.6 ha (208.2 mi²) for Northampton and Accomack counties, respectively. Because most of the land in the two counties is undeveloped or agricultural land, they also have the greatest potential for wetland creation than other Virginia shorelines.

Bay Side of Northampton County

The bay side of Northampton County is characterized by relatively high lands, including substantial cliffs near the mouth of the bay. This shoreline has some small areas of salt marsh within coves, but is most notable for its beach/dune systems, including some wide sandy beaches near the Town of Cape Charles.⁶⁹⁷

⁶⁹⁷Varnell, L.M., and C.S. Hardaway Jr., 2005, "A risk assessment approach to management of estuarine dunefields," *Ocean & Coastal Management* 48:767–781.

Estuarine beach/dune systems occur in areas of stability and sand accretion, such as the mouths of tidal creeks, embayments, in front of older dune features such as washovers or spits, and against structures like jetties and groins. An estimated 16.42 km (10.2 miles) of dune shore occur along the bay side of Northampton County, mostly fronting headlands.⁶⁹⁸

Shore protection is likely along most of Northampton's bay side shoreline, with the exception of the heads of some tidal creeks. Shore protection often is required on upland banks and interflaves experiencing erosion.⁶⁹⁹ Regardless of any shoreline hardening, the high upland elevation of this area would make marsh migration difficult. The lack of lowlands, with the exception of the shoreline near the Town of Cape Charles, means that the primary impact of sea level rise on these shorelines will be erosion. Beach nourishment to protect public beaches is likely, and recently the Board on Conservation and Development of Public Beaches provided \$300,000 for a breakwater and beach nourishment project in the Town of Cape Charles. The dunes themselves are important for erosion control of adjoining lands, and therefore the Commonwealth of Virginia seeks to preserve them under the Coastal Primary Sand Dune Protection Act of 1980.⁷⁰⁰

⁶⁹⁸Hardaway, C.S., Jr., D.A. Milligan, L.M. Varnell, G.R. Thomas, W.I. Priest, L.M. Menghini, T.A. Barnard, and C. Wilcox, 2004, Northampton County Dune Inventory, Technical Report, Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, VA, p. 5.

⁶⁹⁹Lyle Varnell and Scott Hardaway, Virginia Institute of Marine Sciences, written communication, 2/15/07.

⁷⁰⁰Milligan, D.W., C.S. Hardaway, Jr., G.R. Thomas, L.M. Varnell, T. Barnard, W. Reay, T.R. Comer, and C.A. Wilcox, 2005, Chesapeake Bay Dune Systems: Monitoring, Technical Report, Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, VA.

⁷⁰¹Varnell and Hardaway, 2005, p. 768 (see note 697).

The beaches and maritime forests on the bay side of Northampton County provide habitat for a variety of species, most notably neotropical songbirds and the federally listed threatened northeastern beach tiger beetle.⁷⁰¹ Evidence for the presence of these species comes from surveys in area nature preserves. The Cape Charles Coastal Habitat Natural Area Preserve (Cape Charles Preserve)⁷⁰² and the Savage Neck Dunes Natural Area Preserve (Savage Neck Preserve)⁷⁰³ both provide what preserve staff consider “outstanding” beach/dune and maritime forest habitat for migratory songbirds. Tiger beetles are also found on the beaches of both preserves, as well as the William B. Trower Bayshore Natural Area Preserve.⁷⁰⁴

Bay Side of Accomack County

The bay side of rural Accomack County is primarily tidal salt marsh, with low-lying lands (less than 2 feet above the wetlands) extending several miles inland. The county as a whole contains nearly a fifth of the state’s dry land within 2 feet of mean high water (MHW), and therefore these marshes are among the most vulnerable in the state.

Local planners expect that most of the bay side shoreline of Accomack County will remain unprotected, with the exception of Onancock Creek, the town of Saxis and the Saxis Wildlife Management Area near the Maryland border, and part of the southern shore of Pungoteague Creek. These unprotected marshes are already migrating inland in response to sea level rise, creating new wetlands in agricultural areas at a rate of 16.2 ha (40 acres) per year (see Section 2.1). Given the anticipated lack of shoreline protection, and the

marginal likelihood of sufficient sediment input to meet an acceleration in sea level rise of more than 2 mm/yr, the seaward boundaries of these tidal wetlands are likely to continue retreating.

