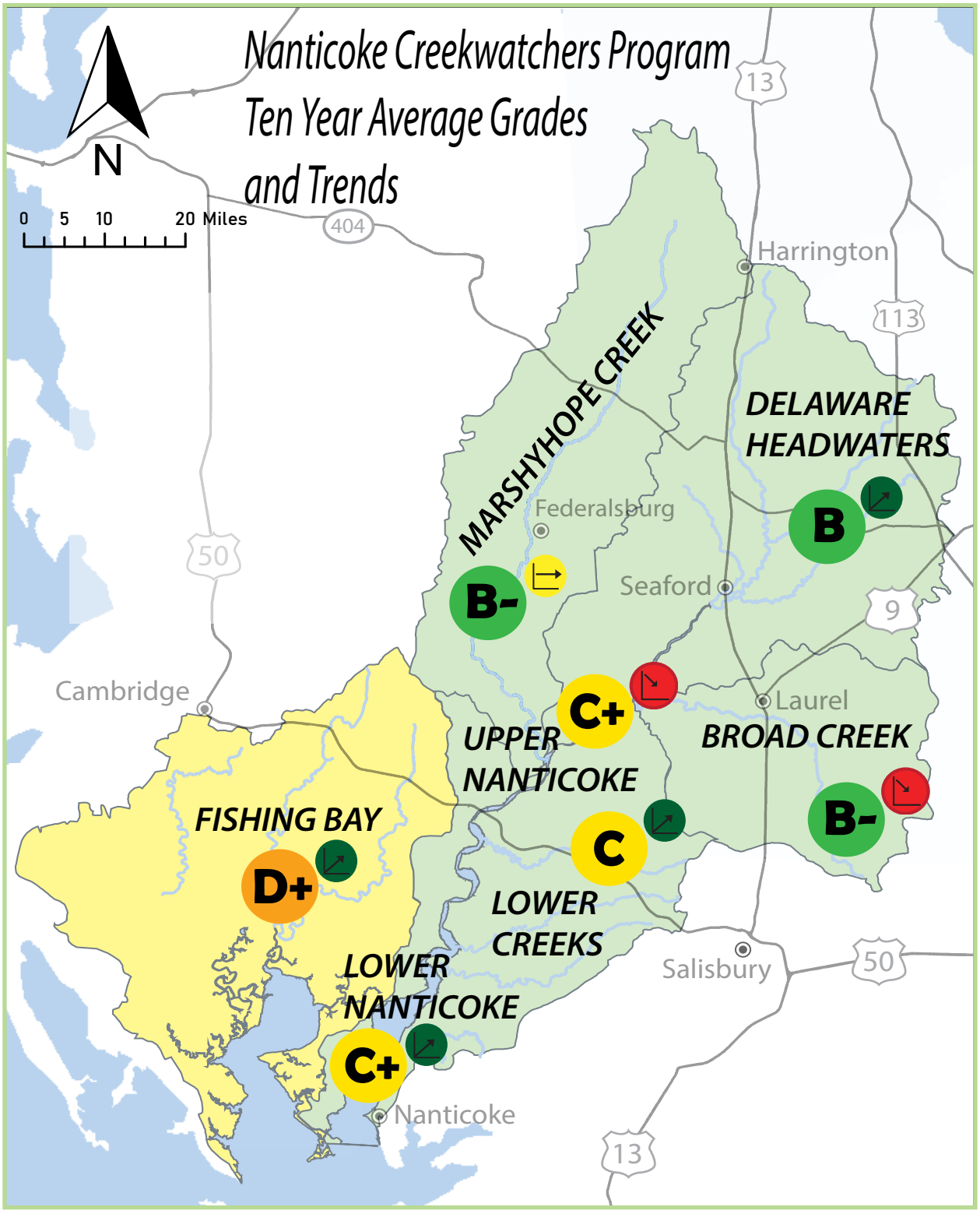
