

3.18 The Chesapeake Bay Shoreline of the Central Eastern Shore

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Overview

The central eastern shore region covers the area between the Chester and Choptank rivers. The shore is jagged and sediment-poor, characterized by multiple coves and inlets.⁶⁷⁸ On the northern end of Kent Island and the Chester River, marshes are expected to be marginal with an increase of 2 mm per year in the rate of sea level rise and to be lost with an increase of 7 mm per year. South of Kent Island, tidal marshes are marginally keeping pace with current rates of sea level rise, and inundation is likely to occur with an increase in sea level rise rate of 2 mm per year (Section 2.1). Erosion is also a significant issue. Planners expect that shorefront development, particularly on Kent Island and in the Easton-St. Michaels area, will lead to widespread shore protection along Chesapeake Bay and the lower tributaries.

This brief literature review discusses species that could be at risk because of further habitat loss resulting from sea level rise and shoreline protection. Existing literature and knowledge of coastal scientists in the area appear to be sufficient in many cases to make qualitative statements about the possible impact if sea level rise causes a total loss of habitat, which might be expected if shores are protected with hard structures and the wetlands are unable to keep pace with sea level rise. Our ability is more limited, however, to say what the impact might be if only a portion of the habitat is lost. The overall environmental impact of sea level rise seems likely to be the following:

- Large areas of marshes and tidal flats, particularly near the mouth of the Chester

and Choptank rivers and around the Eastern Bay, will be lost. Crabs, juvenile fish, and the larger fish and waterfowl that feed on them will all be affected. The area lies in the Atlantic Flyway, and will affect the ability of migratory birds to feed on the route south in the winter.

- Assuming that shores are protected with structures rather than beach nourishment, many of the remaining beaches will erode up to the shore protection structure. This will reduce the invertebrate population (e.g., mudsnails, tiger beetles, crabs) and therefore stress shorebirds that prey on these species.
- Various marsh areas are likely to be retained. The upper reaches of tributaries, including the Chester and Choptank rivers as well as areas with minimal shoreline protection and low erosion, such as the Wye Island area, are likely to retain current marshes. These areas provide critical spawning and nursery habitat for anadromous fish. Poplar Island will provide a large, isolated marsh and tidal flat area. These regions will continue to support the fish, crustaceans, birds, and reptiles that rely on them today.

Chester River and Kent Island

The Chester River forms the northern border of Queen Anne's County. Planners expect that its shores are unlikely to be protected from Chestertown in the upper river down to Queenstown. Accretion estimates indicate that marshes along the river will be marginal with an increase in sea level rise rates of 2 mm per year (Section 2.1). Fringing tidal marshes are present throughout this portion of the river, with minimal large marshes. Migration may be possible, but in

⁶⁷⁸Stevenson and Kearney, 1996 (see note 38).

some areas inshore elevation quickly rises (e.g., elevation rises to 20 feet high within 500 feet of the shoreline along Wilmer Neck) and will impede migration. Birds that breed in the Chester River marshes (e.g., Virginia rail, American black duck) or breed near and feed in the marshes (e.g., great blue and green herons, osprey) will be negatively affected by the habitat and prey loss.⁶⁷⁹ Along the river southeast of Eastern Neck, near Queenstown, are large tidal flats.⁶⁸⁰ Local planners view shore protection as almost certain along the developed areas between Queenstown and Kent Island, at the mouth of the Chester River. Therefore, unless sedimentation increases significantly, these tidal flats are likely to be inundated if sea level rise accelerates. The Chester River also provides essential spawning habitat for king and Spanish mackerel, cobia, and red drum, as well as forage habitat for flounder and bluefish that feed in marsh and shallow water areas near the mouth of the river.⁶⁸¹ Loss of tidal flats may result in a decline in the resident invertebrates and fish that use the shallow waters as well as the birds that feed on the flats (e.g., great blue and green herons).⁶⁸²

