Nanticoke Watershed Alliance

2008-2012

FIVE YEAR NANTICOKE RIVER REPORT CARD

The Nanticoke Creekwatchers Citizen Water Monitoring Program began gathering water quality data in 2008 after a pilot half-year program in 2007. This Five Year Nanticoke River Report Card examines the trends shown in the four key indicators the program measures--dissolved oxygen, Secchi depth (water clarity), total phosphorus, and total nitrogen--from 2008 to 2012. This report will also look at bacteria measurements on the mainstem of the Nanticoke River from Seaford, Delaware, to Nanticoke, Maryland, although these are not given a grade since analyses must be made on a per site basis instead of a regional average. Full data sets are available from the Nanticoke Watershed Alliance (NWA) and at public libraries throughout the watershed.

OVERALL HEALTH GRADES FROM 2008-2012

River Region	2008	2009	2010	2011	2012
Upper Nanticoke	B	B	B	B-	B-
Lower Nanticoke	C	C	C+	C+	C+
Delaware Headwaters	B	B	B	B	B
Broad Creek	B	B	B	B	B
Marshyhope Creek	C+	B	B	B-	B
Lower Creeks	C	C	C	C+	C
Fishing Bay Headwaters	D+	D+	D	D	D

The Nanticoke Creekwatchers program divides the watershed into six scoring regions: the Upper Nanticoke in Delaware, the Lower Nanticoke in Maryland, the Delaware Headwaters, Broad Creek, Marshyhope Creek, and Lower Creeks. In addition, Dorchester Citizens for Planned Growth (DCPG) monitor five Fishing Bay headwaters sites. Fishing Bay is not included in the Nanticoke watershed averages. Instead, the Fishing Bay headwaters sites receive their own score. In addition, Blackwater National Wildlife Refuge (BNWR) monitors sites in the Fishing Bay watershed. When BNWR and Creekwatchers data is combined, a more complete view of the Fishing Bay watershed's water quality develops. For the Five Year Report Card, only the headwater sites are included for purposes of consistency.

Most regions saw relatively steady overall health grades during the 2008-2012 period. The Delaware Headwaters and Broad Creek consistently reported the best scores overall, while the Lower River and Lower Creeks performed worst in the watershed. Headwater sites in Fishing Bay showed the poorest water quality throughout the five-year period.

Overall health scores only tell part of the story, however. By examining the key indicators, trends and issues specific to regions emerge.

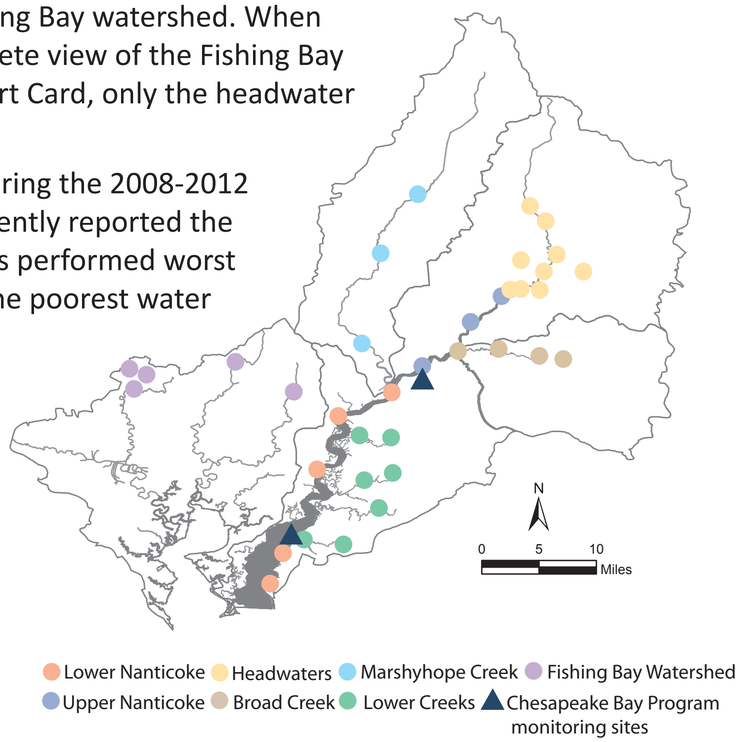


Figure 1 (above): Average overall health scores for 2008-2012 for all regions.

