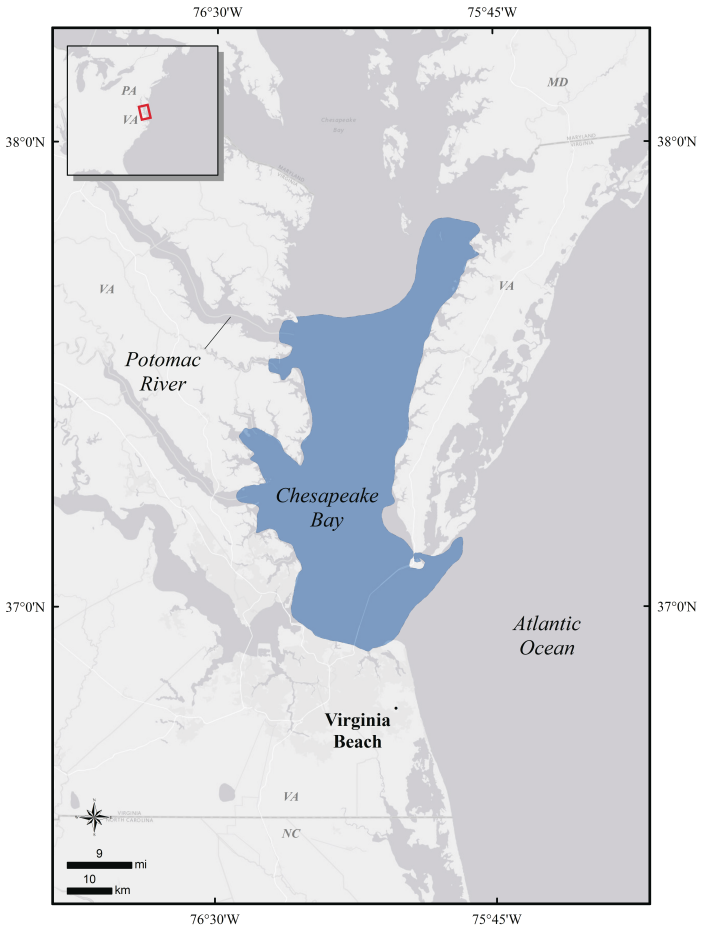
Key Site 83: Lower Chesapeake Bay, Virginia

Location: 37°23'41"N, 76°5'51"W

Size: 2655 km^2

Description: Chesapeake Bay is the largest estuary in the United States and the third largest in the world. It is more than 320 km long, stretching from Havre de Grace, Maryland, to Virginia Beach, Virginia (Schubel and Pritchard 1986). The bay can be subdivided into upper and lower Chesapeake Bay because benthic communities and salinity regimes differ substantially. The lower portion of the bay stretches from Potomac River to Virginia Beach at the mouth of the bay in the Atlantic Ocean. The lower reach is dotted by several large islands such as Bloodsworth, Smith, and Tangier Islands. The bay is relatively shallow with an average depth of 6.46 m, and lower bay salinities range from 15 to 29 ppt. The bay receives about half of its water volume from the Atlantic Ocean in the form of saltwater. Large rivers such as the Potomac, Rappahannock, York, and James Rivers contribute millions of gallons of fresh water to the lower reaches of the bay (Chesapeake Bay Program 2019). This is a highly populated area with large cities such as Richmond on the James River and Norfolk at the mouth of the bay. Air temperatures range from a mean high of 6°C to a mean low of –2°C in the winter and a mean high of 30°C to a mean low of 22°C in the summer.



Precision and Correction of Abundance Estimates Presented: Abundance estimates are based on data from the Atlantic Coast Wintering Sea Duck Survey (see Silverman et al. 2012 for methods; also see Methods section in this atlas) and related surveys (Mid-Winter Survey [MWS; Eggeman and Johnson 1989] or Atlantic Marine Assessment Program for Protected Species [AMAPPS 2015]). Abundance estimates presented for this key habitat site have not been adjusted to account for incomplete detection or other biases. Therefore, abundance estimates should be considered minimum estimates.

Biological Value: During winter, this area supports 87 different species of waterbirds and 29 species of waterfowl (Chesapeake Bay Program 2019). The seagrass beds (e.g., eelgrass and widgeon grass) support a huge diversity of bivalves and crustaceans (Seitz et al. 2006), which are an important food source for scoters (*Melanitta* spp.) and Long-tailed Duck (*Clangula hyemalis*) (Cottam 1939), which are the most common sea duck species wintering in the area. Silverman et al. (2012; see Methods section in this atlas) estimated a minimum of 40,000 sea ducks, including 31,000 wintering scoters and more than 4000 wintering Long-tailed Ducks in the lower reaches of the bay. Important features for sea ducks in this key site are relatively shallow areas in and around the mouths of rivers such as the Potomac, Rappahannock, York, and James Rivers.

Sensitivities: The lower Chesapeake Bay is a major commercial shipping and naval cruiser waterway. The mouth of the bay experiences high waterway traffic near Norfolk, primarily from a naval base, and civilian boating traffic near Virginia Beach and Hampton. This high commercial, military, and civilian waterway traffic has the potential for increasing pollution, habitat destruction, and introduction of invasive species. Eutrophication from runoff from residential areas and commercial sites, and warming water temperatures, can be a serious problem

with adverse effects on fisheries and oyster reefs (Cook et al. 1998, Kemp et al. 2005). Climate change may also have drastic impacts on the health of the bay. Extensive tidal marshes, which have served as effective nutrient buffers along the bay's margins, are now being lost with rising sea level. Also, in drier years the decreased inflow of fresh water from rivers can drastically alter the salinity gradients, causing a decline in certain species of submerged aquatic vegetation (Kemp et al. 2004). The spread of invasive species is exacerbated by increasing water temperatures (Setzler-Hamilton et al. 1995) as a result of climate change.

