Wicomico Creekwatchers: 2011 Water Quality Monitoring Results

Photo by E. Seldomridge

Wicomico Creekwatchers monitor water quality at 23 sites throughout the Wicomico River system from March until November, collecting samples bi-weekly from the following tributaries and ponds: Wicomico Creek, the East Prong, Shiles Creek, Rockawalkin Creek, Coulbourne Mill Pond, Johnson Pond, Parker Pond, Schumaker Pond, Tony Tank and Allen Pond. The water quality analysis includes chlorophyll a, salinity, pH, nitrogen (nitrate and total nitrogen) and phosphorus (phosphate and total phosphorus) levels.

The sampling sites are divided into four functional groups: Ponds, Upper Wicomico, Lower Wicomico and Wicomico Creek. The Ponds are impoundments in or near the city of Salisbury, surrounded by residential properties and fed by streams draining farmland and other residential areas, including the Town of Delmar and its wastewater treatment plant (WWTP). These impounded streams flow into the Upper Wicomico, which is also affected by the inputs of the Fruitland and Salisbury wastewater treatment plants. The Lower Wicomico waters are diluted by tidal action from the Chesapeake Bay, and they are also more distant from large urban nutrient sources. Wicomico Creek is mainly surrounded by agricultural land.

The Wicomico River watershed drains 182 square miles of land in Wicomico and Somerset counties in Maryland and Sussex County in Delaware. Much of the land use in this watershed is agricultural, but the river water quality is also greatly influenced by developed areas, including the City of Salisbury at the upstream end. Ultimately, all rain water that flows into the river makes its way into Tangier Sound and the Chesapeake Bay.

SUMMARY OF RESULTS

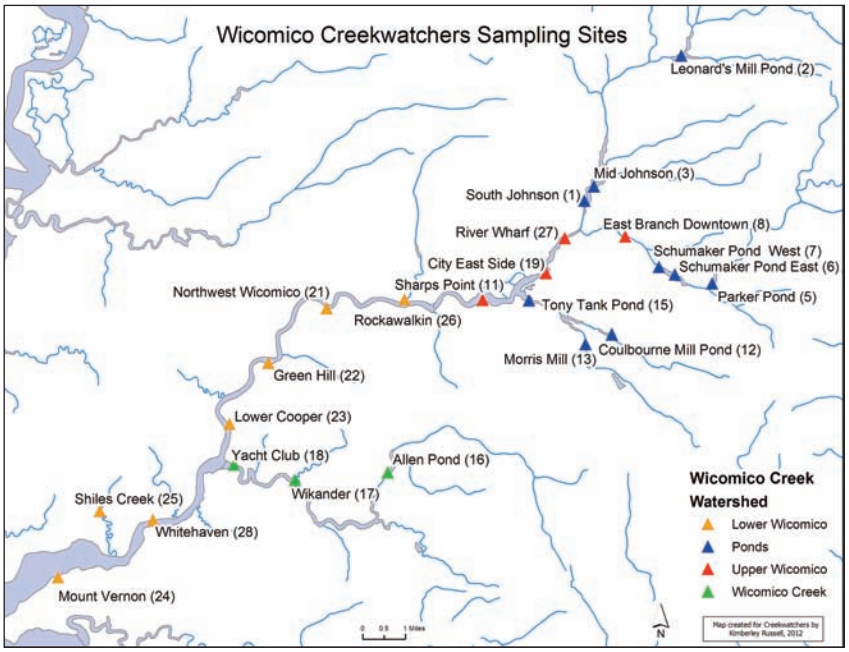
In 2011, water quality results were variable by parameter, with the Upper Wicomico showing the most consistent improvement overall.

Total Nitrogen (TN) displayed the most positive trend, lower than in previous years in all groups, and approaching the healthy threshold in Wicomico Creek and the Lower Wicomico. All group averages were "acceptable," between the unhealthy and healthy levels for TN. Two individual upstream site averages were at unhealthy levels, however.

Total Phosphorus (TP) declined only in the Upper Wicomico, increasing markedly in the Ponds and Lower Wicomico, and increasing slightly in Wicomico Creek. As with TN, all group averages were between the unhealthy and the healthy thresholds ("acceptable"). One individual upstream site averages reached the unhealthy level.