Kent Island is highly developed, with shore protection almost certain along the Chesapeake Bay side (CBIM location 48). Historically, the shore along Chesapeake Bay had mostly narrow sandy beaches with some pebbles along low bluffs, with some wider beaches with small dunes. Terrapin Park, north of the Bay Bridge, still has an extensive dune system. The privately owned shores, however, are gradually being replaced with stone revetments. The beaches will be unable to migrate inland, leading to habitat loss for the various resident invertebrates, including tiger beetles, sand fleas, and numerous crab species. Shorebirds that rely on beaches for forage and nesting will face more limited

resources.⁶⁸³ The Eastern Bay side, by contrast, has several tidal creeks, extensive tidal flats, and wetlands. Planners expect that only two-thirds of these shores are likely or certain to be protected, because Maryland's Critical Areas Act will prevent intense development along one-third of the shore. Given the low accretion rates, the current marshes and tidal flats in these areas are likely to be lost, although some marsh may convert to tidal flat. Extensive SAV beds once grew in the nearshore areas of Eastern Bay, but little remains except in Crab Alley Bay (CBIM location 49), where shore protection is likely or almost certain.⁶⁸⁴ Increasing water depths are likely to reduce—and eventually eliminate—the existing SAV (largely a mix of *Ruppia maritima* and *Zannichellia palustris*); a landward migration onto existing flats and marshes will depend on sediment type and choice of shoreline structure (see discussion of SAV in Section 3.1). The loss of tidal wetlands and probable loss of SAV would cause losses to fish and birds as discussed above for the Chester River. Additionally, large shellfish beds in Eastern Bay may be affected by the habitat changes, with uncertain consequences.

Talbot County/Wye River

East of Kent Island across Eastern Bay is the Wye River, Wye East River, and Wye Narrows. In the Wye River, recreationally important fish include striped and largemouth bass, several catfish and perch species, blue gill, and black crappie. Many smaller fish inhabit the marshes and SAV, including mummichog, striped killifish, menhaden, bay anchovy, hogchoker, and Atlantic silverside. The Wye River also produces an abundant blue crab harvest, as well as oysters and soft-shell clams.⁶⁸⁵ The Wye East River and Wye Narrows contain extensive

⁶⁷⁹Robbins and Blom, 1996, pp. 76–77, 92–93, 128–129 (see note 552).

⁶⁸⁰Tiner and Burke, 1995 (see note 32).

⁶⁸¹NOAA's Guide to Essential Fish Habitat Designations in the Northeastern United States, Summary of Essential Fish Habitat for the Chester River, accessed on July 20, 2006, at <http://www.nero.noaa.gov/hcd/md2.html>.

⁶⁸²Author's analysis based on Robbins and Blom, 1996, pp. 50 and 63 (see note 552).

⁶⁸³Lippson and Lippson, 2006, pp. 26–42 (see note 2).

⁶⁸⁴Orth, R. J., D. J. Wilcox, L. S. Nagey, A. L. Owens, J. R. Whiting, and A. K. Kenne, 2005, 2004 Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Coastal Bays, VIMS Special Scientific Report No. 146, Final report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD, Grant No. CB973013-01-0, available at: <http://www.vims.edu/bio/sav/sav04>.

⁶⁸⁵Wye Island NRMA Land Unit Plan, 2004, Prepared by the Maryland DNR Land and Water Conservation Service, p. 19.

freshwater marsh. Planners view shore protection as unlikely along the eastern side of the Wye River and in the Wye Narrows, but almost certain along the western side (e.g., the Bennett Point region) and likely along parts of the Wye East River. If the marshes and tidal flats in these areas are lost, the juvenile fish nurseries will be lost and species that feed in the marshes and SAV (e.g., wading birds, striped bass, blue gill, blue crabs) will lose an important food source.

Farther upstream on the Wye East River is the Wye Island Natural Resource Management Area (Wye Island NRMA, CBIM location 50). Steep vegetated banks, 1 to 20 feet in height with some areas eroded to bluffs, are the primary border around the island, with some areas of estuarine marsh forming more gradual slopes to upland areas.⁶⁸⁶ The marshes of Wye Island support a large waterfowl population, with a wintering waterfowl count of 20,000 birds such as mallard, canvasback, and ruddy ducks and Canada geese.⁶⁸⁷ Local planners indicate that adjacent areas are unlikely to be protected, with the exception of the area south of Wye Island. Current erosion rates in the area are low (approximately 2 feet per year); however, accretion rates are also low and migration is impeded in areas by the upland height and by dense vegetation, which shades the shorelines and inhibits growth of emergent vegetation.⁶⁸⁸ Nonstructural and hybrid shoreline protections have been implemented at the Wye Island NRMA site to protect the various habitats.⁶⁸⁹ Maryland DNR will manage Wye Island to protect its biological diversity and structural integrity, such that detrimental effects from sea level rise acceleration are minimized.⁶⁹⁰

⁶⁸⁶Ibid., p. 13.

