



# 2015 NANTICOKE RIVER REPORT CARD

## River Final Grade



Water clarity and phosphorus scores slightly improved; however, water clarity continued to be moderately poor in both regions. Phosphorus scores were moderately good, while nitrogen scores were poor. Chlorophyll a scores were moderate.

## Creeks Final Grade



Water clarity scores were good for all regions, except for the Lower Creeks in Maryland and Broad Creek in Delaware. Nitrogen scores were poor in all creek regions; the Lower Creeks' nitrogen scores declined greatly from 2014 to 2015. Phosphorus scores were moderate or good in all creek regions, with the Lower Creeks showing marked improvement over 2014. Chlorophyll a scores varied from poor in Broad Creek to moderate in other areas.

Two final grades were calculated: Rivers and Creeks. The "River" grade is a measure of the health of the mainstem of the Nanticoke River. The "Creeks" grade assesses the health of the creeks that feed into the Nanticoke. Both grades are important indicators of the overall health of the watershed.

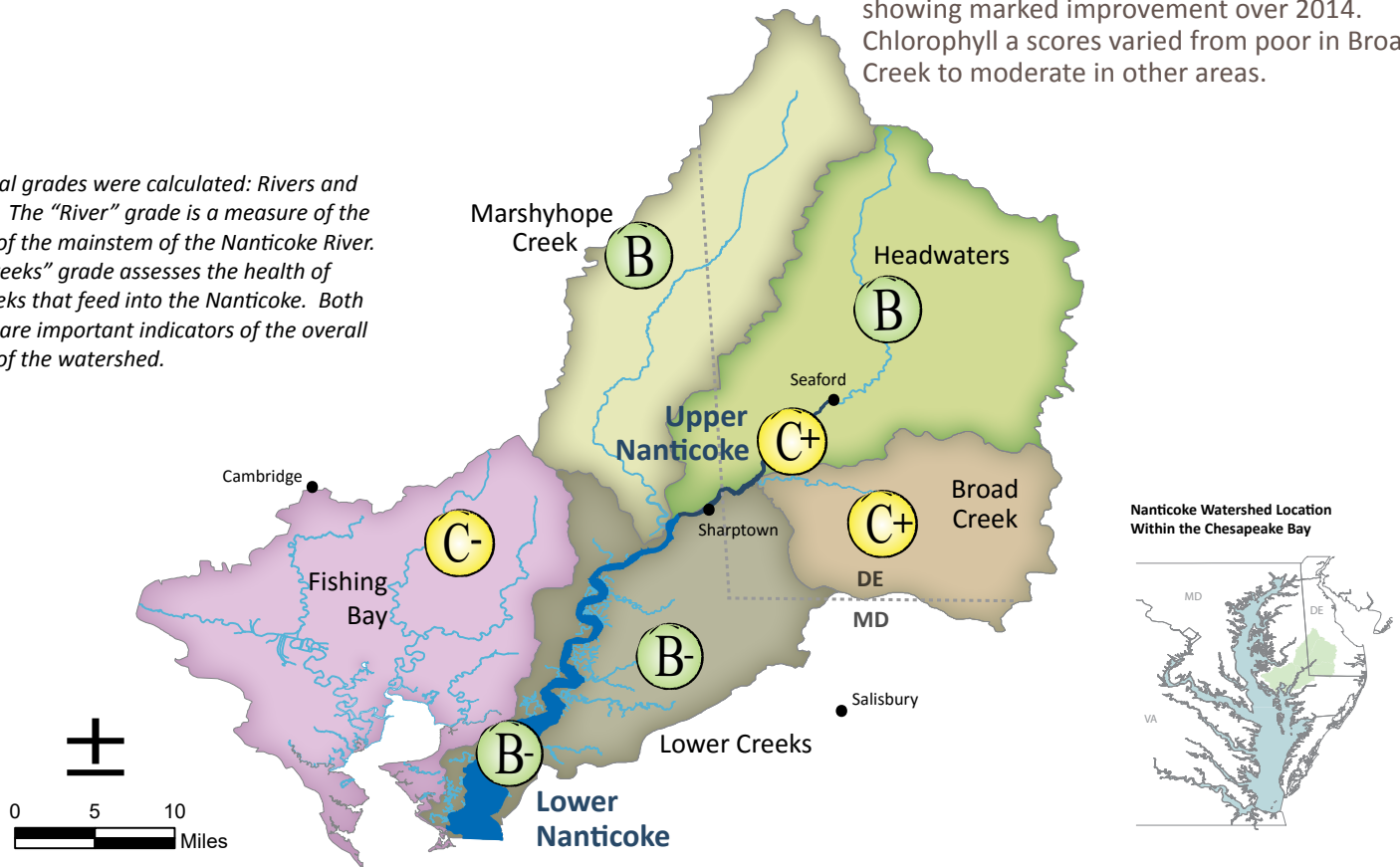


Figure 1: Report card grades for the Nanticoke River, its creeks, and Fishing Bay in 2015. The water quality grades are based on data collected by Nanticoke Creekwatchers, volunteer citizen scientists for the Nanticoke Watershed Alliance. Additional Nanticoke River watershed data comes from the Chesapeake Bay Program, including sites monitored by the Delaware Department of Natural Resources and Environmental Control and the Maryland Department of Natural Resources. Blackwater National Wildlife Refuge provided data from their volunteer program for the Fishing Bay watershed.

## What Do the Grades Mean?



All water quality indicators meet desired levels. Quality of water in these locations tends to be very good, most often leading to very good habitat conditions for fish and shellfish.



Most water quality indicators meet desired levels (60-79%). Quality of water in these locations tends to be good, often leading to good habitat conditions for fish and shellfish.



There is a mix of healthy and unhealthy water quality indicators (40-59%). Quality of water in these locations tends to be fair, leading to fair habitat conditions for fish and shellfish.



Some or few water quality indicators meet desired levels (20-39%). Quality of water in these locations tends to be poor, often leading to poor habitat conditions for fish and shellfish.



