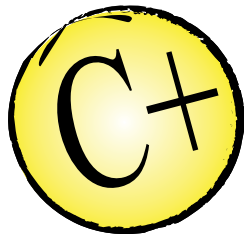




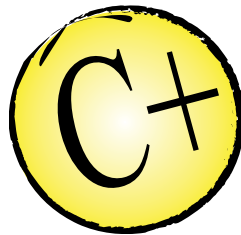
2011 NANTICOKE RIVER REPORT CARD

River Final Grade



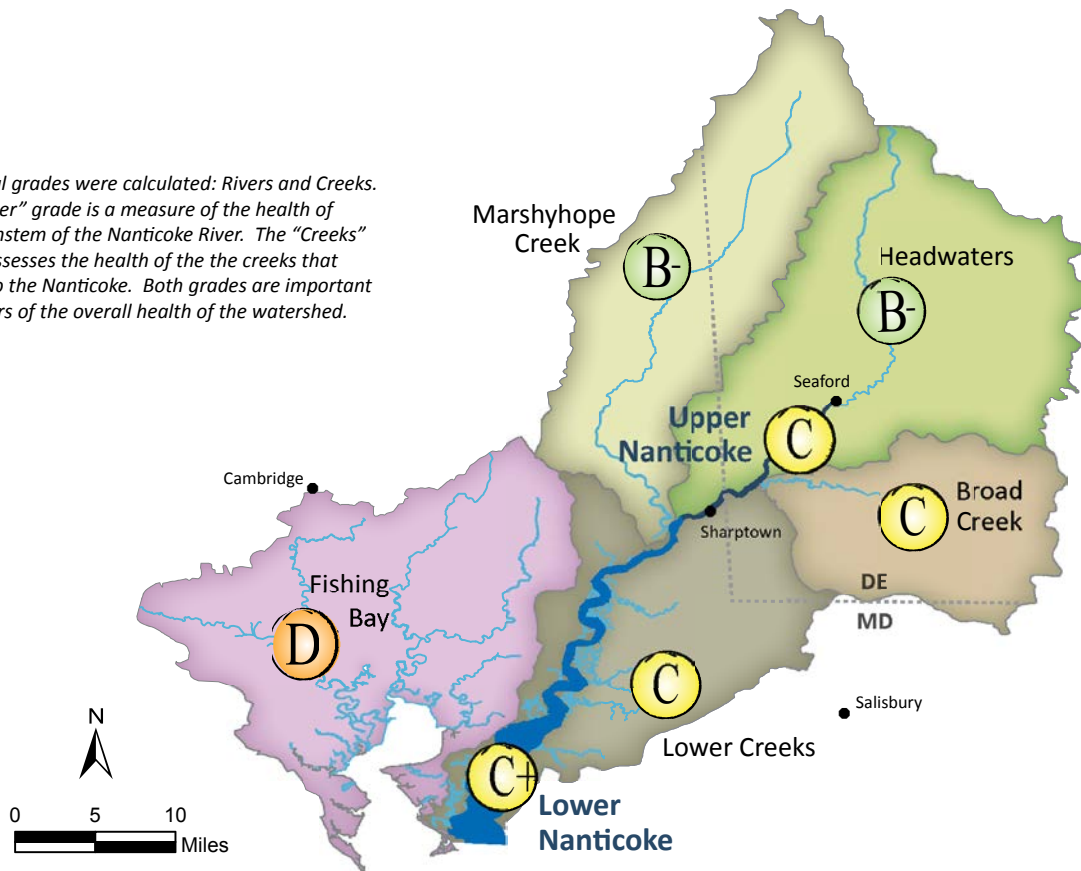
- Oxygen scores were generally good.
- Water clarity scores were very good for the Upper Nanticoke but poor for the Lower Nanticoke.
- Nitrogen scores were poor, particularly in the Upper Nanticoke.

Creeks Final Grade



- Oxygen scores were very good in all creek regions.
- Water clarity scores were very good for all regions, except for the Marshyhope Creek and Lower Creeks in Maryland.
- Nitrogen scores were poor in all creek regions.