The upland elevations are higher in southern than northern Accomack County, which will make migration more difficult. Marshes in the Hackensack area in northern Accomack County cannot keep pace even with the current rate of sea level rise (Section 2.1). The likelihood of armoring along the inland portions of the tidal creeks south of Onancock could also lead to greater relative wetlands loss along this shoreline compared to the northern part of the county.

The salt marshes of Accomack County support a variety of species, including rare bird species such as the seaside and sharp-tailed sparrow. According to a fact sheet by the State of Virginia, Parkers Marsh Natural Area Preserve in Accomack County provides excellent habitat for sharp-tailed sparrow and Peregrine falcon.⁷⁰⁵ Growth and survival of these species could be reduced where shores are hardened, unless alternative suitable habitat is available nearby.

A study in the Eastern Shore indicated that bird communities in large marshes cannot persist in habitat patches of less than 5 ha (12.4 acres)⁷⁰⁶ Declines in birds where marsh loss is substantial could have a dramatic effect on local estuarine food webs. Dr. Michael Erwin of the Patuxent Wildlife Research Center has noted that waterbirds and shorebirds are top-level consumers in marshes and an important link in energy and nutrient transport among nearshore, marsh, and upland habitats as well as the surrounding estuary.⁷⁰⁷ Loss of these birds could remove a significant amount of biomass from nearshore habitats (e.g., the total biomass of just

⁷⁰²Virginia Department of Conservation and Recreation, Cape Charles Coastal Habitat Natural Area Preserve Fact Sheet. Accessed December 5, 2007 at: http://www.dcr.virginia.gov/natural_heritage/natural_area_preserves/capecharles.shtml.

⁷⁰³Virginia Department of Conservation and Recreation, Savage Neck Dunes Natural Area Preserve Fact Sheet. Accessed December 5, 2007 at: http://www.dcr.virginia.gov/natural_heritage/natural_area_preserves/savage.shtml.

⁷⁰⁴Virginia Department of Conservation and Recreation, William B. Trower Bayshore Natural Area Preserve Fact Sheet. Accessed December 5, 2007 at: http://www.dcr.virginia.gov/natural_heritage/natural_area_preserves/wmtrower.shtml.

⁷⁰⁵Virginia Department of Conservation and Recreation, Parkers Marsh Natural Area Preserve Fact Sheet. Accessed December 5, 2007 at: http://www.dcr.virginia.gov/natural_heritage/natural_area_preserves/parkers.shtml.

⁷⁰⁶Watts, 1993, p. 35 (see note 61).

⁷⁰⁷Erwin, 1996, p. 214 (see note 240).

one species of wintering waterfowl exceeded 50,000 kg).⁷⁰⁸

Although gradual inundation in the near term could increase tidal creeks and channels, making the marsh surface more accessible for nekton (i.e., free-swimming finfish and decapod crustaceans such as shrimps and crabs), as tidal flooding increases and the accessible area declines, a decrease in nekton production could occur. For example, Weisburg and Lotrich demonstrated experimentally that growth rates of mummichogs can decrease significantly when they have no access to tidal marsh.⁷⁰⁹ As marsh habitats drown, populations of immobile species that cannot survive when permanently inundated could be lost. Mobile species will need to find other suitable habitats, but if these alternative sites provide lower quality habitat, the growth and survival of these populations could decline.

Accomack County lacks the dune/beach shorelines found on the bay side of Northampton County. Nonetheless, the small patches of beach that do occur provide important species habitat. For example, the rare tiger beetle is found in sandy beach habitat in the Parker's Marsh Natural Area Preserve.⁷¹⁰

There are four major island complexes on the bay side of Accomack County, including Tangier, Smith, Great Fox, and Watts islands. These islands provide nearly predator-free nesting for numerous island-nesting bird species. Erosion and flooding on these islands due to sea level rise could reduce critical habitat and the local populations of these species.⁷¹¹

⁷⁰⁸Ibid.

⁷⁰⁹Weisburg, S.B., and V.A. Lotrich, 1982, "The importance of an infrequently flooded intertidal marsh surface as an energy source for the mummichog *Fundulus heteroclitus*: An experimental approach," *Marine Biology* 66:307–310.

⁷¹⁰Virginia Department of Conservation and Recreation, Parkers Marsh Natural Area Preserve Fact Sheet. Accessed December 5, 2007 at: <http://www.state.va.us/dcr/dnh/parkers.htm>.

⁷¹¹Watts, 2006, p. 32 (see note 495).