Very few or no water quality indicators meet desired levels. Quality of water in these locations tends to be very poor, most often leading to very poor habitat conditions for fish and shellfish.

# BROAD CREEK DECLINES; LOWER CREEKS IMPROVE 2

River Region	Dissolved Oxygen	Water Clarity	Total Nitrogen	Total Phosphorus	Chlorophyll a	Overall Health Index	Trend
DE Headwaters	A+	A-	F	A+	C+	B	→
Marshyhope Creek	A+	B+	F	A-	B	B	→
Lower Nanticoke	A+	D+	D	A-	C+	B-	→
Lower Creeks	B	C+	D+	A-	C+	B-	↑
Broad Creek	A+	B	F	A	C-	C+	↓
Upper Nanticoke	A+	C-	F	A-	C-	C+	→
Fishing Bay**	C+	D	D+	D+	C+	C-	→

Figure 2: The table to the left shows a breakdown of grades for each reporting region, by water quality indicator. The Overall Health Index (total score) is calculated by averaging the numeric scores of all indicators. The trend column shows if the score improved, declined, or remained steady from the previous year.

\*\*Scores for Fishing Bay Watershed are included in this report due to its relevance and proximity to the Nanticoke River but are not included in calculations for the Rivers and Creeks "Final Grade." The NWA program includes five headwaters sites, but analysis also incorporates data taken by Blackwater National Wildlife Refuge's volunteer water monitoring program. Thanks to program volunteers and staff for collecting and sharing data.

All "Overall Health Index" grades remained consistent for a third year except for Broad Creek, which declined, and the Lower Creeks, which improved. However, some specific indicator scores changed between 2014 and 2015, such as nitrogen scores declining in the Lower Creeks and DE Headwaters. The total Rivers and total Creeks grades remained the same as in 2014, with B- and B grades, respectively.

See Pages 4-5 for an in-depth look at indicators.

## BACTERIAL SOURCE TRACKING PROJECT

During summer 2015, six volunteers collected bacteria samples at three Creekwatchers sites--the Nanticoke River at Rt. 13 in Seaford, DE, Cherry Beach at Sharptown, MD, and the Tyaskin Wharf in Tyaskin, MD. The volunteers then transported their samples directly to the Salisbury University Bacterial Source Tracking Lab, which is led by Dr. Mark Frana. Dr. Frana and his staff analyzed the samples with the purpose of excluding or verifying humans as the source of bacteria at these three sites.