Figure 2 (right): A map shows the Nanticoke and Fishing Bay watersheds, along with all 36 sites monitored by the program and the Chesapeake Bay Program sites included in analysis.

What Do the Grades Mean?

A 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.

B 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.

C 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.

D 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.

F 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.

Figure 3 (below): Creekwatchers Dan Houghtaling and Alan Kamauff record dissolved oxygen and water temperature information that have been stored on their DO meter. Creekwatchers monitor their sites 17 times per year from early spring through mid-autumn.

DISSOLVED OXYGEN

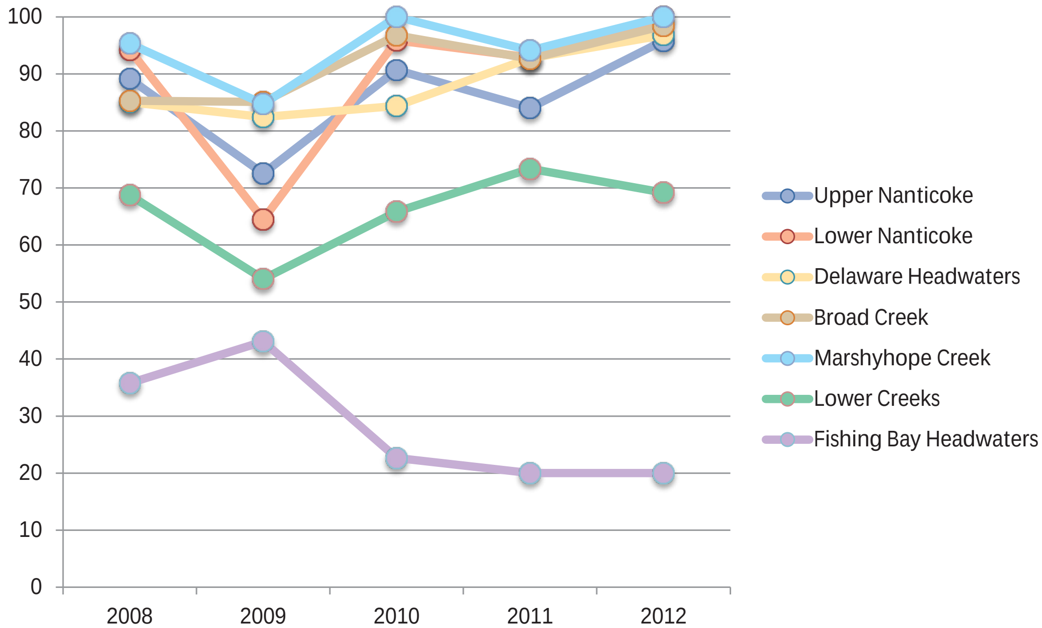


Figure 4 (above): Average dissolved oxygen grades for all regions from 2008-2012.

Nanticoke Creekwatchers measure surface dissolved oxygen (DO) in water no deeper than 0.3 meters below the surface. Dissolved oxygen is crucial for all living creatures, from aquatic worms to blue crabs and striped bass. Dissolved oxygen should be above 5.0 mg/L to support a healthy ecosystem.

Dissolved oxygen can vary according to the depth of the water, the time of the year, and weather events. During stressful periods common during summer months, droughts and high temperatures can lead to poor dissolved oxygen and fish kills. However, dissolved oxygen can be higher at the surface and the very bottom of the water column and very low in middle ranges, which pressures a number of fish species. With the exception of the Fishing Bay headwater sites, most regions scored very well in dissolved oxygen.

WATER CLARITY

Aquatic grasses and fish depend upon sunlight to help feed and protect them. Water clarity can be impacted by nutrient and sediment pollution. Constant wind action (such as that experienced in the Lower Nanticoke) and wave action created by engines can also diminish the amount of light that penetrates the water column. The Upper Nanticoke between Seaford and Sharptown has seen a marked decrease in water clarity over the past few years, which may indicate increased erosion.

