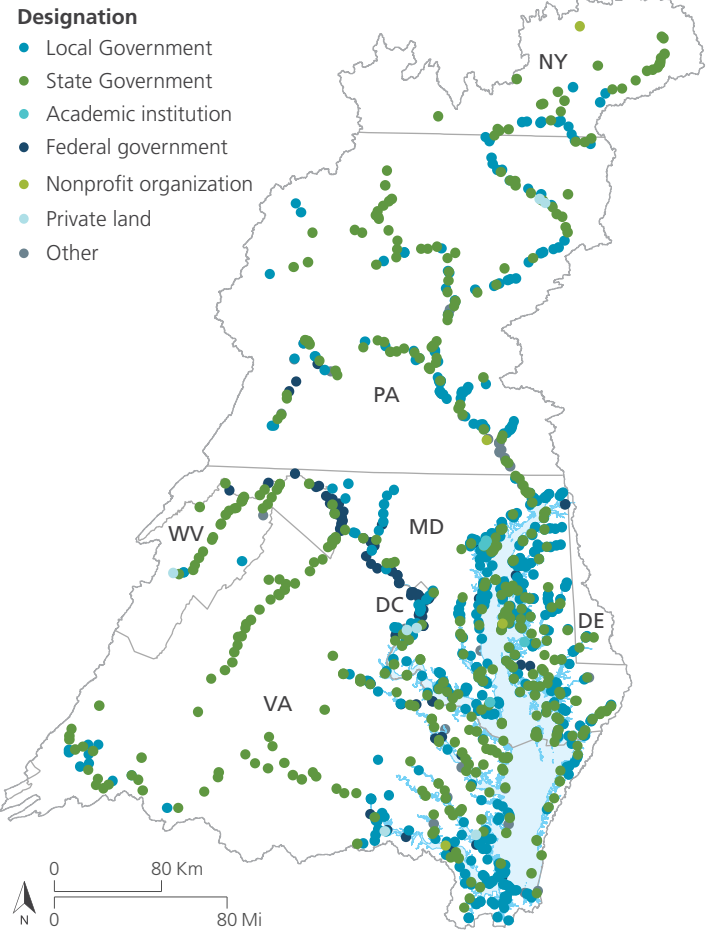# Chesapeake Bay
Report Card 2016

C

University of Maryland Center for Environmental Science

Fun for you and your family

Stewardship is defined as "the responsible oversight and protection of something considered worth caring for and preserving." In order to feel a sense of stewardship with a resource like Chesapeake Bay, people need to connect with it and feel a sense of place. This sense of place that comes from experiencing the Chesapeake's waters can lead to a feeling of kinship and a sense of shared responsibility for Bay resources. As a result, people who enjoy the Bay and its rivers through public access sites are more likely to become citizen stewards.

Expanding public access opportunities for citizens around the Chesapeake Bay watershed for activities like boating, fishing, swimming, and viewing is a focus of the Chesapeake Bay Program partnership. These public access points provide a fun way for people to connect with nature. Activities such as these strengthen families, build personal connections, boost local, state, and federal economies, and support stewardship of the Bay.

Public access in the Chesapeake Bay watershed

Designation
- Local Government
- State Government
- Academic institution
- Federal government
- Nonprofit organization
- Private land
- Other

With public access sites throughout the watershed, recreational opportunities in and around Chesapeake Bay are varied and numerous. Map and photos by Chesapeake Bay Program.