To this purpose, the lab tested all samples against a human DNA marker suitable for this region. All three sites reported non-detection of the human DNA marker during all eight sampling periods. This means that septic systems are not the cause of bacteria at these sites.

In addition, the lab provided fecal enterococcus data, which is a standard used for determining the safety of waters for recreational purposes. During summer 2015, bacteria levels trended lower than they had in previous summers. All three sites reported bacteria counts of fewer than 104 MPN (Most Probable Number) during at least 75% of the sampling periods.

The Nanticoke Watershed Alliance and the Bacterial Source Tracking Lab are conducting one additional tracking project during Summer 2016 on the Transquaking River. These results will be presented in the 2016 Nanticoke River Report Card, which will be released in July 2017.

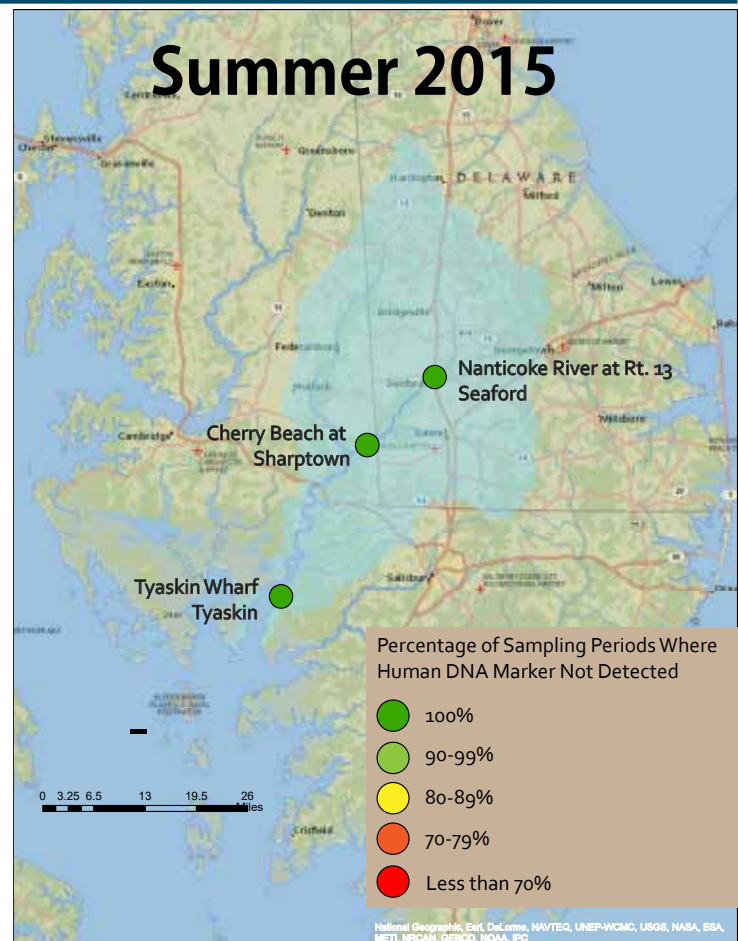


Figure 3 (above): The map shows the three sites and the percentage of sampling periods where human DNA markers were not detected.