Potential Conflicts: There are many potential conflicts in the lower reaches of the Chesapeake Bay because of high human densities. Hard clam aquaculture is a growing industry in the lower Chesapeake Bay and often conflicts with restoration of submerged aquatic vegetation, which is important for fish and blue crab (Hershner and Woods 1999). Declining bivalve communities due to eutrophication, warming water temperatures, and competition with invasive species can decrease the quality of habitat for wintering sea ducks.

Status: Most of the land in the lower Chesapeake Bay is private and under conservation easement, but there are also protected federal and state lands such as Plum Tree Island National Wildlife Refuge, Savage Neck Dunes State Natural Area Reserve, and Saxis Wildlife Management Area (Chesapeake Bay Program 2019). On the eastern shores are Chesapeake Bay National Estuarine Research Reserve, Janes Island State Park, Saxis Wildlife Management Area, and Martin National Wildlife Refuge. There are also significant efforts to identify and protect watersheds that are critical to water quality in the bay. Nonetheless, there are far fewer protected areas in the lower reaches of the bay than in the upper Chesapeake Bay. Areas below mean high tide fall under the jurisdiction of the Commonwealth of Virginia, particularly the Virginia Marine Resources Commission. There are a number of Important Bird Areas (IBA) within the key site. Of particular importance to sea ducks are the Chesapeake Bay Islands and Western Marshes IBAs. The protection and health of the Chesapeake Bay is closely monitored by the Chesapeake Bay Program (2019).

Literature Cited

Atlantic Marine Assessment Program for Protected Species (AMAPPS). 2015. https://atlanticmarinebirds.org/downloads/amapps_usfws_report_v1_May2015.pdf.

Chesapeake Bay Program. 2019. Science. Restoration. Partnership. https://www.chesapeakebay.net/.

Cook, T., M. Folli, J. Klinck, S. Ford, and J. Miller. 1998. The relationship between increasing sea-surface temperatures and the northward spread of *Perkinsus marinus* (Dermo) disease epizootics in Oysters. Estuarine, Coastal, and Shelf Science 46:587–597.

Cottam, C. 1939. Food habits of North American diving ducks. U.S. Department of Agriculture. Technical Bulletin No. 643. 140 pp.

Eggeman, D. R., and F. A. Johnson. 1989. Variation in effort and methodology for the midwinter waterfowl inventory in the Atlantic Flyway. Wildlife Society Bulletin 17:227–233.

Hershner, C., and H. Woods. 1999. Shallow Water Resource Use Conflicts: Clam Aquaculture and Submerged Aquatic Vegetation. Center for Coastal Resources Management, Virginia Institute of Marine Science, Gloucester Pt., VA. Technical Report. 60 pp. http://ccrm.vims.edu/projreps/clamaqua_sav.pdf.

Kemp, W. M., R. Batiuk, R. Bartleson, P. Bergstrom, V. Carter, C. L. Gallegos, W. Hunley, L. Karrh, E. W. Koch, J. M. Landwehr, K. A. Moore, L. Murray, M. Naylor, N. B. Rybicki, J. C. Stevenson, and D. J. Wilcox. 2004. Habitat requirements for submerged aquatic vegetation in Chesapeake Bay: Water quality, light regime, and physical-chemical factors. Estuaries 27:363–377.

Kemp, W. M., W. R. Boynton, J. E. Adolf, D. F. Boesch, W. C. Boicourt, G. Brush, J. C. Cornwell, T. R. Fisher, P. M. Glibert, J. D. Hagy, L. W. Harding, E. D. Houde, D. G. Kimmel, W. D. Miller, R. I. E. Newell, M. R. Roman, E. M. Smith, and J. C. Stevenson. 2005. Eutrophication of Chesapeake Bay: Historical trends and ecological interactions. Marine Ecology Progress Series 303:1–29.

Schubel, J. R., and D. W. Pritchard. 1986. Response of the Upper Chesapeake Bay to variations in discharge of the Susquehana River. Estuaries 9:236–249. https://doi.org/10.2307/1352096.

Seitz, R. D., R. N. Lipcius, N. H. Olmstead, M. S. Seebo, and D. M. Lambert. 2006. Influence of shallow-water habitats and shoreline development on abundance, biomass, and diversity of benthic prey and predators in Chesapeake Bay. Marine Ecology Progress Series 326:11–27.

Setzler-Hamilton, E. M., D. A. Wright, V. S. Kennedy, and A. Magee. 1995. Temperature/salinity tolerance in larvae of zebra mussels and its potential impact in northern Chesapeake Bay. *In* P. Hill and S. Nelson (eds.), Proceedings of the 1994 Chesapeake Research Conference, Toward a Sustainable Coastal Watershed: The Chesapeake Experiment, pp. 371–376. Chesapeake Research Consortium, Norfolk, Virginia.

Silverman, E. D., J. B. Leirness, D. T. Saalfeld, M. D. Koneff, and K. D. Richkus. 2012. Atlantic coastal wintering sea duck survey, 2008–2011. U.S. Fish and Wildlife Service: Division of Migratory Bird Management, Laurel, Maryland. https://ecos.fws.gov/ServCat/Reference/Profile/142409.