Volunteer your time to improve the Bay

You can get involved with your local watershed organization or volunteer to do stream sampling in your community. Volunteering is a great way to be a good steward of our Bay. As a volunteer scientist, the data you collect will be incorporated into management decisions about Chesapeake Bay and its watershed through the Chesapeake Monitoring Cooperative. The Cooperative is a partnership that provides technical, logistical, and outreach support to incorporate volunteer water quality and macroinvertebrate monitoring data into the Chesapeake Bay Program partnership. The Cooperative is working with diverse partners to collect and share new and existing water quality data. This is the first effort to integrate volunteer science data into a federal program. Check out chesapeakemonitoringcoop.org.
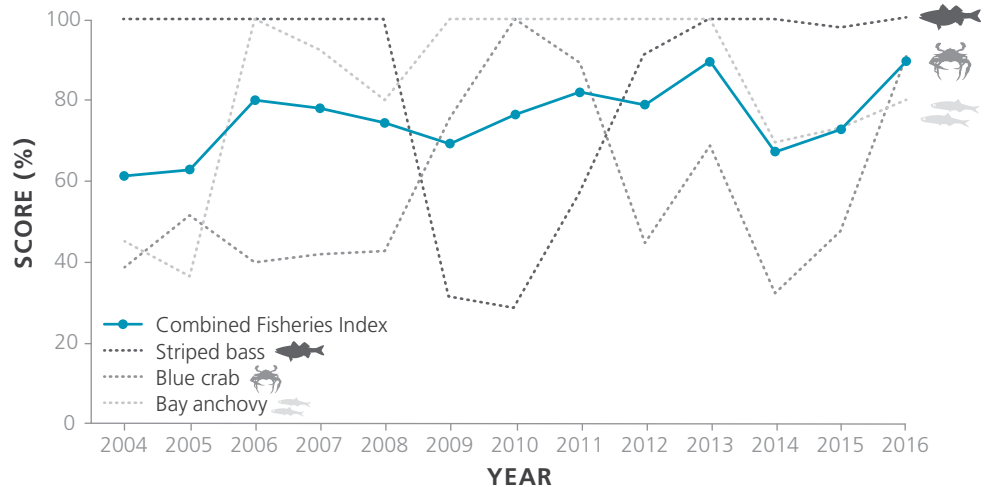

Stream water quality monitoring is fun and educational. Photo by the Alliance for Aquatic Resource Monitoring.

More gains for fish populations

A striped bass is handled by Captain Pete Ide at Fishing Creek in Chesapeake Beach, MD. Photo by Chesapeake Bay Program.

Health of Fisheries, 2004–2016

Four indicators of fisheries health showed widespread score improvements in 2016.

Striped bass, bay anchovy, and blue crab are ecologically, economically, and socially important fish species in Chesapeake Bay, and are incorporated into the Combined Fisheries Index. While the Index is variable over time, the 2016 score of 90% was a large improvement over the previous year's score of 73%. This is the highest the fisheries score has been since the start of the report card. The Index is an average of all three species scores. Striped bass held steady with a 100% score, while both blue crab and bay anchovy improved. Blue crab scored a 90% and bay anchovy scored an 80%. Fisheries indicators can vary greatly from year to year since these species move throughout the Bay and beyond.

Partnering with stakeholders on management

OysterFutures is a National Science Foundation-funded project that is testing an innovative approach for building consensus on oyster management and restoration in the Choptank region by including stakeholders in a collaborative modeling process. Stakeholders, including watermen, agency representatives, and environmental groups participate in meetings to develop management recommendations and work with scientists to create a model that forecasts potential effects of management options on oyster populations, the oyster industry, and water quality. Respectful and positive discussions at workgroup meetings bode well for this collaborative approach, which is designed to develop science-based regulations that meet the needs of multiple stakeholders.

Eastern oysters (left) and Atlantic menhaden (right) are commercially important fisheries in the Bay. Photos by Chesapeake Bay Program.

Working to better understand forage fish

New research brought together data from eight monitoring programs to better understand predator-prey relationships and the status of forage fish in the Chesapeake Bay. *Forage Indicators And Consumption Profiles For Chesapeake Bay Fishes*, a project led by Andre Buchheister and Ed Houde at UMCES Chesapeake Biological Laboratory, illuminates trends in abundance of key forage groups and patterns of consumption by predators over time. This work builds a foundation of knowledge to assess and understand complex forage relationships in the Bay. Indicators in this paper could be used to inform future management decisions and help set targets for forage species. Support for research like this leads to a healthier Bay, healthier communities, and a thriving economy.

Improving trends continue

Bay Health trends

↗	Significantly improving
↗	Slightly improving
→	No change
↘	Slightly declining
↘	Significantly declining

2016 Chesapeake Bay Health: C

C- ↗ **Upper Western Shore**

Moderately poor ecosystem health. Overall health declined the most out of all regions, with all indicator scores decreasing or staying the same except for chlorophyll *a*. Over time, this region has a significantly improving trend.

D ↗ **Patapsco and Back Rivers**

Poor ecosystem health. Overall health improved the most out of all regions. There were improvements in total phosphorus, dissolved oxygen, and chlorophyll *a*. Over time, this region has a significantly improving trend.

Upper Bay **C** ↗

Moderate ecosystem health. Health remained steady. Improvements in aquatic grasses and water clarity were balanced by declines in benthic community. Over time, this region has a significantly improving trend.