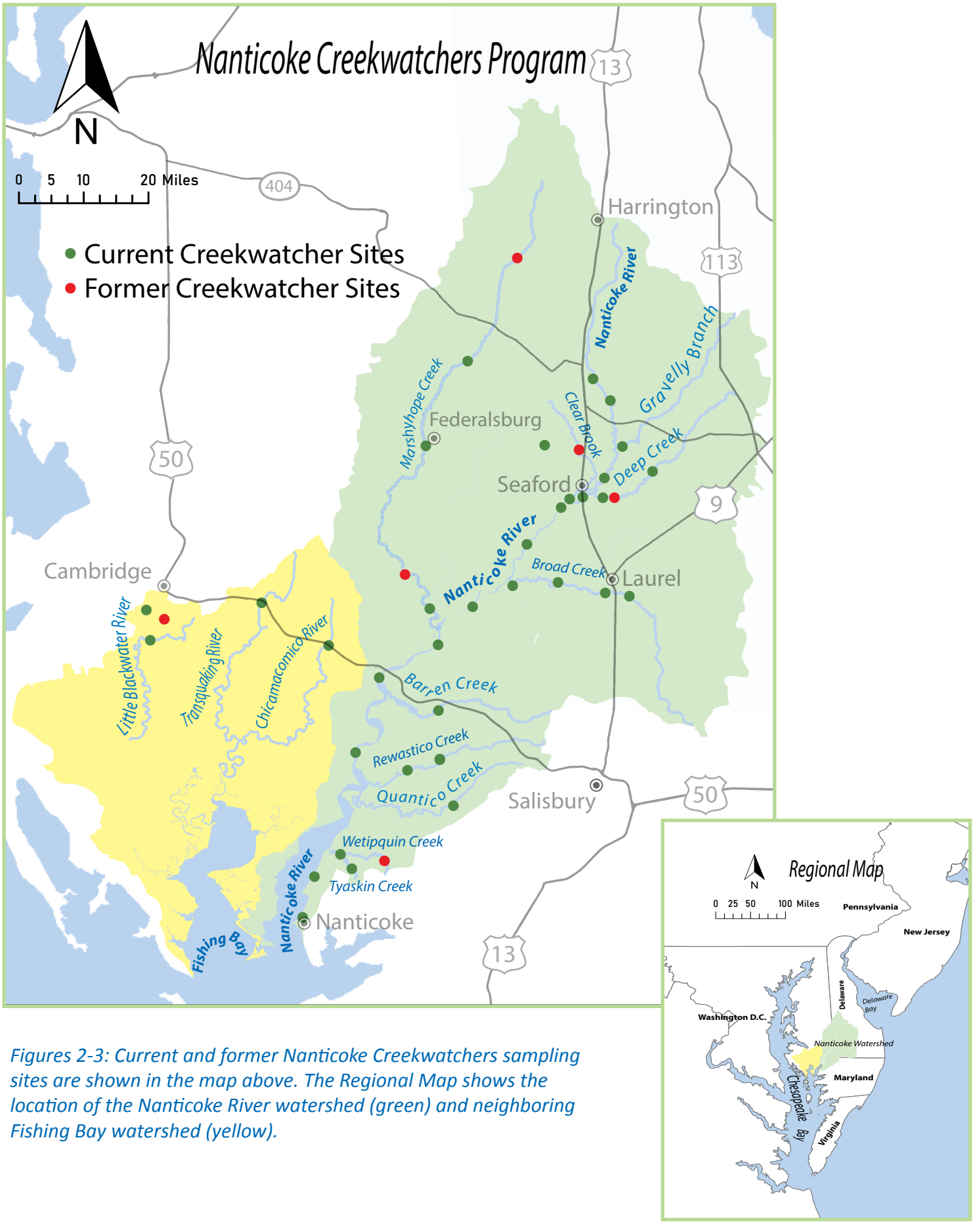
Nanticoke Watershed Alliance