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.



Nanticoke Watershed Location Within the Chesapeake Bay

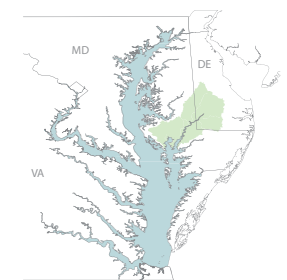


Figure 1: Report card grades for the Nanticoke River and its creeks in 2011. The water quality grades are based on data collected by Nanticoke Creekwatchers, volunteer citizen scientists for the Nanticoke Watershed Alliance. Data from two Chesapeake Bay Program monitoring sites on the Nanticoke River were also included for analysis.

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.

NITROGEN SCORES POOR FOR THIRD YEAR

Overall health index grades for the six regions within the Nanticoke Watershed ranged from B- to C (Figure 2). In 2011, both the Nanticoke River and the creeks received a C+ overall. Fishing Bay Watershed, though not part of the Nanticoke River system, can play a role in the overall health of our watershed. For the third year in a row, Fishing Bay received the lowest score overall (D).*

As with previous years, dissolved oxygen and water clarity continued to score well in most of the watershed. The poorest clarity scores occurred in the lower sections of the river and creeks. Decreased water clarity in those areas may be partly due to the open water habitat; these areas are more prone to excessive algae growth and winds that churn up sediments.

Total nitrogen grades continued to be poor in all sections, following the trend established in previous report cards. The lowest grades were in Broad Creek and the Delaware Headwaters, which received F's. Nitrogen levels in Broad Creek and particularly the James Branch were very high throughout the year. The James Branch site showed excessive nitrogen levels all 17 sampling periods. During the 2011 calendar year, fish kills followed extensive algae blooms in the Broad Creek subwatershed, including an early August event at Chipmans Pond in Laurel, Delaware. Algae was visible in many ponds and the headwaters of Broad Creek prior to the arrival of the heavy rainfall and strong winds that accompanied Hurricane Irene. The continued high nitrogen scores could reflect a problem with sources that provide steady outputs of nitrogen, such as failing septic systems, septic without nutrient reduction systems that are in critical areas near waterways, or overapplication of fertilizers. The "best" nitrogen score was found in the Lower Nanticoke (C grade).

Total phosphorus grades were similar to 2010's report card. By far, Broad Creek showed the biggest change--declining from a B in 2010 to a D- in 2011.

Scores for fecal enterococcus, a bacterial indicator of water quality for recreational activities, were similar to last year's scores. As in 2010, the 2011 scores ranged from B to D-. Fecal enterococcus represents the potential presence of animal and human waste in the water. Fecal enterococcus scores are impacted by wastewater treatment systems, leaks from septic systems, and livestock or wildlife waste entering waterways.

River Region	Dissolved Oxygen	Water Clarity	Total Nitrogen	Total Phosphorus	Fecal Enterococcus	Overall Health Index
Headwaters	A	A+	F	A	D-	B-
Marshyhope Creek	A	C	D-	B	B	B-
Lower Nanticoke	A	D	C	C	B	C+
Broad Creek	A	A+	F	D-	C	C
Lower Creeks	B	C+	C-	C	C-	C
Upper Nanticoke	A-	B-	D	C+	D	C
Fishing Bay**	D-	C	C-	F	D	D

Figure 2: 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.

*Scores for Fishing Bay Watershed were included in this report due to its relevance and proximity to the Nanticoke, but were not included in calculations for the Rivers and Creeks "Final Grade." Fishing Bay scores are based on five sampling sites only, which are monitored by Dorchester Citizens for Planned Growth (DCPG). See Figure 3 for the locations of these sites.

