

A vibrant, high-angle photograph of a forest stream. The water flows over a series of moss-covered rocks, creating a small waterfall. The surrounding trees and foliage are dense and green, with sunlight filtering through the canopy. The overall scene is serene and natural.

# 2018 *Chesapeake Bay & Watershed Report Card*

*University of Maryland Center for Environmental Science*

# Many tidal indicator scores decreased in 2018

All indicator scores decreased or remained the same in 2018 and the overall Chesapeake Bay health score decreased from 54% to 46%, which is a C. Despite the decrease in score, overall bay health is still significantly improving over time.

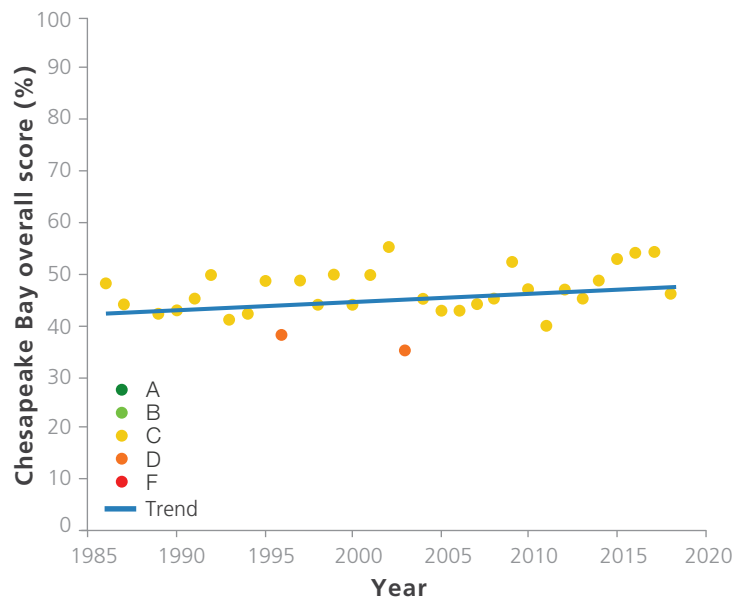
Bay-wide, dissolved oxygen scored 85% in 2018. Water clarity scored 7%, a decrease from last year's 17%. The benthic community score decreased from a 60% to a 59%. Total nitrogen scored 44%, a decline from last year's 59%. Total phosphorus scored 72%, declining from a 76% in 2017. Chlorophyll *a* scored 22%, a decrease from 35% in 2017. Aquatic grasses scored 36%, a decline from last year's 44%.

Despite declines in 2018, total phosphorus, total nitrogen, dissolved oxygen, and aquatic grasses have significantly improving trends over time. Water clarity and chlorophyll *a* have significantly declining trends. Benthic community shows no significant change in health over time.

Of the many factors that affect Chesapeake Bay health, the extreme precipitation seen in 2018 appears to have had the biggest impact. The Baltimore area received 72 inches of rain in 2018, which is 175% above the normal of 42 inches. Climate change causes increased variability in rainfall with extreme wet and dry conditions in different regions. These extremes will continue to put pressure on the entire Chesapeake Bay watershed.

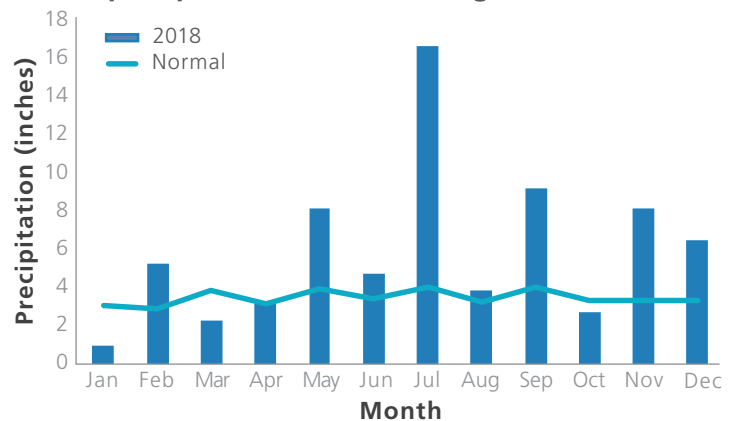
The long-term trajectory of bay health is still positive, even with the impacts of precipitation on the Bay in 2018. Even so, restoration efforts are needed to continue to reduce nutrient and sediment pollution in Chesapeake Bay, especially in light of increased precipitation extremes from climate change.