Ten Year Nanticoke River Report Card

www.NanticokeRiver.org

The Nanticoke Creekwatchers Program began collecting water quality data in six Nanticoke River regions (Upper Nanticoke, Lower Nanticoke, Delaware Headwaters, Broad Creek, Marshyhope Creek, and Lower Creeks) and in Fishing Bay Headwaters in 2008. This report card examines findings from the first ten years of data collection. Below, the map (Figure 2) shows the seven regions, their average grades during the program's first ten years, and trend indicators for each region. The map on the right (Figure 3) shows the sites used in the creation of this report card. **Delaware Headwaters (B) has the highest average score, while the Lower Creeks (C) in the Nanticoke and Fishing Bay headwaters (D+) have the lowest scores.**





Figures 2-3: Current and former Nanticoke Creekwatchers sampling sites are shown in the map above. The Regional Map shows the location of the Nanticoke River watershed (green) and neighboring Fishing Bay watershed (yellow).

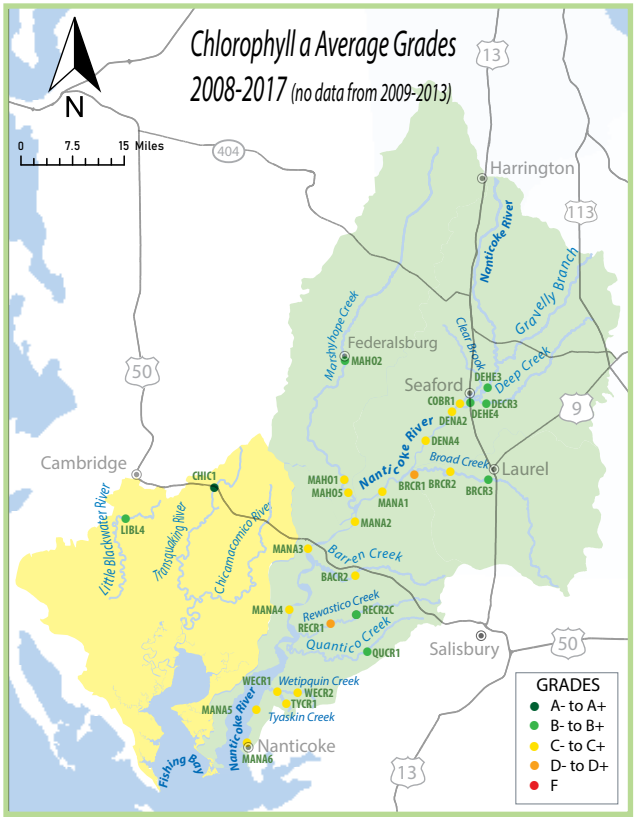


Figure 4 (above): The map shows chlorophyll a average grades for all tidal sites during 2008 and 2014-2017, which are poorest in Broad Creek.

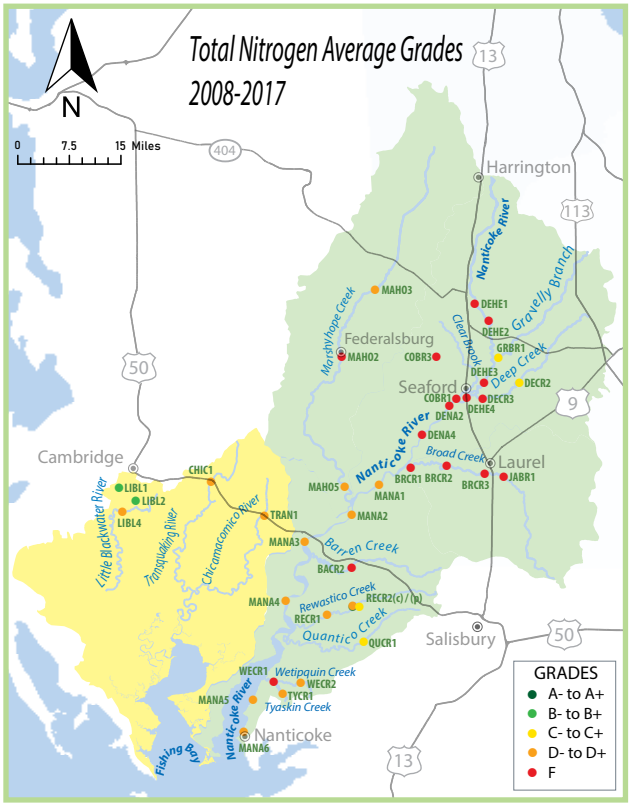


Figure 5 (above): A map shows average total nitrogen grades for 2008-2017, which are poor throughout the Nanticoke.