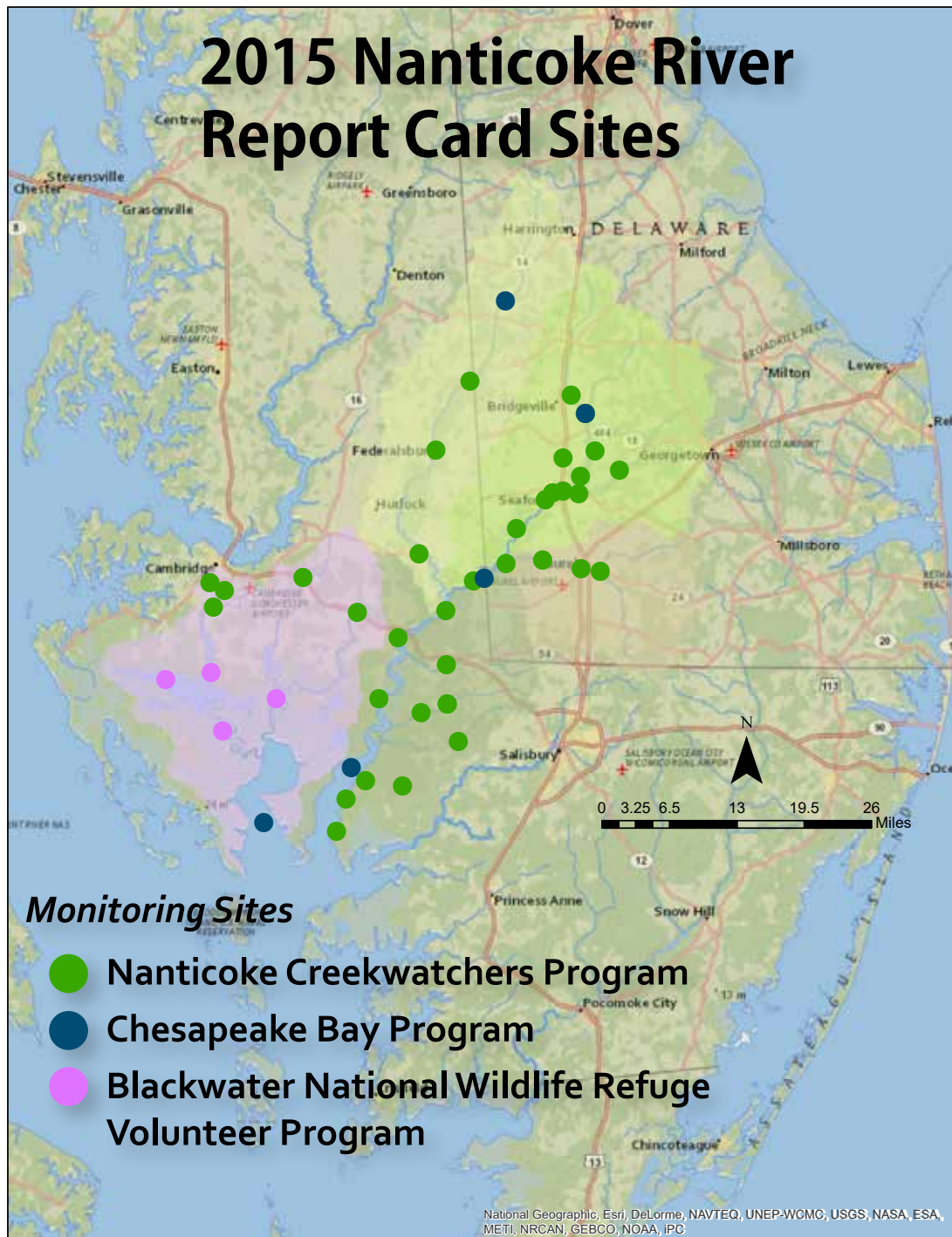


Figure 4: The Nanticoke Watershed Alliance included 45 sites in data analysis for the 2015 Nanticoke River Report Card. Data derived from the 36 Nanticoke Creekwatchers sites, four sites from the Blackwater National Wildlife Refuge’s volunteer monitoring program, and five Chesapeake Bay Program (CBP) sites (two in Delaware, three in Maryland). Some of the CBP sites overlap or closely match existing Nanticoke Creekwatchers sites; those sites may not be clear. All sites are noted on the 2015 Nanticoke River Report Card Sites map (above). The NWA used data from the five key indicators used in this report card, along with salinity data, for data analysis purposes.

The NWA uses a multithreshold system provided by the Mid-Atlantic Tributary Assessment Coalition. The Tidal Protocol, Bacteria Addendum, and Nontidal Protocol documents can be viewed at the University of Maryland’s Center for Environmental Science’s Integration and Application Network’s website at [ian.umces.edu](http://ian.umces.edu).