Water Clarity worsened substantially in all groups compared with 2010, with only one site showing healthy levels.

Chlorophyll a levels increased in most groups compared with 2010, and all group averages were above the healthy threshold. Several upstream sites had healthy averages, however.

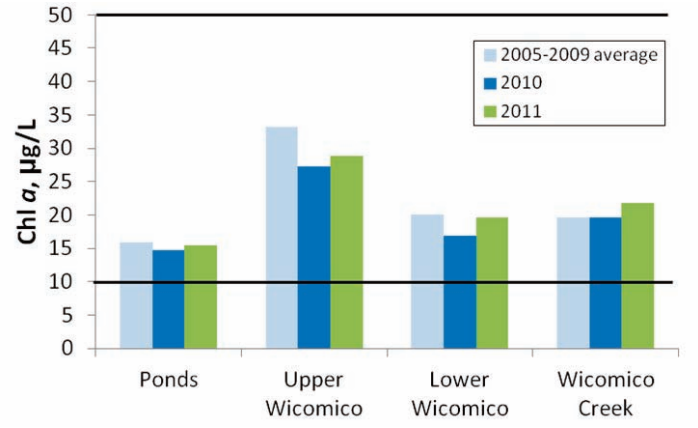


The U.S. Environmental Protection Agency has named the Wicomico River an impaired water body due to pollution from excess nutrients and coliform bacteria, and lack of water clarity. The Wicomico River Creekwatchers program was created in 2002 to increase the availability of reliable, objective water quality data for the river. It is a community partnership for scientific monitoring of the waters of the Wicomico River and its tributaries. Citizen volunteers collect water samples at 23 sites along the Wicomico River, and student volunteers from Salisbury University perform the water quality analysis, in conjunction with the University of Maryland Center for Environmental Science Horn Point Laboratory. The data are presented in annual reports for use by citizens, businesses and public officials to ensure adequate protection of the health of the Wicomico River.

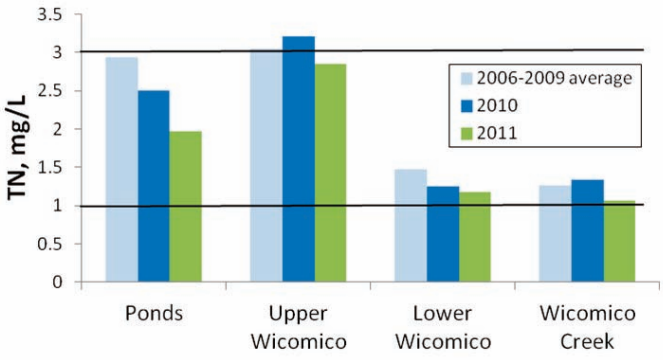
Wicomico Creekwatchers are also the official monitoring entity of the City of Salisbury's Wicomico River Project.

Watershed: the area of land that drains into a particular body of water
Runoff/nonpoint source: pollution (trash, sediment, toxins, oils and nutrients), carried by rainwater, that comes from broad land areas draining into a water body
Point source: a pipe or specific outfall that carries pollution into a water body
Nutrient sources: lawn fertilizers, septic systems, farm animal manure, car exhaust, etc.

