



Calvert County Environmental Commission

The Chesapeake Bay and its Tributaries

1. How old is the Chesapeake Bay and how did it form?

The present Chesapeake Bay began to form around the end of the last ice age, as rising sea levels from melting ice sheets began to flood the lower valley of the Susquehanna River about 10,000 years ago. By 8,000 years ago, the Bay east of Calvert County began to widen rapidly, becoming a two-layer estuary by around 6,000 years ago. The Bay is continuing to widen slowly due to shoreline erosion and flooding of low-lying areas. The early Native Americans were here before the present Bay began to form. Several earlier versions of Chesapeake Bay existed during other times of warm interglacial periods when ice sheet coverage of the Earth was reduced.

2. Where does the sand along Calvert County's beaches and on the bottoms of streams come from?

Geologists use the term "sand" to indicate materials with particle sizes of 0.01 to 0.02 inches in diameter. Most local sand is made of the common mineral, quartz, but other minerals resistant to weathering and erosion are also present in smaller amounts. These minerals were eroded from ancient hard rocks in the Piedmont and Appalachian regions (e.g., granite, gneiss, and quartzite) over many tens of millions of years. The eroded material was moved downslope and out onto the Coastal Plain by streams and rivers. Today, the sand is being redistributed by storm water, stream channel erosion, and by wave action from our beaches. Sands along the base of Calvert Cliffs are on average moving southward.

3. How many miles of streams drain Calvert County?

There are 243 miles of non-tidal and freshwater streams in the county. This estimate comes from the 1:100,000 scale base map used by the Maryland Biological Stream Survey conducted by the Department of Natural Resources (DNR). Use of a finer scale base map (e.g., 1:24,000) would result in more miles of streams, perhaps 25% more. The DNR number of 243 miles does not include larger than 4th order freshwater or tidal streams. Calvert County's streams drain 22, 12-digit watershed. Most of the 18 largest county streams like Lyons, Hunting, Battle Creek, 3 and St. Leonard creeks drain into the Patuxent River. Two of the larger Bayside streams are Fishing and Parkers creeks that drain into Chesapeake Bay. For more information on DNR's stream survey, go to: [Maryland Biological Stream Survey](#).

4. How many kinds of fish are found in the Chesapeake Bay, in the Patuxent River, and in the County's freshwater streams?

More than 350 species (kinds) of fish have been found in the Chesapeake Bay and its tributaries. Within the main stem Bay, 211 fish species are known to occur. Only 32 species are considered year-round residents. The rest are spawning migrants and seasonal visitors. For more information on Bay fishes, see [Field Guide to Fishes of the Chesapeake Bay \(chesapeakefishes.com\)](#).

Depending on the source, between 33 and more than 100 fish species occur in the Patuxent River basin. For the main stem portion that flows past Calvert County, 33 fish species is the best estimate. [About the River | Patuxent Riverkeeper \(paxriverkeeper.org\)](#)

The Maryland Biological Stream Survey conducted by the Department of Natural Resources collected 33 fish species in Calvert County's freshwater streams. The Eastern Mudminnow was most commonly encountered, followed by Redfin Pickerel, American Shad, Blacknose Dace, and Bluegill on the top five list. For details, see: [MBSS Site details \(maryland.gov\)](http://maryland.gov/MBSS)

5. Who monitors the health of Calvert County streams?

Healthy streams will typically contain a large and diverse community of aquatic organisms with good water quality, a wide range of suitable habitat, and a forested riparian (streamside) areas. Healthy streams are essential in Calvert County to protect the Patuxent River and the Chesapeake Bay.

Streams in the county are monitored by the Maryland Department of Natural Resources (DNR), Calvert County Planning & Zoning (P&Z), the University of Maryland's Chesapeake Biological Laboratory (CBL), and the American Chestnut Land Trust (ACLT).

DNR has been monitoring biology, chemistry, and physical habitat in county streams since 1995. As of 2015, DNR's Maryland Biological Stream Survey has sampled 49 stream sites in the county. Additional sites will be sampled in 2017 and 2018. DNR's volunteer-based Stream Waders Program sampled 99 stream sites in Calvert County between 2000 and 2015.

CBL monitors water quality in 14 tidal streams, in addition to conducting research projects in the Patuxent River. In response to the rapid growth of marinas and residential dwellings along the shores of Solomons Harbor, annual water quality assessments in the harbor and also in three tributaries in the Mill Creek watershed (Back, St. Johns, and Mill creeks) have been conducted since 1987. Long time series of monitoring data are very important for tracking temporal changes.