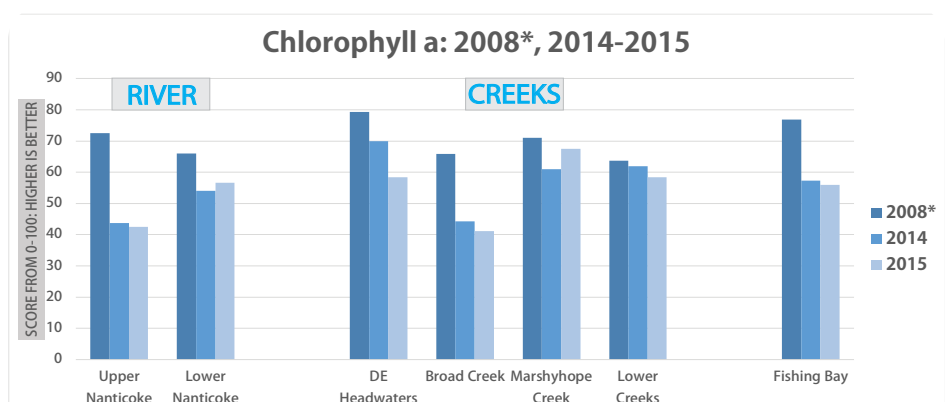
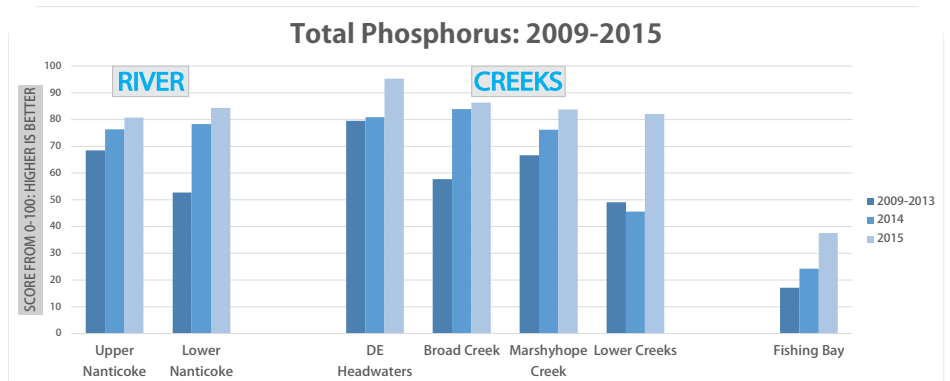
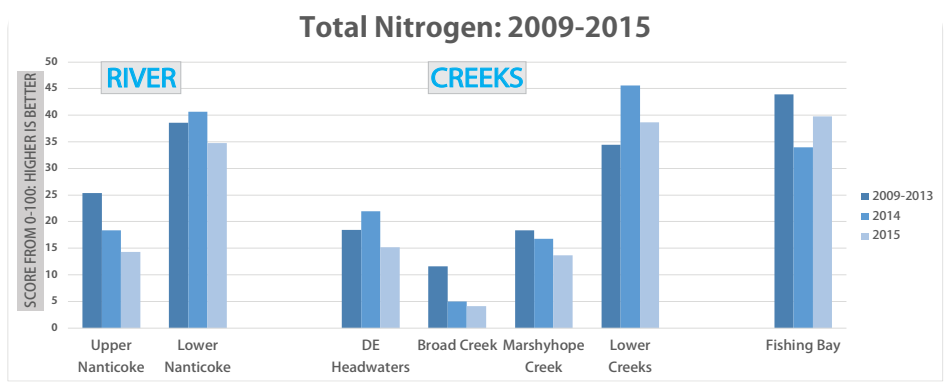
Although necessary for plant growth and fertilization, in excessive amounts, nitrogen and phosphorus cause a number of water quality issues, including algal blooms, low dissolved oxygen, and poor water clarity. Cover crops, appropriate fertilizer use, and planting native trees, shrubs, and plants can reduce nutrient runoff into our local waterways.

Nitrogen and phosphorus are key indicators, as these nutrients are major pollution sources in the Nanticoke River watershed (and throughout the Chesapeake Bay watershed).

Since the inception of the Nanticoke Creekwatchers program, total nitrogen has been the poorest indicator. Most subwatersheds, especially those in the upper half of the region, have consistently scored F's. Although scores improved slightly in most regions in 2014, total nitrogen scores declined broadly in 2015. All subwatersheds scored F's except for the Lower Creeks (D+) and Lower Nanticoke (D). Additionally, many of the scores fell below 2014 averages and five-year averages. However, Fishing Bay showed a slight improvement over the 2014 average (but not the five-year average).