D+ ↗ **Lower Western Shore (MD)**

Poor ecosystem health. Improvements in total phosphorus and dissolved oxygen offset declines in chlorophyll a. Over time, this region has a significantly improving trend.

Upper Eastern Shore **C** →

Moderate ecosystem health. Health remained steady. While some indicators improved, others declined. Total nitrogen declined the most out of all the regions.

D+ → **Patuxent River**

Poor ecosystem health. Overall health improved due to increases in total phosphorus, dissolved oxygen, and chlorophyll *a* scores.

Choptank River **C** →

Moderate ecosystem health. Overall health declined due to decreases in total nitrogen, water clarity, and benthic community scores.

C- → **Potomac River**

Moderately poor ecosystem health. Health remained steady. Improvements in total phosphorus and water clarity were offset by declines in other indicators.

Lower Eastern Shore (Tangier) **C+** ↗

Moderate ecosystem health. Overall health improved due to gains in chlorophyll *a* and total phosphorus. This region has a significantly improving trend.

C → **Rappahannock River**

Moderate ecosystem health. Health slightly improved. Aquatic grasses scored the highest in this region. There were also improvements in total phosphorus.
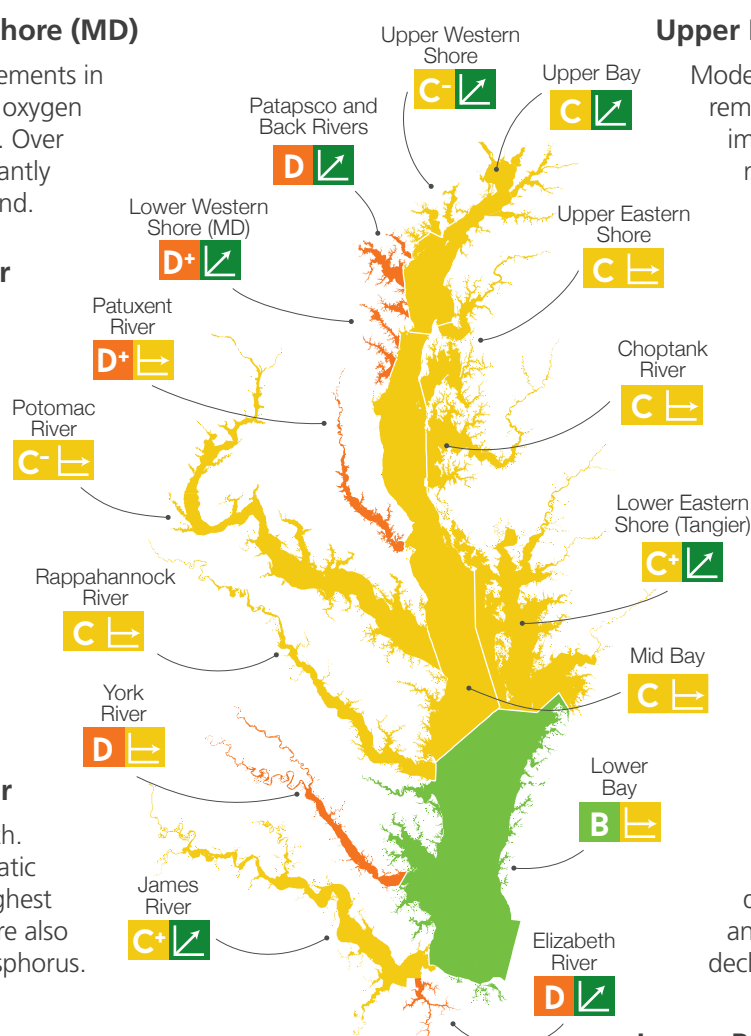
Mid Bay **C** →

Moderate ecosystem health. Health remained steady. Improvements in dissolved oxygen, total phosphorus, and aquatic grasses were offset by declines in benthic community.

D → **York River**

Poor ecosystem health. This region declined from the previous year. Lowest dissolved oxygen and total phosphorus scores of any region. Showed declines in total nitrogen and aquatic grasses scores.
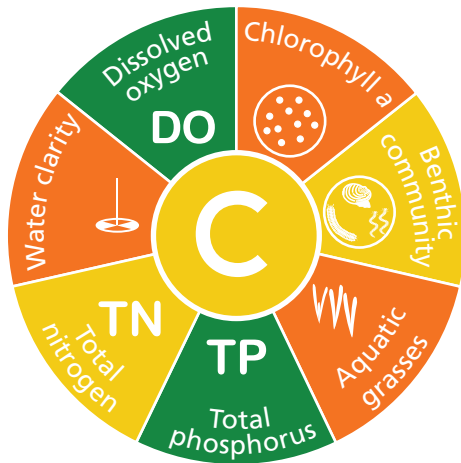
Lower Bay **B** →

Moderately good ecosystem health. Continues to be the highest scoring region, particularly for total nitrogen and total phosphorus. This was the only region where benthic community improved from the previous year.