## Chesapeake Bay health scores increasing over time



Although bay health decreased in 2018, there is a statistically significant positive trend over time.

## 2018 precipitation was much higher than normal



The Baltimore area received 72 inches of rain in 2018—30 inches more than normal. Data from National Weather Service.



With climate change and variable precipitation, flooding around the bay area is increasingly prevalent. Photo by James Currie.

# Expanding into the Chesapeake Bay Watershed

Including watershed indicators in the Chesapeake Bay & Watershed Report Card is an exciting addition that will occur over the next few years. Water quality and biotic indicators for watershed health will be added, as well as indicators that reflect sustainable fisheries, engaged communities, and other socioeconomic issues outlined in the Chesapeake Bay Agreement.

Nitrogen and phosphorus are important indicators for assessing watershed health. The maps show preliminary results of water quality analyses for these indicators. These indicators were measured in each of the colored portions of the watershed (see maps below). There are more data available for these watershed indicators and those data will be incorporated in future report cards.

This preliminary analysis shows that total nitrogen generally had better scores in rural areas and poor scores in more urban areas, such as the greater Baltimore area. Total phosphorus scores were varied, with poor health in southeastern Pennsylvania along the Susquehanna River.

In future versions of this report card these and other indicators will be combined to determine a Chesapeake Bay watershed health score.

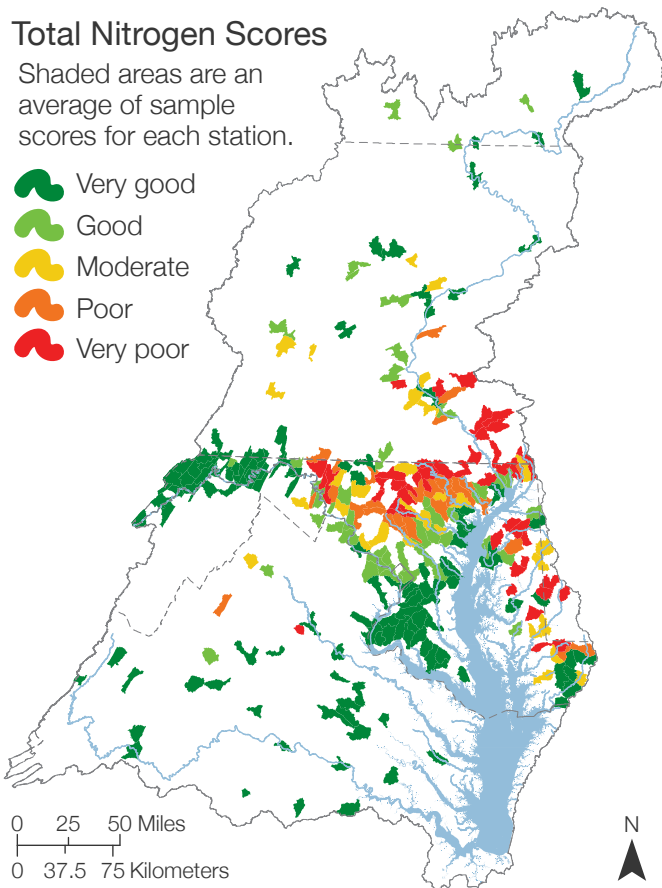


Farmland and forest land use along the Susquehanna River in Northern Pennsylvania. Photo by Nicholas A. Tonelli.

## Total Nitrogen Scores

Shaded areas are an average of sample scores for each station.