CHLOROPHYLL A is a measurement of algae present in tidal waterways. The program measured chlorophyll a in 2008 and again from 2014 until the present. Chlorophyll a grades peaked in 2008, except for Fishing Bay (2017) and Lower Creeks (2014).

Broad Creek has consistently scored worst in this parameter. However, the Upper Nanticoke has experienced increasing amounts of algae at its sites in recent years. Upper Nanticoke scored the lowest region grade of 2017, performing worse than Broad Creek. The Lower Creeks changed very little during the time period and had the least variability of any of the regions on a year-to-year basis. The other regions experienced mixed results.

NITROGEN is a naturally-occurring element that is required for plants to grow and is commonly found in lawn and garden and agricultural fertilizers. Like phosphorus, excessive amounts of nitrogen in waterways can help fuel algal blooms (some of them harmful to human and animal health) and cause low dissolved oxygen and fish kills. Excessive nitrogen in the form of nitrates can also cause health issues. **Unfortunately, the Nanticoke River in general has scored very poorly during the ten year period, with excessive amounts of nitrogen throughout all six regions.** However, both the Lower Creeks and Lower Nanticoke regions in Maryland have shown improvement in this category.

In Delaware, a nontidal site on Deep Creek (DECR2) and a nontidal site on Gravelly Branch (GRBR1) are the only sites that have average grades higher than Fs. The sites are very different in appearance and function, but both sites support aquatic grasses during the growing season.

Unlike many other indicators, Fishing Bay headwater sites tend to fare better in total nitrogen amounts than Nanticoke River sites. However, this region is showing a downward trend in total nitrogen grades, which speaks to the general poor water quality at these headwater sites.

PHOSPHORUS is the other major nutrient responsible for algal blooms and a number of water quality-related issues in waterways, along with nitrogen (page 4). **Over the first ten years of the Nanticoke Creekwatchers program, phosphorus grades have improved slightly in most regions.** All regions except for the Lower Creeks (2015) and Fishing Bay (2015) experienced their best scores in 2017; Fishing Bay was the only region that declined in 2017.

Outside of Fishing Bay, two sites in the Lower Creeks region score lowest in this category: a site on Rewastico Creek (RECR1) and one on Quantico Creek (QUCR1).

WATER CLARITY is related to nutrient pollution, as storm-related runoff can easily overwhelm waterways with soil, chemicals, and nutrients. Murky waterways are unable to support aquatic life such as freshwater mussels, oysters, and aquatic grasses.

Water clarity has declined in both the Upper Nanticoke and Lower Nanticoke regions. However, the Lower Creeks have shown a slight improvement during the 2008-2017 period. Other regions have shown mixed results.

In general, the Delaware Headwaters sites, Broad Creek at Laurel, DE, and Marshyhope Creek in Federalsburg, MD, have scored very well in water clarity. Of special mention is the DEHE3 site, which is in the Middleford portion of the Nanticoke River northeast of Seaford and averaged an A grade over the ten year period, the only site to do so.

What's good and what's bad? How do we measure health?

The Nanticoke Watershed Alliance uses multithreshold criteria developed by the Mid-Atlantic Tributary Assessment Coalition (MTAC) to analyze and grade sites and regions. Many criteria differ according to the salinity regime. See ***ian.umces.edu*** for more information.