Figure 5 (above): Average water clarity scores for all regions from 2008-2012. Water clarity depth must be at least 0.5 meters to support a healthy ecosystem.

Steps to Improve Water Clarity

1) Obey no-wake signs and reduce boat speed in narrow shoreline areas.

2) Instead of installing "hard" shorelines such as rip-rap or bulkhead, install or restore a soft, natural shoreline or a hybrid shoreline that consists of vegetation and breakwaters.

3) Retain buffers to prevent sediment from running off soil and pavement.

TOTAL PHOSPHORUS

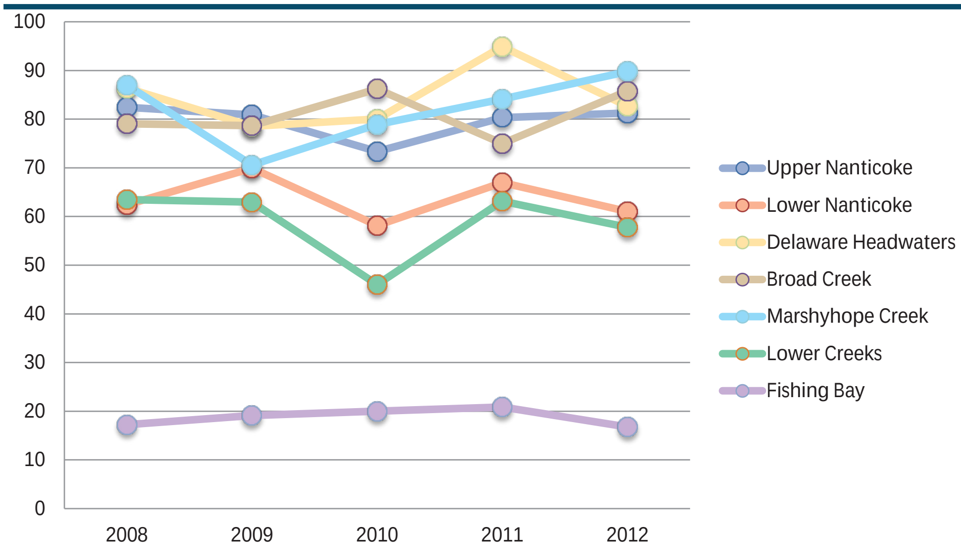


Figure 6 (above): Average total phosphorus scores for all regions from 2008-2012. The NWA uses a multithreshold scoring system provided by the Mid-Atlantic Tributary Assessment Coalition to determine total phosphorus grades.

In the majority of regions, total phosphorus falls within reasonable limits. The Fishing Bay headwater sites consistently show problems with phosphorus, however, and the Lower tributaries and river often show room for improvement in phosphorus reduction.

Phosphorus is one of two key nutrients. Although nutrients are required by aquatic organisms, excessive amounts of phosphorus and nitrogen can wreak havoc on aquatic systems and water quality by fuelling algae blooms, which rapidly use available dissolved oxygen available in waterways, especially after the blooms die off.

TOTAL NITROGEN

Throughout the Nanticoke watershed, nitrogen pollution is a problem. Excessive levels of nitrogen can cause human health issues, such as methemoglobinemia (or blue baby syndrome).

Broad Creek in Delaware has consistently showed the highest amount of nitrogen, scoring an “F” all five years, although all other regions--with the exception of the Fishing Bay headwaters sites--also score very poorly.