- Very good
- Good
- Moderate
- Poor
- Very poor



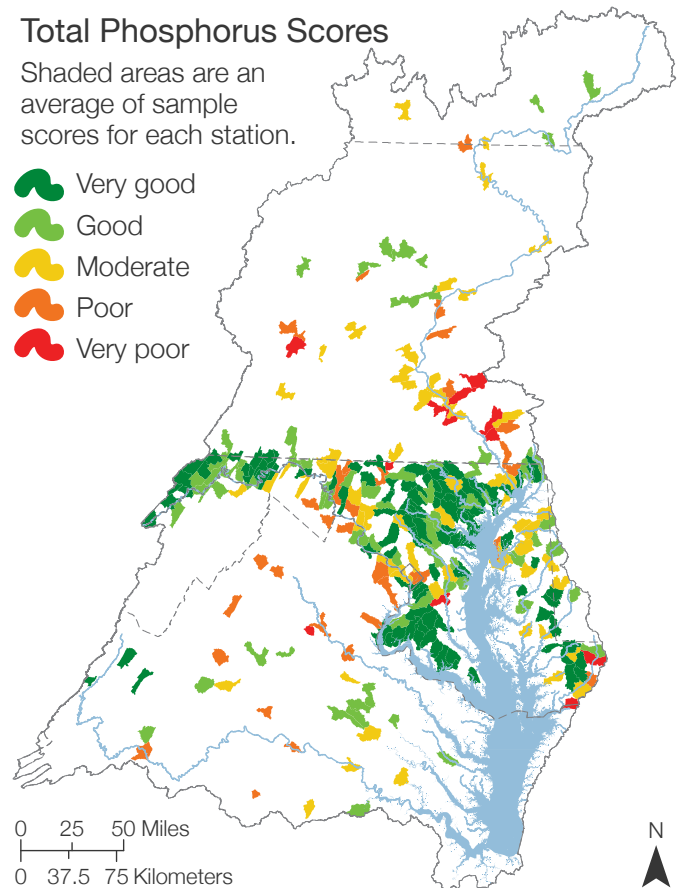
0 25 50 Miles  
0 37.5 75 Kilometers



## Total Phosphorus Scores

Shaded areas are an average of sample scores for each station.

- Very good
- Good
- Moderate
- Poor
- Very poor



0 25 50 Miles  
0 37.5 75 Kilometers



Shaded areas include every sample score for each station. These station scores are averaged for each year, and then the years are averaged for an overall watershed area score. All data were collected between 2012 and 2016. Data from Chesapeake Bay Program Nontidal Water Quality Monitoring Program and the Maryland DNR Maryland Biological Stream Survey.