Conversely, phosphorus scores improved in all subwatersheds and Fishing Bay. The Lower Creeks showed the greatest improvement in 2015. In spite of improvements, Fishing Bay continues to report highly excessive phosphorus levels, and measures should be taken to reduce the amount of phosphorus entering those waterways.

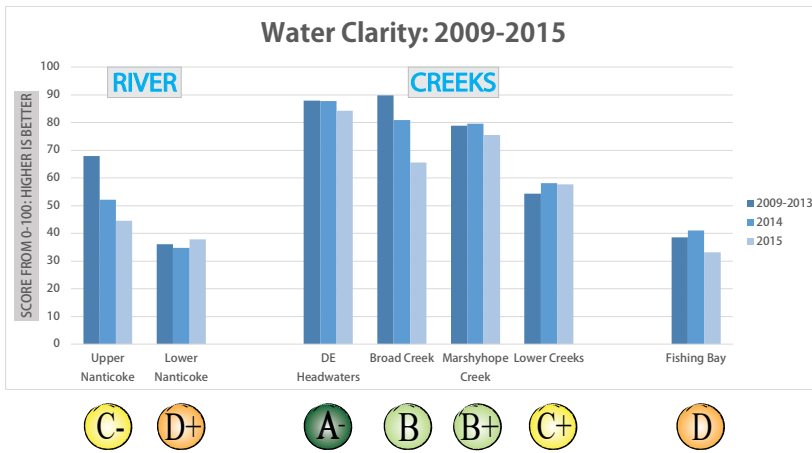
The chlorophyll a score reflects the amount of algae present in the water, which helps us view a more complete picture of nutrient-related water quality. Chlorophyll a scores were mixed, with most subwatersheds showing slight declines in scores. However, the Lower Nanticoke and Marshyhope Creek regions improved slightly in 2015 over the previous year. Broad Creek, which tends to have the poorest nitrogen scores, and the Upper Nanticoke reported the highest amounts of algae of all subwatersheds.



Figures 5-7 show total nitrogen, total phosphorus, and chlorophyll a scores for each subwatershed. Five-year average scores (2009-2013), 2014 scores, and 2015 scores are provided when available. Note that the nitrogen graph only shows 0-50, instead of 0-100, as do the other charts.

\*Figure 7: The program did not measure chlorophyll a from 2009-2013.

# WATER CLARITY AND DISSOLVED OXYGEN IN 2015 5



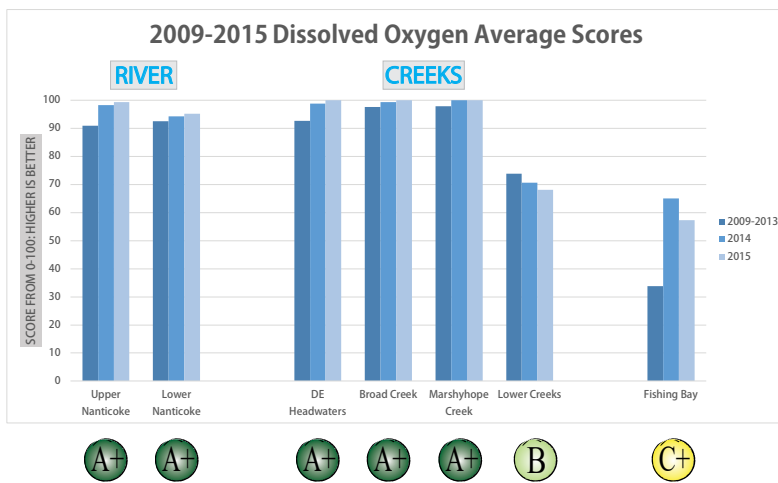
Figures 8-9 (above and below right) show charts that compare 2009-2013 five-year average scores, 2014, and 2015 scores for water clarity and dissolved oxygen. The Blackwater National Wildlife Refuge Fishing Bay sites were included in 2014 and 2015.

Figures 10-11 (below): (l) Chesapeake Conservation Corps Volunteer JoJo Maturana works with Creekwatcher Frank Wilson at the Henson Scout Reservation on the Marshyhope Creek. (r) Creekwatchers Richard Julian and Alice Mohrman prepare their chlorophyll a sample at a site on Deep Creek.