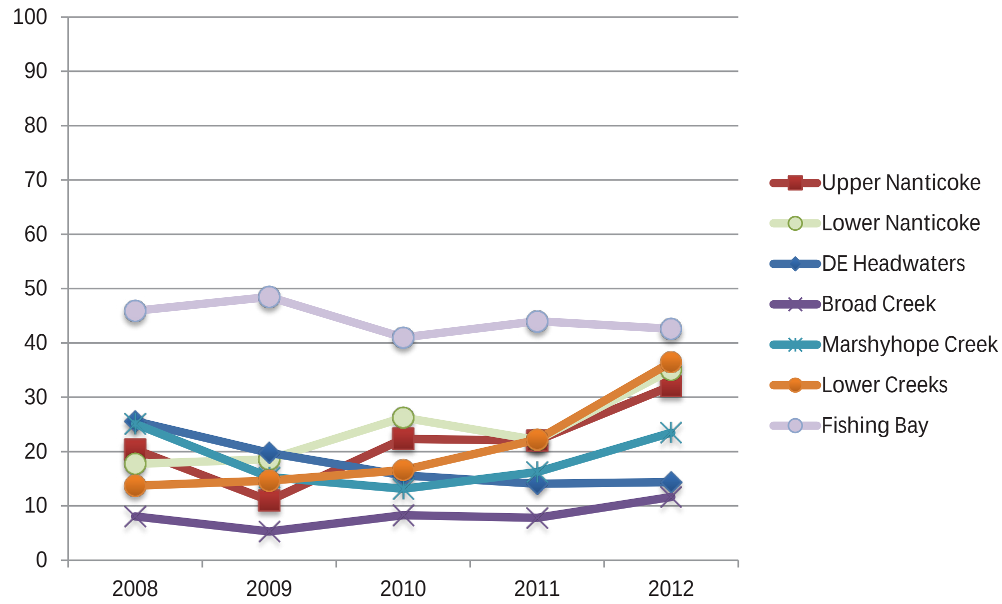


Figure 7 (above): Average total nitrogen scores for all regions from 2008-2012. The NWA uses a multithreshold scoring system provided by the Mid-Atlantic Tributary Assessment Coalition to determine nitrogen scores.

Nitrogen infiltrates waterways through a number of sources, including fertilizers, septic systems, and wastewater effluent. Leaving buffers along waterways, reducing stormwater runoff, and fertilizing appropriately and only when needed can help limit nitrogen pollution.

Steps to Reduce Nutrients

1) Retain or plant grass or tree buffers along waterways, including ditches, streams, creeks, and the river.

2) Obtain a soil test and only fertilize as needed.

3) Dispose of pet waste properly.

4) Plant a rain garden in the lowest area in your yard to hold rain for a short period following a rain event.

5) Use rain barrels to hold water instead of allowing water to runoff during rain events.

6) Maintain your septic system. Consider upgrading to an enhanced nutrient removal system.

7) Participate in volunteer oyster gardening programs, such as Marylanders Grow Oysters.

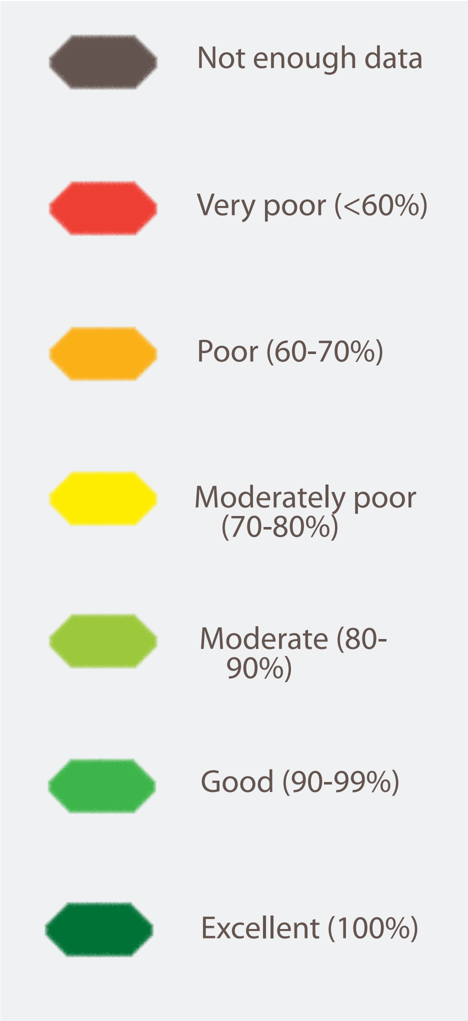
Figure 8 (above-top): Leaving vegetative buffers between your lawn and water can help reduce nutrient and sediment pollution.