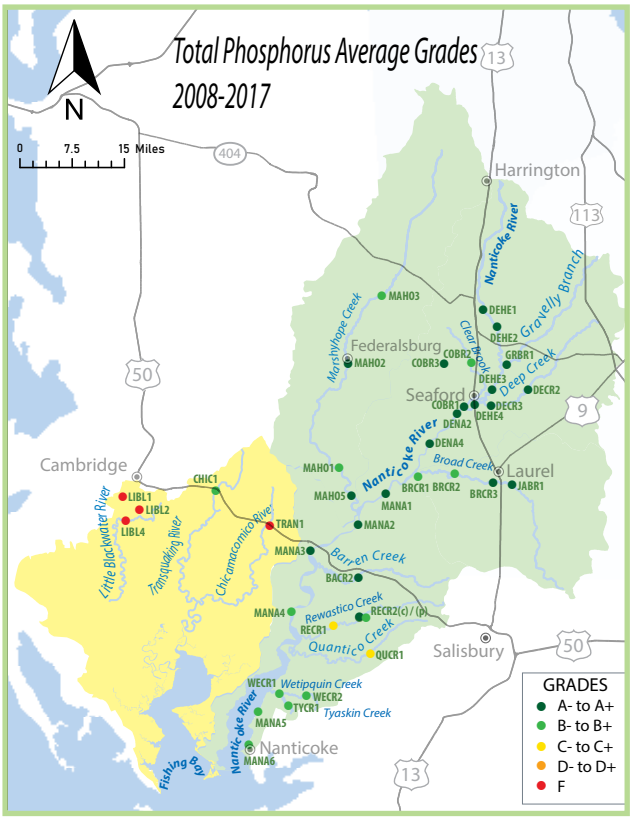


Figure 6 (above): The map shows total phosphorus average grades from 2008-2017, which have improved slightly in most regions.

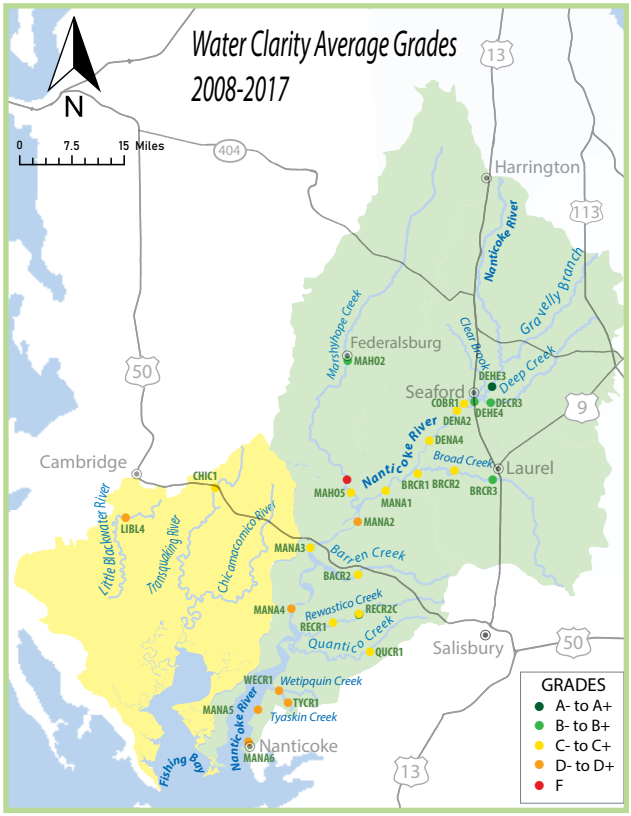


Figure 7 (above): The map shows water clarity average grades from 2008-2017 for tidal sites, which has declined in the Upper and Lower Nanticoke regions.

In general, **DISSOLVED OXYGEN** is a strong indicator throughout the Nanticoke River region. **The only site to not average an A+ to B- grade during the ten year period is WECR2 in the Lower Creeks, which averaged a D. However, the Fishing Bay headwater sites are the opposite, as the TRAN1 site is the only one to not score in the D to F range.**

Dissolved oxygen can differ according to the water depth; Creekwatchers have been taking multiple measurements (known as a depth profile) since 2014, and these measurements are included in analysis from 2014-2017.

Low dissolved oxygen can be caused by decaying algal blooms or leaf litter and extremely warm water temperatures. Buffered waterways tend to have lower water temperatures and higher dissolved oxygen. Low or no dissolved oxygen can create a number of issues, including fish kills and dead zones.