# Watershed health and the benthic community

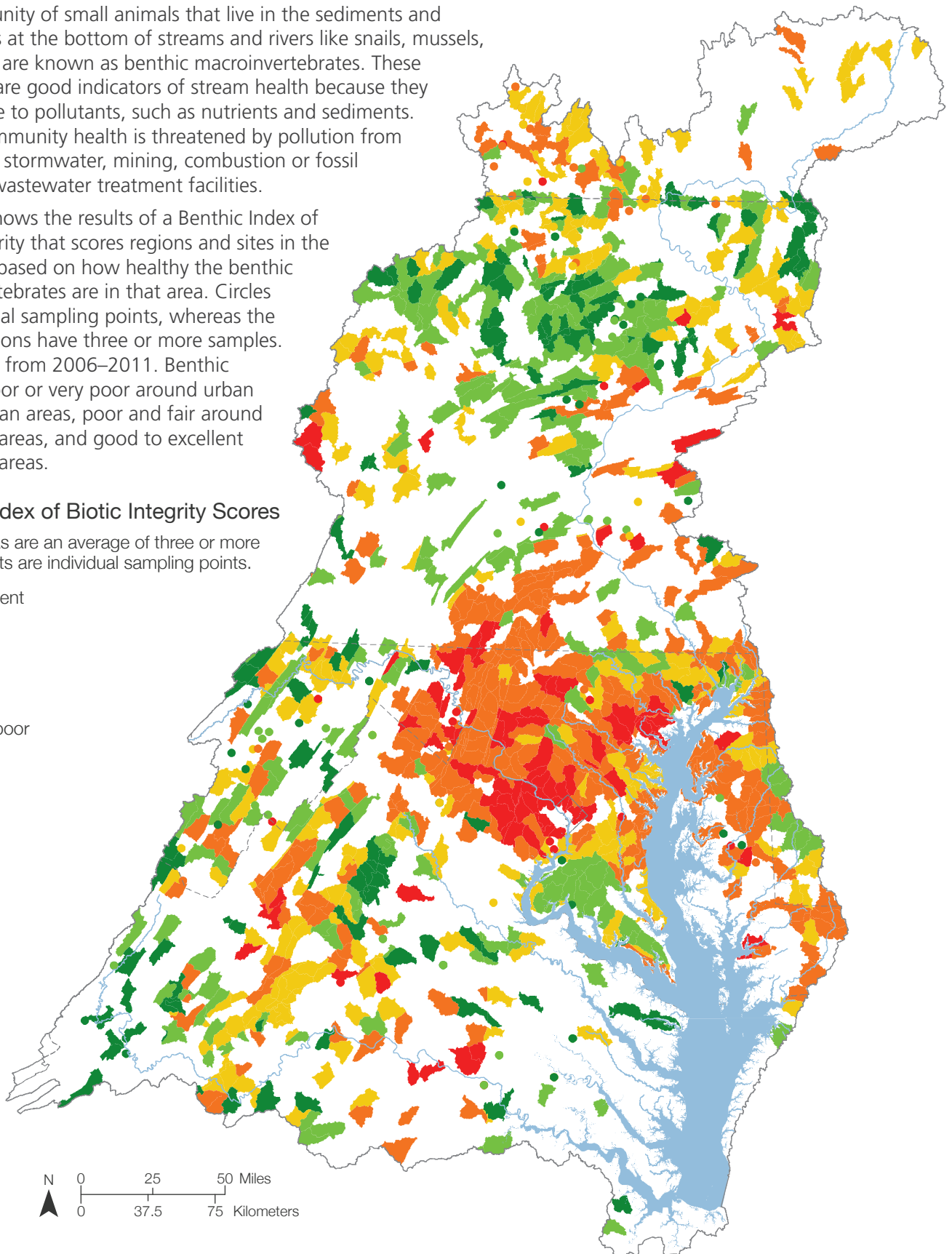
The community of small animals that live in the sediments and under rocks at the bottom of streams and rivers like snails, mussels, and insects are known as benthic macroinvertebrates. These organisms are good indicators of stream health because they are sensitive to pollutants, such as nutrients and sediments. Benthic community health is threatened by pollution from agriculture, stormwater, mining, combustion or fossil fuels, and wastewater treatment facilities.

This map shows the results of a Benthic Index of Biotic Integrity that scores regions and sites in the watershed based on how healthy the benthic macroinvertebrates are in that area. Circles are individual sampling points, whereas the shaded regions have three or more samples. All data are from 2006–2011. Benthic health is poor or very poor around urban and suburban areas, poor and fair around agriculture areas, and good to excellent in forested areas.