Figure 9 (above-bottom): Residents with structures in brackish waters—such as those at Nanticoke, Maryland—can participate in programs such as Marylanders Grow Oysters, which provides oyster spat for homeowners to grow for a year. The spat are later planted in sanctuaries.

Fecal enterococci bacteria data is used to determine the safety of swimming in waters in marine and in freshwater systems. Because of that, the report card shows the percentage of bacteria samples that fall within the acceptable range specified by the Environmental Protection Agency (EPA) from Memorial Day to Labor Day. Further, some samples used to determine this percentage do not meet the EPA's six-hour from capture to analysis requirement. Lastly, bacteria data is useful on a site-by-site level only since it gives specific information about safety that regional averages cannot convey.

Because of this, bacteria data is not included in determining the overall health of the watershed, and although the scores may seem immediately alarming due to the low number of passing sites, readers should keep in mind that the Nanticoke features a number of wetlands that support higher bacteria counts and that bacteria naturally occur in the environment. Lastly, the program is unable to identify the sources of bacteria due to the high cost of doing so, which makes it impossible to pinpoint the root cause of these high bacteria levels. These results do suggest the need to perform bacteria sourcing.

Understanding Bacteria Scores



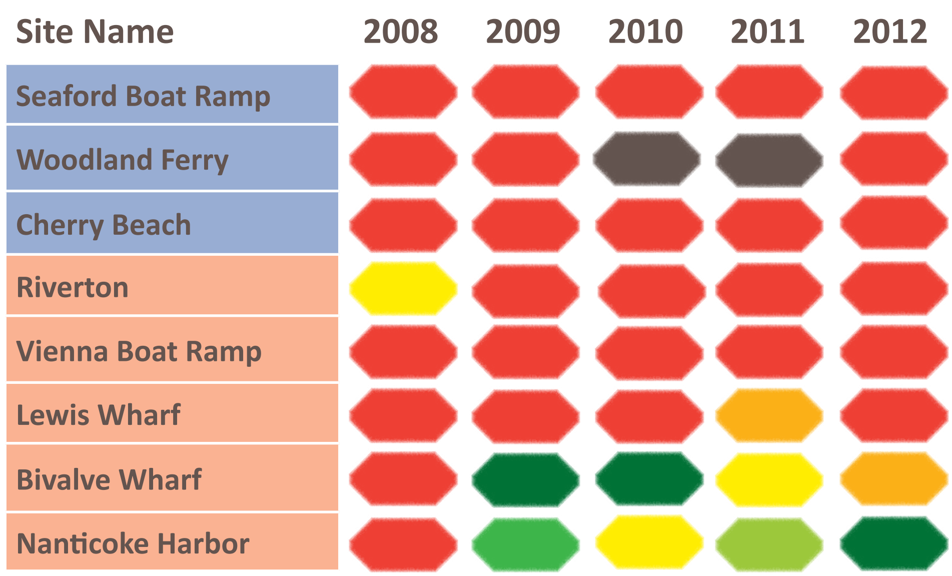


Figure 10 (above-top): The map shows the eight sites on the mainstem of the Nanticoke River that are included in the bacteria analysis for the report card. Data for all sites monitored in the Nanticoke and Fishing Bay watersheds is available directly from the NWA or via local libraries.

Figure 11 (above): The grid shows the percentage of time samples between Memorial Day and Labor Day equalled or counted fewer than 104 Colony Forming Units. Less than 60 percent is considered a poor score, while 100 percent is considered excellent. See the "Understanding Bacteria Scores" legend for a full understanding of the bacteria grid.

There were an inadequate number of datasets for Woodland Ferry in 2010 and 2011, and no score is provided for those years.

Figure 12 (opposite page): Creekwatcher Cyrus Marter measures water clarity at Wetipquin Creek.