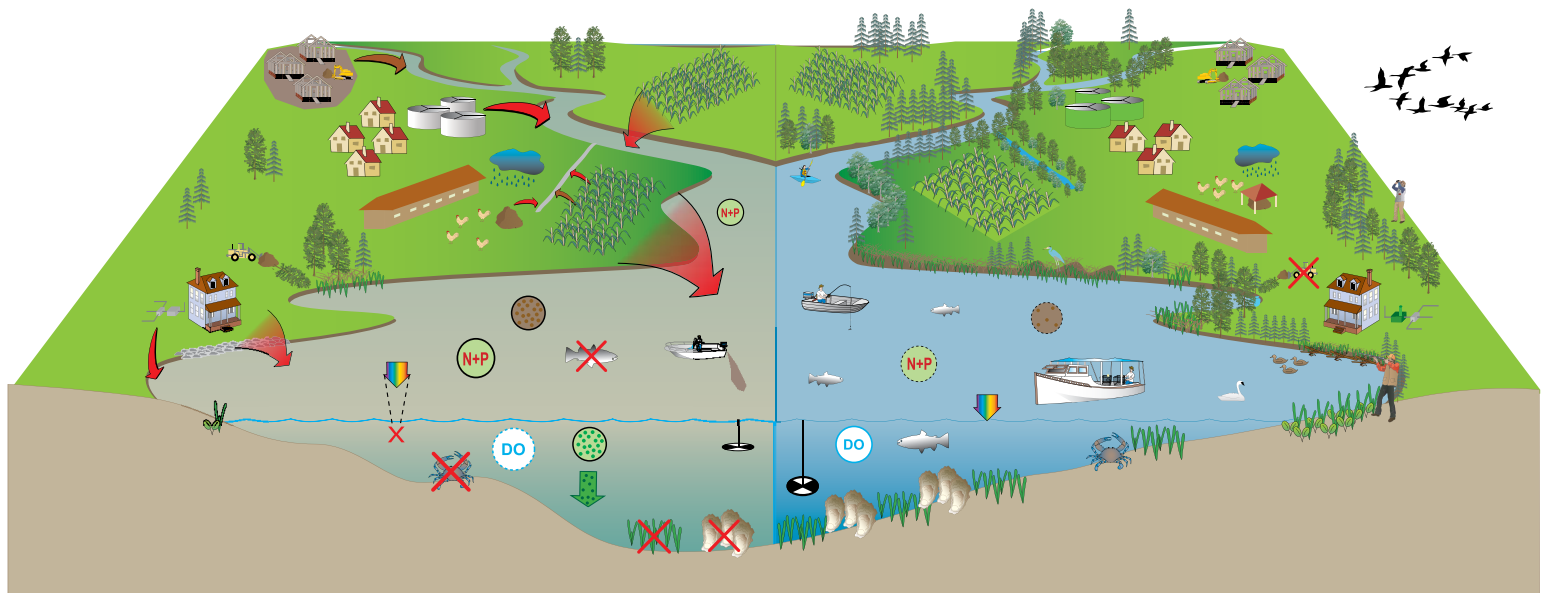


Figure 3. Algae on Broad Creek in Laurel, Delaware, on August 23, 2011, prior to Hurricane Irene.



Figure 4. Broad Creek in Laurel, Delaware, on August 30, 2011, following Hurricane Irene.

MAKE CHOICES FOR A HEALTHIER NANTICOKE



Pollutants

Sediments, or soil pollution, can enter surface waters from eroding stream banks and lands with decreased plant cover, such as some agricultural acreage and construction sites. Excess sediment creates cloudiness (turbidity), which reduces the amount of light reaching aquatic vegetation. Many species, especially crabs and young fish, rely on these grasses for habitat.

Nitrogen and Phosphorus are key nutrients found in many fertilizers that are used on both agricultural and residential lands. Excess amounts of these nutrients can result in algal blooms, which deplete the amount of oxygen in the water available for fish and other organisms native to the Nanticoke River and its tributaries.

Human and Animal Waste can add excess nutrients to the Nanticoke, in turn reducing the amount of oxygen availability. It also can lead to a buildup of bacteria that may cause illnesses in humans who come in contact with contaminated waterways.



Figure 5: Rain barrels act as cisterns, storing water until needed for watering the garden or for other outdoors purposes. Rain barrel owners reduce runoff, conserve water, and save money. Every inch of rain that falls on a 1,000 square foot surface yields 600 gallons of rainwater.