P&Z staff and citizen volunteers are sampling 28 non-tidal streams to monitor nutrient concentrations and loads. Funding for this monitoring program comes from the Cove Point Natural Heritage Trust.

Staff and volunteers with ACLT are monitoring water quality in several tributaries to Parkers Creek. In 2017, ACLT also started to monitor the fish community in the tidal portion of Parkers Creek and also in several non-tidal tributaries.

6. What are the current conditions of County streams, the Patuxent River, and the Bay?

Results from the Maryland Biological Stream Survey conducted by the Department of Natural Resources (DNR) plus their volunteerbased Stream Waders Program show that over half of the non-tidal and freshwater streams in Calvert County are in poor or very poor ecological condition. That assessment means that almost 140 miles of streams have been degraded by stormwater runoff and other stressors and are candidates for restoration.

On a more positive note, the remaining 100+ miles of streams are still relatively healthy and should be protected. Index scores for the benthic macroinvertebrate and fish communities were highest in Lyons Creek and lowest in Fishing Creek. Another positive finding is that nitrate-nitrogen concentrations were very low in all county streams sampled by DNR. The major factor degrading our streams seems to be poor physical habitat quality. Recent analyses of DNR data conducted by Ron Klauda (rjklauda@gmail.com) showed that fish community index scores were higher in county streams that flow into the Patuxent compared to those streams that flow directly into the Bay. No eastwest differences in

index scores were found for the benthic macroinvertebrate community. Reasons for the east-west differences in stream fish communities are not known and will require further study.

The lower 35 or so miles of the 110-mile long Patuxent River estuary, the longest river completely within Maryland, flow along the western and southern edges of Calvert County before entering Chesapeake Bay. Although there have been several upgrades to the nine major and several smaller waste water treatment plants that discharge about 70 million gallons of water to the river every day, water and habitat quality remain poor. The latest report card for the Patuxent gave it a grade of D in 2017 (see [Home | EcoHealth Report Cards \(ecoreportcard.org\)](#) for more information).

Every second Sunday in June since 1988, Bernie Fowler, former Maryland State Senator and long-time Calvert County resident, led a wade-in at Jefferson Patterson Park to measure water clarity in the Patuxent using the “Bernie Fowler Sneaker Index”. Bernie passed away in 2021, but local residents have continued the annual wade-in.

On June 10, 2018, Bernie lost sight of his white sneakers at a water depth of 36 inches on his bib overalls, down from 41.5 inches in 2017, but still better than most years since 2000. Measurements in previous years have been as deep as 44.5 inches in 1997 and as shallow as 8 inches in 1989).

Much work remains to be done to restore the Patuxent to what it was like during the 1950s and early 1960s. The Chesapeake Bay is the eastern boundary of Calvert County, about 30 miles long from North Beach to Solomons Island. Since the late 1960s, water quality in the Bay has declined. The most severe problems occur in the mid-Bay region, some of which is adjacent to Calvert County. Major problems include algal blooms, dead zones with very low dissolved oxygen levels in the water, the disappearance of sea grasses, and other even more complicated water chemistry issues. However, in August 2017, DNR reported that dissolved oxygen conditions in the Maryland portion of the Bay were improved and the “dead zone” volume in August was much smaller than the previous 30-year average. For more information, go to: [Eyes on the Bay of Maryland Department of Natural Resources : Your Home for Maryland Tidal Water Quality Data](#)

7. What are the major threats to the health of our streams, the Patuxent, and the Bay?

The major threats to aquatic ecosystems are almost always human population growth and the associated development and land use changes that come along with growth. These major threats are manifested as impacts to county streams, the Patuxent, and the Bay via a long list of stressors. There is no single 'smoking gun'. Natural disturbances such as floods and droughts keep even healthy aquatic systems in a state of dynamic rather than stable equilibria. So the plants and animals (the biota) living there are adapted to an ever-changing environment. But human influences often magnify the intensity and/or increase the frequency of disturbances and impose unnatural changes that can overwhelm the innate resiliency of aquatic biota. For streams, the stressors include increases in impervious (non-absorbing) land cover, increases in storm water runoff, more channel erosion and sedimentation, loss of streamside forests, inflow of road salts and other contaminants, blockages, competition with invasive species, and global warming/climate change. Since the adverse effects of these stream stressors cascade down slope, they also threaten the health of the Patuxent and the Bay --- where excess nutrients and sediments plus chemical contaminants and invasive species are especially important threats.

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