ABOUT THE CREEKWATCHERS PROGRAM

In 2007, the NWA piloted the Nanticoke Creekwatchers Citizen Water Monitoring Program. Since then, Creekwatchers have sampled 17 times per year from early spring through mid-autumn. They monitor 36 sites (31 in the Nanticoke River watershed and 5 in the Fishing Bay watershed) in total. At each site, Creekwatchers make observations, take field measurements, and acquire two water samples that our partner lab, Envirocorp Labs Inc., processes and analyzes for total nitrogen, total phosphorus, and bacteria data.

Over the years, several organizations have supported the program through financial and technical assistance. They include Envirocorp Labs Inc., the Delaware Department of Natural Resources and Environmental Control (DNREC), the Chesapeake Bay Trust, the Community Foundation of the Eastern Shore, the Mid-Atlantic Tributary Assessment Coalition, and EcoCheck.

From 2008-2012, over 70 Creekwatchers participated in the program. Some Creekwatchers committed to a year's service and others participated all five seasons. Creekwatchers have tested in snow, wind, rain, and before and after tropical storms. Without them, this report card and the data they have provided would not be possible. Thanks to every Nanticoke Creekwatcher for their diligence, service, and support!

NANTICOKE CREEKWATCHERS: 2008-2012

Don Allen
Linda Allen
Harvey Altergott
Amy Ash
Daniel Ash
Richard Ball
Richard Biron
Bryan Burkholder
Autumn Collins
Jack Conner
Jean Conner
Brett Darrah
Rick Darrah
Ed Dryden
Melinda Duryea
Susan Good
Barbara Hale
Bob Hambury
Wolf Hehn
Bob Heim
Linda Heim
Ann Henderson
Dan Houghtaling
Rob Hutton
Roman Jesien
Ric Johansen
Andrea Kahn
Ethan Kanh
Fred Kahn
Alan Kamauff
Bob Kijewski
Bonnie Kijewski
John King
Chuck Kropp
Shelton Lankford
Vernon Lankford
David Lee
Beth Ann Lynch
Bob Mack
Ron Maher
Barbara Marhoefer
Maryland Conservation Corps
Cyrus Marter
Mike Pretl
David Ranzan
Ali Schwartz
Steve Schwartz
Ted Schwartz
Stan Shedaker
Ed Skibicki
Ed Snyder
Fred Sponseller
Dana Svane
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Chris Tyler
Howard Vanderslice
James West
Janet Wheatley
Ken Wheatley
Carolyn Whitt
Jon Whitt
Lee Williams
Frayser Williamson
Thomas Wolfle
Dick Work
Sally Work
Chris Wright
Leslie Wright
Ed Yesko
Ruth Yesko
Nan Zamorski
Rick Zamorski
Gabriel Zapecki

ABOUT THE ALLIANCE

Founded in 1992 by a bi-state commission, the Nanticoke Watershed Alliance (NWA) is headquartered in Vienna, Maryland, in the Captain John Smith Discovery Center. The NWA works toward partnerships and progress in conserving the natural, cultural, and recreational resources of the Nanticoke River watershed through education, collaborative outreach, and dialogue.

Figure 13 (above left): Participants at a "Wade In" measure the "sneaker index," a casual indicator of water clarity.

Figure 14 (above right): Creekwatchers receive a 2012 Delaware Governor's Volunteer Award for outstanding environmental group.

The NWA is a consortium of organizations dedicated to conserving the river and its resources. The NWA works with forty "Partners in Conservation" to help achieve our mission and many of its collaborative efforts. Some of the NWA's recent initiatives include:

- A flexible agriculture buffers program
- A Nanticoke River Watershed Atlas and Watershed Management Plan
- Homeowner workshops designed to educate and empower homeowners in improving water quality locally
- Captain John Smith National Historic Water Trail online guide and website development at paddlethenanticoke.org
- Environmental education programs and workshops for educators
- A service-learning stewardship program

Want to register for a program, become a volunteer, join as a new Partner in Conservation, or keep up-to-date with NWA events and happenings? Visit us at www.nanticokeriver.org or "Like" us on Facebook.

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

Project Supervisor/Author
Beth Wasden

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