Water clarity (or Secchi depth) is crucial for aquatic grasses and bottom-dwelling aquatic animals. Poor water clarity can smother aquatic creatures with no or limited mobility, such as oysters and freshwater mussels, and prevent predators from finding prey. Poor water clarity is also unable to sustain underwater grasses, which hold sediment and phosphorus in place in waterways and provide cover and food for juvenile fish and crabs.

Water clarity may be diminished due to a number of factors, including algal blooms that are driven by excessive nutrients, runoff from landward sources due to lack of appropriate buffer vegetation, and erosion generated by excessive wave energy created by boat wakes and storms.

The Lower Nanticoke was the only subwatershed to show any improvement in this indicator, nudging from a D to a D+; however, as in previous years, it scored worst overall in this category. Marshyhope Creek and Lower Creeks remained steady. All other subwatersheds showed minor declines in water clarity.



Dissolved oxygen is crucial for all aquatic life. Low dissolved oxygen can be caused by conditions such as algal blooms and by decaying organic matter (such as leaves) in the water. Once dissolved oxygen reaches critical levels, fish kills and dead zones occur.

In general, Nanticoke Creekwatchers take at least two dissolved oxygen measurements per site (surface and bottom readings). Deep water sites take additional measurements. Measurements vary at different points in the water column, especially during periods of intense biological activity, such as algal blooms. Water temperature and salinity (at brackish sites) also varies.

With the exception of the Lower Creeks and Fishing Bay, all other subwatersheds showed slight improvements or flat scores for this indicator. Fishing Bay continues to struggle with dissolved oxygen, with sites in the upper reaches of the Little Blackwater River, Chicamicomico River, and Transquaking River unable to consistently support aquatic life.

Lawns can provide recreational and social space in your landscape, but too much lawn can add nutrients, sediment, and other chemicals to your local waterways. There are many low-cost or free options that can improve water quality, enhance wildlife habitat, and . Fertilize the right amount at the right time with the right product to save money, reduce runoff (and nutrient and sediment pollution), and promote a healthy, lush lawn.

Livable Lawns  
[www.delawarelivablelawns.org/](http://www.delawarelivablelawns.org/)

MD Lawn Fertilizer Act  
[mda.maryland.gov/pages/fertilizer.aspx](http://mda.maryland.gov/pages/fertilizer.aspx)

University of MD Extension Home and Garden Center  
[extension.umd.edu/hgic](http://extension.umd.edu/hgic)

**F**ollow Delaware’s Livable Lawns Program and the Maryland Lawn Fertilizer Act.  
 By signing up for the Livable Lawns Program and following up with fertilizer application information, homeowners can receive a \$50 gift card for native plants.

**P**erform a soil test every three years to determine what your lawn needs. Soil tests can be analyzed by a number of public and private agencies, including the University of Delaware’s Soil Testing Lab.

University of Delaware’s Soil Testing Lab  
[ag.udel.edu/DSTP/](http://ag.udel.edu/DSTP/)

Agrolab  
[www.agrolab.us/](http://www.agrolab.us/)

Native Plants for Wildlife Habitat and Conservation Landscaping (Chesapeake Bay Watershed)  
[www.nps.gov/plants/pubs/chesapeake](http://www.nps.gov/plants/pubs/chesapeake)

Chesapeake Bay Native Plant Center  
[www.nativeplantcenter.net](http://www.nativeplantcenter.net)

**R**educe your grass lawn by seeding a perennial meadow, carpeting your landscape with moss in shade areas, or planting native trees and shrubs to provide shade, food, and depth in your landscape.

Figure 12 (background): A bee gathers nectar and pollen from a butterfly weed (*Asclepias tuberosa*), a native plant.

During the 2015 season, 36 citizen scientists participated throughout the season in the Nanticoke Creekwatchers Citizen Water Monitoring Program. These volunteers monitored 36 sites in the watershed, including five in neighboring Fishing Bay watershed. Creekwatchers sampled at their sites every other week from late March through early November, gathering data and water samples and making observations about their sites.