Actions for a Healthier Nanticoke

1. Install **rain barrels** (see Figure 5) to collect roof runoff for watering gardens and lawns. This conserves water, prevents excess stormwater runoff during heavy rain events, can help improve total nitrogen, total phosphorus, and bacteria scores.
2. Plant **rain gardens** at your home, school, or other public locations. Rain gardens use native, water-loving plants to filter rainwater runoff from roofs, driveways, walkways, parking lots, and compacted lawn areas. Rain gardens can cut down on the amount of pollution reaching creeks and streams by up to 30%.
3. Upgrade your septic system to one that includes advanced nutrient reduction. **Upgraded Wastewater Treatment Plants and Septic Tanks** can help prevent excess nutrients found in human waste from entering the Nanticoke River. They can also remove harmful bacteria, thus improving bacteria scores.
4. Volunteer in your community in long-term positions or for short-term projects, such as buffer strip plantings or installation of living shorelines. **Buffer strips** consist of strips of trees and other vegetation that improve water quality in waterways by filtering pollutants, reducing flooding and erosion, and providing shade to shallow water habitats. **Living Shorelines** protect property from erosion and provide habitat for fish, birds and other wildlife. They also protect water quality by trapping excess nutrients and sediment.
5. Plant **cover crops**. Cover crops help farmers manage soil fertility, soil quality, water usage, weeds, pests, diseases, and wildlife. Cover crops also help take up excess nutrients, prevent soil erosion, and improve total phosphorus and total nitrogen scores.
6. Protect and manage **forests**. Contiguous forest buffers in critical areas, in particular, provide key habitat for wildlife and birds. They also absorb large amounts of nutrients. Native trees are uniquely adapted to local climates, which reduces dependency on external watering and fertilization.

ABOUT THE CREEKWATCHERS PROGRAM

During the 2011 season, 23 citizen scientists participated in the Nanticoke Creekwatchers Citizen Water Monitoring Program. These volunteers monitored 32 sites in the watershed. Creekwatchers sampled at their sites every other week from April through November, gathering data and water samples and making observations.

Envirocorp Labs Inc. of Harrington, Delaware, continues to serve as a keystone of the program, providing over \$70,000 of lab work annually. During the 2011 season, the Delaware Department of Natural Resources and Environmental Control funded the Delaware portion of the program, while the Chesapeake Bay Trust supported the Maryland section of the watershed.

Thanks to the 2011 Creekwatchers!

Richard Ball
Bob Hambury
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Alan Kamauff
Bonnie Kijewski
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Cyrus Marter
Stan Shedaker
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Susan Good
Dan Houghtaling
Ric Johansen
Bob Kijewski
John King
Ron Maher
Mike Pretl
Fred Sponseller
Frayser Williamson
Chris Wright
Ruth Yesko
Rick Zamorski



Figures 6-7: On left, Cyrus Marter and Ron Maher (l-r) acquire a nutrient sample on the Lower Nanticoke. On right, Susan Good measures the Secchi depth on the Marshyhope Creek.

ABOUT THE ALLIANCE

The Nanticoke Watershed Alliance is a consortium of non-profit organizations, local businesses, industry, state and federal agencies who all work together to ensure a bright future for the iconic Nanticoke River. The Alliance 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.
- Working to create strong bi-state relationships, ensuring access and effective conservation for the entire Nanticoke Watershed.
- Developing a watershed management plan and an updated river atlas to ensure the Nanticoke maintains its high level of ecological health and cultural significance.
- Engaging volunteers in restoration activities, rain garden planting, outreach at festivals, oyster gardening, and stream clean-ups.

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

Support the Alliance!

- Join our team of dedicated volunteers and help with water monitoring, restoration and cleanups, outreach efforts and more.
- Make a tax-deductible donation to support our work for the river and its communities.
- Become an Alliance partner. Businesses and organizations can join the Alliance'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.

The Nanticoke Watershed Alliance would like to thank the following organizations for their contributions and support of the Creekwatchers program during the 2011 season:



Project
Supervisor/Author
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