C+ ↗ **James River**

Moderate ecosystem health. Improvements in chlorophyll *a* were balanced by declines in aquatic grasses. This region has a significantly improving trend.
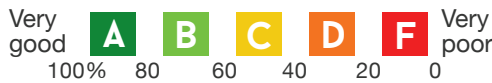
Elizabeth River **D** ↗

Poor ecosystem health. Health of this region is variable, showing large changes in indicator scores from year to year. This region has a significantly improving trend.

Map labels:
- Upper Western Shore **C-** ↗
- Upper Bay **C** ↗
- Patapsco and Back Rivers **D** ↗
- Lower Western Shore (MD) **D+** ↗
- Upper Eastern Shore **C** →
- Patuxent River **D+** →
- Choptank River **C** →
- Potomac River **C-** →
- Lower Eastern Shore (Tangier) **C+** ↗
- Rappahannock River **C** →
- Mid Bay **C** →
- York River **D** →
- Lower Bay **B** →
- James River **C+** ↗
- Elizabeth River **D** ↗

Recent improvements hold steady

Bay Health scale

Very good — A | B | C | D | F — Very poor
100% — 80 — 60 — 40 — 20 — 0

The overall score for the Chesapeake Bay Health Index for 2016 was 54%, compared with 53% in 2015. While this is only a slight improvement, it is encouraging to see health remaining steady despite many pressures on the Chesapeake Bay and its watershed. Overall Bay health shows no significant change over time (1986–2016), neither improving nor declining.

Bay-wide, dissolved oxygen continues to be the best-scoring indicator. Dissolved oxygen scored 90% in 2016, an A. Total phosphorus strongly improved, scoring 82%, an A-, which is a positive development considering last year's decline. While the total nitrogen score went down in 2016 to 55%, a C+, it is still improving in the long term. Water clarity scored 24%, a D-; chlorophyll a scored 35%, a D+; aquatic grasses scored 39%, a D+; all remaining the same as the previous year. Benthic community declined the most since 2015, scoring 54%, a C.

Total phosphorus, total nitrogen, and aquatic grasses all have significantly improving trends. Water clarity and chlorophyll a have significantly declining trends. Dissolved oxygen and benthic community show no significant change in health over time.

Indicators in the Chesapeake Bay Report Card

There are seven indicators that make up the Bay Health Index for the Chesapeake Bay Report Card. Each indicator is compared to scientifically derived thresholds or goals and scored to determine the overall grade. There are fifteen reporting regions (see map in center page) that make up Chesapeake Bay, and each indicator is scored by reporting region, and then the reporting regions are weighted by area to calculate the overall Bay Health Index. There are also three fisheries indicators that make up the Fisheries Index; however, this index is not used in the overall Bay Health Index score.

Chlorophyll a is used as a measure of phytoplankton (microalgae) biomass. High phytoplankton levels lead to reduced water clarity and decomposing phytoplankton result in reduced dissolved oxygen levels.

Water clarity is a measure of how much light penetrates though the water column. Water clarity plays an important role in determining aquatic grasses and phytoplankton distribution and abundance.

Aquatic grasses, or submerged aquatic vegetation, are one of the most important habitats in Chesapeake Bay. They provide critical habitat to key species such as blue crab and striped bass, and can improve water clarity.

DO Dissolved oxygen is critical to the survival of Chesapeake Bay's aquatic life. The amount of dissolved oxygen needed before aquatic organisms are stressed, or even die, varies from species to species.

Benthic community, or the Benthic Index of Biotic Integrity, measures the condition of the benthic community living in or on the bottom areas of the Bay. These organisms are a key food source for fish species.

Striped bass, bay anchovy, and blue crab make up the Combined Fisheries Index, which is not included in the Bay Health score. Bay anchovy is one of the most abundant schooling fish species in the Bay, providing an important food source for top predators. Striped bass are key top predators, and use the Bay as an important spawning and nursery area. Blue crabs are both predator and prey in the Bay's food web and use aquatic grasses as habitat.