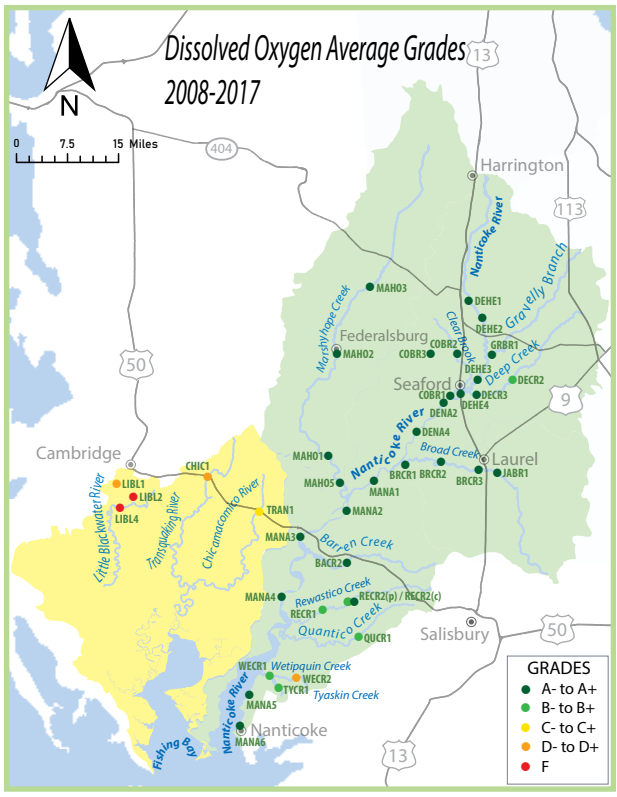
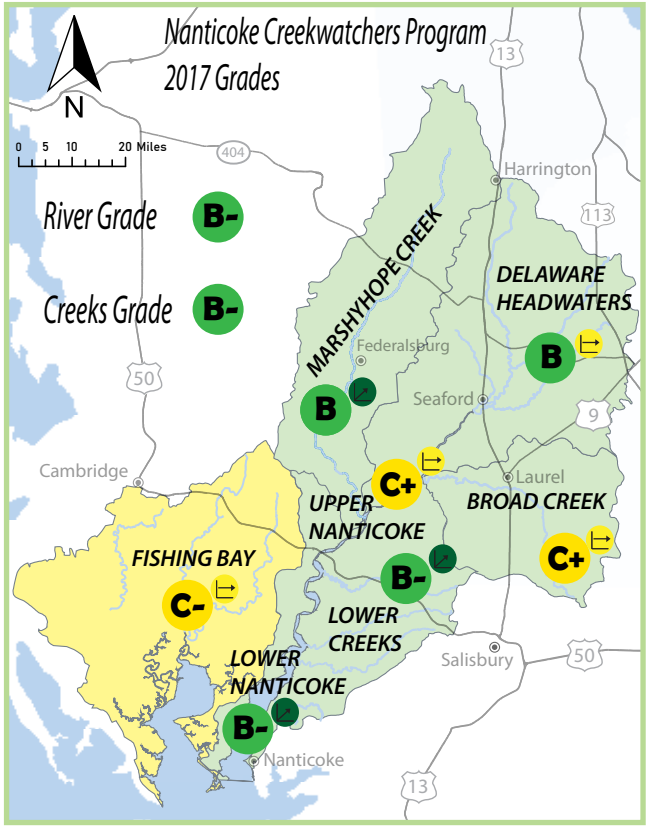


Figure 8 (above): A map shows average dissolved oxygen grades for 2008-2017, which are tend to be strong, except at Fishing Bay sites and at WECR2 in the Lower Creeks.

2017 RESULTS



The scores in 2017 **improved or remained flat in all six Nanticoke regions and the Fishing Bay headwaters** over 2016 grades. The largest improvements were in Marshyhope Creek, which rebounded from a C+ in 2016 to a B in 2017, and the Lower Creeks, which improved from a C to a B-.

The River and Creeks both improved from C+ in 2016 to B- in 2017. Phosphorus scores improved in all regions except for Fishing Bay, which reflects fewer major rain events influencing sampling dates.

Delaware Headwaters scored highest in chlorophyll a, total phosphorus, and dissolved oxygen, while Marshyhope Creek scored highest in water clarity. Lower Nanticoke performed best in total nitrogen within the Nanticoke; Fishing Bay had the best total nitrogen score overall.