⁶⁸⁷Ibid., p. 18.

⁶⁸⁸Ibid., pp. 33–34.

⁶⁸⁹Burke, D., E.W. Koch, and J.C. Stevenson, 2005, Assessment of Hybrid Type Shore Erosion Control Projects in Maryland's Chesapeake Bay, Phases I and II, Final Report submitted to the Chesapeake Bay Trust, Annapolis, MD, p. 9, and further discussions throughout document.

⁶⁹⁰Wye Island, 2004, p. 12 (see note 685).

Easton–St. Michaels–Tilghman Island

Planners expect continued development and shore protection in the general area of Easton and St. Michaels, including both sides of the Miles and Tred Avon rivers and most of the land in between. On the bay side of Tilghman Island (CBIM location 51), the high erosion rates will tend to encourage construction of shoreline protection measures, particularly following construction of waterfront homes.⁶⁹¹ Walnut Point (CBIM location 53), at the southern end of Tilghman Island, has been ripped and bulkheaded multiple times after continuing losses of protective measures from storms and high-energy waves. The multiple waterways (e.g., Harris Creek, Broad Creek, Avon River) east of Tilghman Island that flow into the Choptank are also all highly developed. The bay side of Tilghman Island has fringing marsh, nearshore SAV beds, and beaches. On the east side of Tilghman Island, marshes and tidal flats are found extensively along the multiple waterways particularly on the eastern edge of Harris Creek and the borders of Broad Creek.⁶⁹² Sea level rise will eliminate most of these marsh and shallow water areas owing to the inability to migrate and their marginal ability to migrate with current sea level rise rates. The loss of beaches and shallow water habitat will eliminate the worms, snails, amphipods, sand fleas, and other invertebrates that live in the beach and intertidal areas and reduce forage for their predators (e.g., oystercatchers, sandpipers, plovers, and glossy ibises). Shallow water habitats, with their resident community of bivalves, worms and other invertebrates, provide a high-density feeding ground for many predators, including fish and wading birds. Loss of shallow water habitat will decrease the SAV that is distributed throughout the coves. Today the SAV provides habitat for many fish as well as forage for waterfowl. Extensive soft-shell clam (*Mya arenaria*) beds are also found in shallow water west of Tilghman Island opposite areas almost certain to be protected.⁶⁹³ The impact of the

⁶⁹¹Maryland Shoreline Changes Online (see note 665).

⁶⁹²Tiner and Burke, 1995 (see note 32).

⁶⁹³NOAA, 1993, Environmental Sensitivity Index summary maps for Chesapeake Bay, obtained from the NOAA Office of Response and Restoration.

armoring and sea level rise on these beds is unknown.

West of Tilghman Island, Poplar Island (CBIM location 52) eroded from more than 1,000 acres during the mid-19th century to less than 10 acres today. It is now being restored to the footprint of 1847 through the beneficial use of dredge material, which is creating shallow water, low marsh, high marsh, and vegetated upland areas.⁶⁹⁴ During the creation process, the island has attracted a variety of wildlife, including great blue herons, double-breasted cormorants, and diamondback terrapins.^{695,696} The final upland elevations will be 20 feet above mean lower low water, more than high enough to retain its functions as sea level rises for the foreseeable future.

Wrapup

Large areas of marshes and tidal flats, particularly near the mouth of the Choptank River and around the Eastern Bay, are likely to be lost. These marshes are only marginally meeting current rates of sea level rise, and are predicted to be lost with a 2 mm/yr increase in rate. Crabs, juvenile fish, and the larger fish and waterfowl that feed on them will all be affected. The central eastern shore lies in the Atlantic Flyway and marsh loss will affect the ability of migratory birds to feed on the route south in the winter. Although the northern side of Kent Island and the marshes on the Chester River are keeping pace today, they are expected to be marginal with a 2 mm/yr increase in sea level rise and to be lost with a 7 mm/yr increase. Armoring of developed areas on Kent Island and south to Queenstown is likely to cause inundation of tidal flats and some marsh areas up to the protection structures.

⁶⁹⁴Poplar Island Environmental Restoration Site, U.S. Army Corps of Engineers, accessed on July 17, 2006, at: <http://www.nab.usace.army.mil/projects/Maryland/PoplarIsland/index.html>.

⁶⁹⁵Ibid.

⁶⁹⁶Robbins and Blom, 1996, double-crested cormorants, pp. 44—45 (see note 552).