## Benthic Index of Biotic Integrity Scores

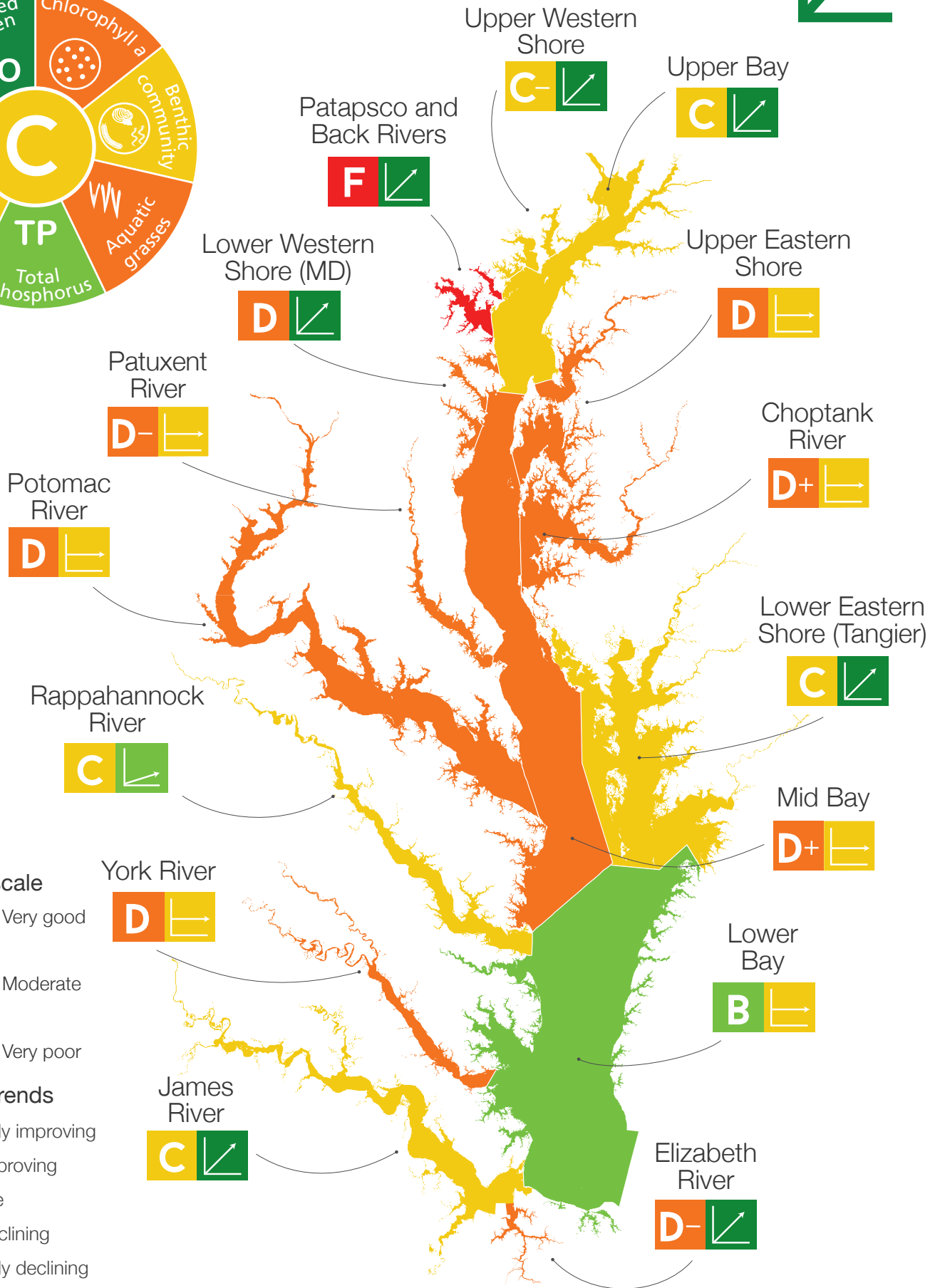
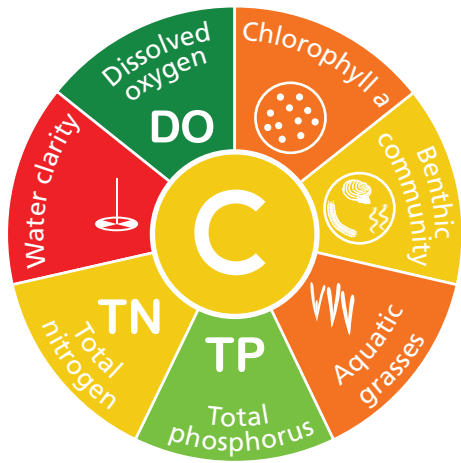
Shaded areas are an average of three or more samples. Dots are individual sampling points.

-  Excellent
-  Good
-  Fair
-  Poor
-  Very poor



Shaded areas represent watershed areas that have three or more samples. Dots represent individual sampling points. All data were collected between 2006 and 2011. Stream macroinvertebrate data collected by federal, state, and local monitoring programs and analyzed by the Interstate Commission on the Potomac River Basin.