TP Total phosphorus is an indicator of excess phosphorus in the Bay. Too much phosphorus can lead to algae blooms, which cause poor dissolved oxygen conditions and stresses Bay organisms.

TN Total nitrogen is an indicator of excess nitrogen in the Bay. Too much nitrogen can lead to algae blooms, which cause poor dissolved oxygen conditions and stresses Bay organisms.

For more information, visit chesapeakebay.ecoreportcard.org

Partnerships work to keep the Bay thriving

Actions are underway to protect and restore the water, habitats, and animals throughout the Chesapeake Bay watershed. These actions are being led by local, state, and federal governments, nonprofit organizations, academic institutions, private businesses, and individual citizens. Strong collaborations and sharing of resources among these groups maximizes the effectiveness of their work. Partnerships are essential to optimize the valuable work occurring throughout the Bay.

One way in which unique partnerships are protecting the Bay is through land conservation. There are currently 8.8 million acres of protected lands throughout the watershed. They have been protected through unique partnerships such as the Chesapeake Conservation Partnership (chesapeakeconservation.org). This regional coalition of over 50 organizations is guiding land conservation by bridging the connection between ecological, cultural, and recreational resources. Key leads are the Chesapeake Conservancy and the National Park Service Chesapeake Bay Office.

Interstate partnerships are also positively influencing the Bay. Maryland and Virginia collaborate on innovative technologies and share knowledge about oyster conservation. Oysters support the economy, the environment, and our cultural heritage. But overharvesting, disease, and pollution have all impacted oyster populations. Restoring and sustaining the populations into the future is essential to the success of all Bay restoration efforts. Maryland, Virginia, federal agencies, and nonprofits have restored significant numbers of oysters in tributaries in both Maryland and Virginia.

Land owner

- Federal
- State
- Local
- Non-Governmental Organization
- Private
- Other
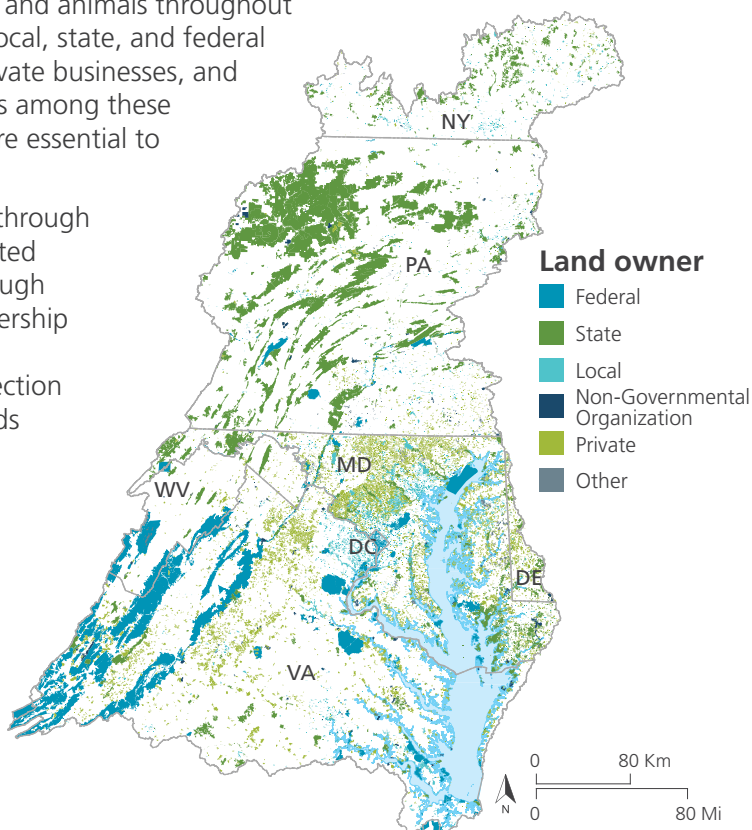
Map: Protected lands in the Chesapeake Bay watershed. Map provided by the Chesapeake Bay Program. Photos left to right: Butch Walters of Deal Island, MD, harvests oysters in the waters north of Deal Island. The Florence Shelly Preserve in Susquehanna County, PA is owned by the Nature Conservancy and features forest, fields, a stream, and glacial pond surrounded by a floating bog. Photos by Chesapeake Bay Program.

About the Chesapeake Bay Report Card

ian.umces.edu

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CENTER FOR ENVIRONMENTAL SCIENCE

chesapeakebay.ecoreportcard.org