Figure 9 (left): The map shows the overall grades for the River and Creeks and region grades in 2017. The trend indicators compare 2017 to 2016 grades. No regions declined in 2017.

Whether you enjoy birdwatching or fishing, gardening or kayaking, healthy waters and happy wildlife go hand-in-hand. We all want clean, healthy water to drink and play in, and many of us enjoy watching wildlife in our landscapes and the places we play in. We can all **make positive changes to our landscapes** that will both improve water quality and enhance the habitat of pollinators, songbirds, aquatic animals, and other wildlife. We encourage you to do what you can, when you can. Every action helps!

Figure 10: Eupatorium serotinum *or late boneset attracts bees and butterflies in late summer and early autumn.*

Figure 11: This seasonal meadow in Laurel, DE, provides color and many benefits for wildlife. It also intercepts polluted rainwater from streets before it can flow into Broad Creek.

NATIVE PLANTS come in all shapes and sizes, blooming at different times of the year and in different colors. They also **attract pollinators** such as bees, butterflies, hummingbirds, and moths and **have deep roots that hold soil in place and make them more resistant to drought**. Native plants do not require fertilizer, so replacing lawn with perennial **MEADOWS** can also **reduce nitrogen and phosphorus** from entering your local waterway. Many great resources exist to help you create a beautiful and productive home landscape, including *Native Plants for Wildlife Habitat and Conservation Landscaping* (***bit.ly/2r20k5D***) by US Fish and Wildlife Service.

Figures 12-13 (above): Some rain barrels (left) include lids as planters. Once the barrel is full, rain water exits through the normal downspout, so it can be diverted to plantings.

This rain garden (right) at Ross Mansion in Seaford, DE, connects with one of the downspouts via underground pipe and an irrigation outlet.

RAIN BARRELS capture water during rain events and store it for future use. Rain barrels can be linked together to increase storage and can be painted to match your home or landscape. They are generally low-cost and easy to install and help conserve water and save money.

RAIN GARDENS require a little more planning but many templates and guides are available, such as *Rain Gardens Across Maryland* (***bit.ly/2r25m1f***). These specialized **gardens treat rain water from roofs** before they enter waterways during rain events. Rain garden sizes and plants used vary, so they are easy to configure to match landscaping needs and desires.

In 2007, the Nanticoke Watershed Alliance began developing what would become a unique and highly-respected volunteer driven water quality monitoring program. Although we've upgraded our equipment and have evolved our methods to meet stringent Tier 3 requirements during the first ten years of the program, the heart of our program remains the same: our volunteers.

Thanks to:

- Nearly 100 citizen scientists, who served almost 12,000 hours from 2008-2017 (service valued at almost $300,000),
- Current and former staff members, including Chesapeake Conservation Corps Volunteers, AmeriCorps Members, and interns,
- Envirocorp Labs Inc., for providing an incredible amount of lab services since 2008,
- Delaware Department of Natural Resources and Environmental Control for providing long-term funding and technical support, and
- All of the program's funders and partners, as well as the private landowners who allow us to access waterways that would otherwise be inaccessible.

VISIT Us!

113 Old Ocean Gateway,
Vienna, MD 21869

www.NanticokeRIver.org

www.Facebook.com/NanticokeRiver

GET INVOLVED!

- **VOLUNTEER** as a Creekwatcher
- **DONATE** to the NWA
- **PARTICIPATE** in our programs and events

Figures 14-17 (top to bottom): Jeff Hampton takes a water sample at Lewis Wharf, MD. Richard Ball carries his Dissolved Oxygen (DO) meter back to his vehicle to record samples. Bonnie and Bob Kijewski grab a water sample along the James Branch in Laurel, DE. Nan Zamorski "whirl-twirls" her bacteria sample at a site on Deep Creek. Cover: Wetipquin Creek near Tyaskin, Maryland.

The Nanticoke Watershed Alliance would like to thank the following organizations for their contributions and support of the Creekwatchers program during the 2017 season:

Project Supervisor/Author
Beth Wasden

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