Envirocorp Labs Inc. continues to serve as a keystone of the program, providing over \$70,000 of lab work annually. In 2015, the Delaware Department of Natural Resources and Environmental Control funded the Delaware portion of the program and provided technical assistance. The Chesapeake Bay Trust funded critical equipment needs. In addition, the Town Creek Foundation supported chlorophyll a testing at all Maryland sites and facilitated the Bacterial Source Tracking project. RSVP of the Lower Shore and Sussex County RSVP (now Delaware 50+) provided additional support for volunteers. The Integration and Application Network at the University of Maryland Center for Environmental Science provided technical assistance, as did Dr. Judith Stribling of Salisbury University.



Figures 18-19: (l) Creekwatchers Rachael Shedaker, Frayser Williamson, Richard Ball, and John Williamson enjoy a late summer potluck along the Rewastico Creek. (r) In November, Creekwatchers celebrate another season well-done at Trap Pond State Park.

## THANK YOU, 2015 NANTICOKE CREEKWATCHERS!

Richard Ball  
 Galen Brosius  
 Sandi Dew  
 Colden Fees  
 Debbie Fees  
 Jane Fox  
 Rusty Good  
 Susan Good  
 Jeff Hampton  
 Dan Houghtaling  
 John Huberty  
 Mary Lynn Huberty  
 Amy Jones  
 Hope Jones  
 Richard Julian  
 Troy Julian  
 Alan Kamauff

Bob Kijewski  
 Bonnie Kijewski  
 John King  
 John Lindinger  
 Pat Maher  
 Ron Maher  
 Cyrus Marter  
 Alice Mohrman  
 Mike Pretl  
 Bob Sellers  
 Rachael Shedaker  
 Stan Shedaker  
 Howard Vanderslice  
 Frank Wilson  
 Frayser Williamson  
 John Williamson  
 Kirsten Zamorski

Nan Zamorski  
 Rick Zamorski

Thanks also our Chesapeake Conservation Corps Volunteer Joanne (JoJo) Maturana for her extensive work on behalf of the Creekwatchers program and to the Delaware Technical and Community College students who attended training and shadowed Creekwatchers during spring 2015.

The Nanticoke Watershed Alliance is a consortium of non-profit organizations, local businesses, industry, state and federal agencies that work together to ensure a bright future for the iconic Nanticoke River. The NWA is a venue for sharing information and creating open and honest dialogue around river issues and potential solutions. Some of our key efforts include:

- Monitoring the health of the Nanticoke River system.
- Providing outreach and workshops to watershed residents.
- Educating middle schoolers in schools and on field trips.
- Offering workshops to teachers in Delaware and in Maryland.
- Organizing river clean-ups, tree plantings, and other events.
- Encouraging recreational usage of and improving public access to the river and its tributaries.

The NWA strives to support the local community through service projects and other outreach events. If you are interested in joining the NWA in making the Nanticoke Watershed a cleaner, healthier, and more beautiful place to live, contact us online at [www.nanticokeriver.org](http://www.nanticokeriver.org).

### Support the NWA!

- Join our team of dedicated volunteers and help with water monitoring, restoration and clean-ups, outreach efforts, and more.
- Make a tax-deductible donation to support our work for the river and its communities.
- Become an NWA partner. Businesses and organizations can join the NWA's "Partners In Conservation" program and become a part of ongoing dialogue associated with the conservation of the Nanticoke River.
- Say hello at our office or at outreach events. Our office is located in Vienna, Maryland, and is open from 9:00 am-4:00 pm, Mondays through Fridays.

For more information, visit [www.nanticokeriver.org](http://www.nanticokeriver.org)



Figures 20-23: Top left: Toast to the Nanticoke attendees enjoy an evening hayride at Layton's Chance Winery in June 2015. Top right: Creekwatcher Dan Houghtaling and former Education Coordinator Lisa Baird teach a few Salisbury Zoo Earth Day participants how to make fish prints. Bottom left: Students from Dorchester Middle School get their hands dirty planting in newly constructed raised beds at their school. Bottom right: Paddlers enjoy an excursion in Trap Pond's bald cypress swamp.

The Nanticoke Watershed Alliance would like to thank the following organizations for their contributions and support of the Creekwatchers program during the 2015 season:



Project Supervisor/Author  
Beth Wasden  
Published: July 2016  
Printed on post-consumer recycled paper