# Chesapeake Bay health is moderate



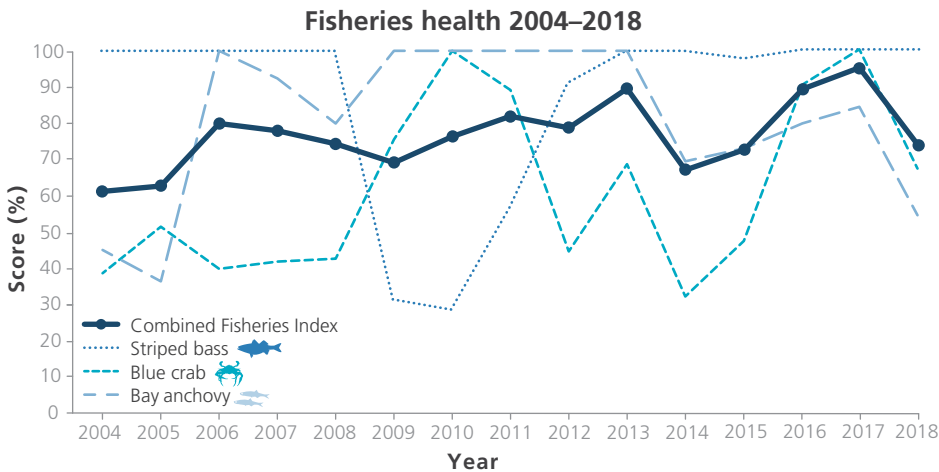
**Bay Health scale**

<b>A</b>	80–100%	Very good
<b>B</b>	60–<80	
<b>C</b>	40–<60	Moderate
<b>D</b>	20–<40	
<b>F</b>	0–<20	Very poor

**Bay Health trends**

	Significantly improving
	Slightly improving
	No change
	Slightly declining
	Significantly declining

# Fish populations decline in 2018



Blue crabs and bay anchovies fish indicator scores showed declines in 2018.

- In 2018, the Fisheries Index scored 74%.
- In 2018, striped bass numbers sharply declined. However, the striped bass score held steady with a 100% score because it is based on 2016–2018 data.
- Both blue crab and bay anchovy scores declined. In 2018, blue crab scored 68% and bay anchovy scored 55%.
- These drops in scores are a cause for concern as smaller populations could lead to less recruitment and further declines in the future.

## You can help the Chesapeake Bay



### Reduce fertilizer use

Fertilizers on your lawn can run off into streams and pollute the rivers and eventually the bay. Only use fertilizer in the fall, or stop using it altogether.



### Carpool and use public transportation

Ridesharing and public transportation reduce the amount of greenhouse gases that go into the atmosphere. This combats climate change effects, like more severe rain events and hotter summers.



### Connect with people across the watershed

Working together with people in other communities, not only within your state, but throughout the watershed, is beneficial to help learn from each other and solve restoration problems.



Reducing fertilizer use helps keep pollution out of the Chesapeake Bay watershed. Photo by Dawn Arlotta.

## About the Chesapeake Bay & Watershed Report Card

Report card produced and released in May 2019 by the Integration & Application Network, University of Maryland Center for Environmental Science. The data and methods underpinning this report card represent the collective effort of many individuals and organizations working within the Chesapeake Bay scientific and management community. The following organizations contributed significantly to the development of the report card: Chesapeake Bay Program, University of Maryland Center for Environmental Science, National Oceanic and Atmospheric Administration, Maryland Department of Natural Resources, Virginia Department of Environmental Quality, Virginia Institute of Marine Science, Versar Incorporated, U.S. Environmental Protection Agency, Maryland Department of the Environment, Interstate Commission on the Potomac River Basin, Old Dominion University, Morgan State University, and U.S. Geological Survey. Data for aquatic grasses includes data from 2018 and partial data from 2017, due to mapping issues during the 2018 monitoring season. Precipitation data from [w2.weather.gov/climate/xmacis.php?wfo=lwz](http://w2.weather.gov/climate/xmacis.php?wfo=lwz). Benthic macroinvertebrate watershed data from [potomacriver.org/wp-content/uploads/2018/12/Stream-Health-2008-Baseline-Report-12-5-18.pdf](http://potomacriver.org/wp-content/uploads/2018/12/Stream-Health-2008-Baseline-Report-12-5-18.pdf). Cover photo of Bucktail State Park, PA by Nicholas A. Tonelli.



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