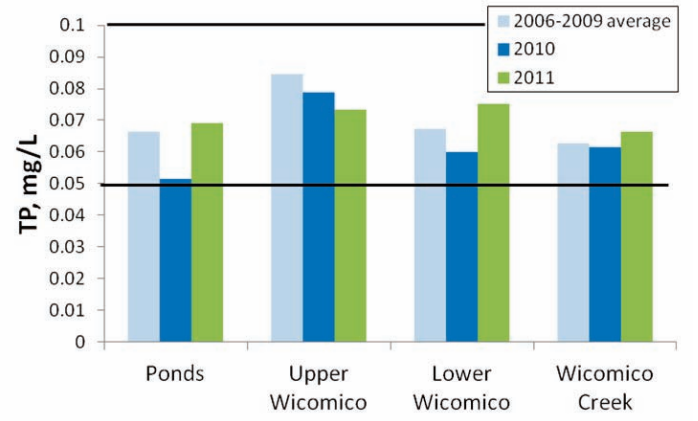
RESULTS



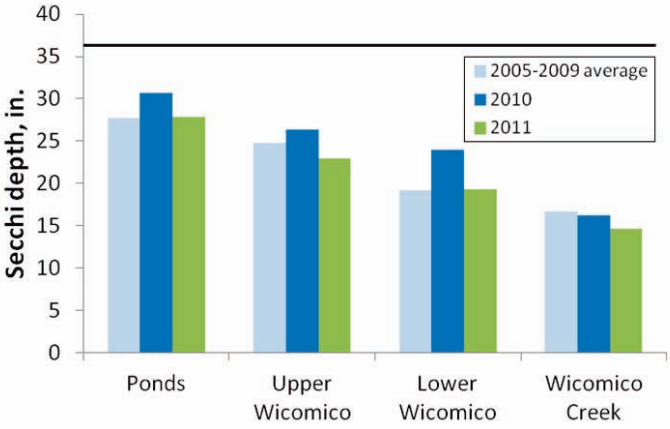
Chlorophyll a for 2011, 2010 and for the previous 5-year period
Chlorophyll allows plants—including algae—to capture sunlight and perform photosynthesis. The abundance of chlorophyll a is a good indicator of the amount of algae present in water. Solid black lines indicate healthy (below 10.0 mg/L) and elevated (10.0 to 50.0 mg/L) reference levels.



Total Nitrogen (TN) for 2011, 2010 and the previous 4-year period
Nitrogen is essential for plants and animals, but an overabundance causes algal blooms and resulting low dissolved oxygen levels. Solid black lines indicate healthy (below 1 mg/L) and moderate (1 to 3 mg/L) values.



Total Phosphorus (TP) for 2011, 2010 and for the previous 4-year period
Phosphorus is a key nutrient in aquatic systems with the same overabundance problems as nitrogen. Phosphorus is often attached to particles of sediment. Solid black lines indicate healthy (below 0.05 mg/L) and moderate (0.05 to 0.1 mg/L) values.

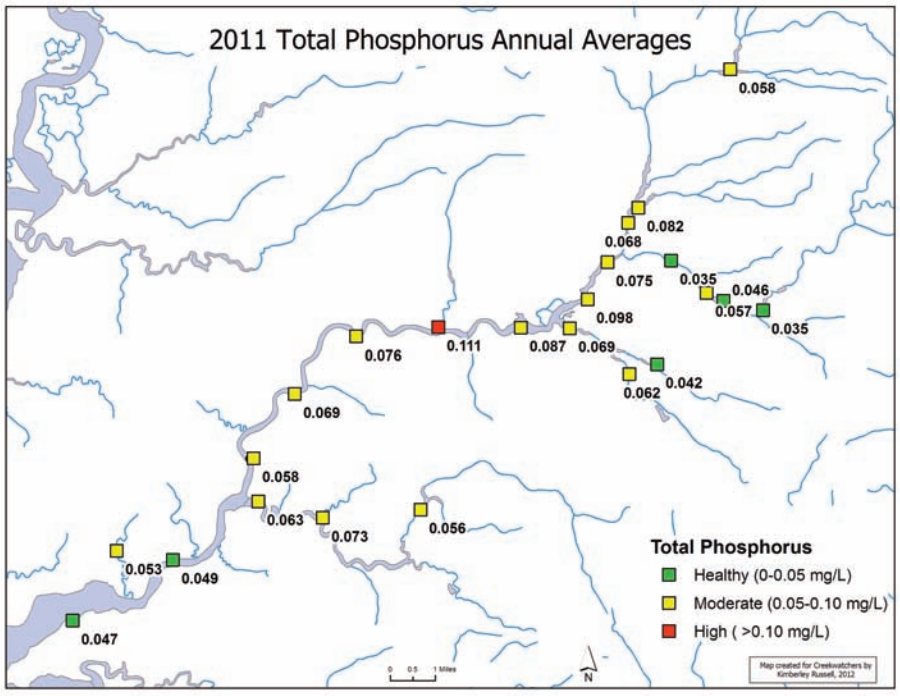


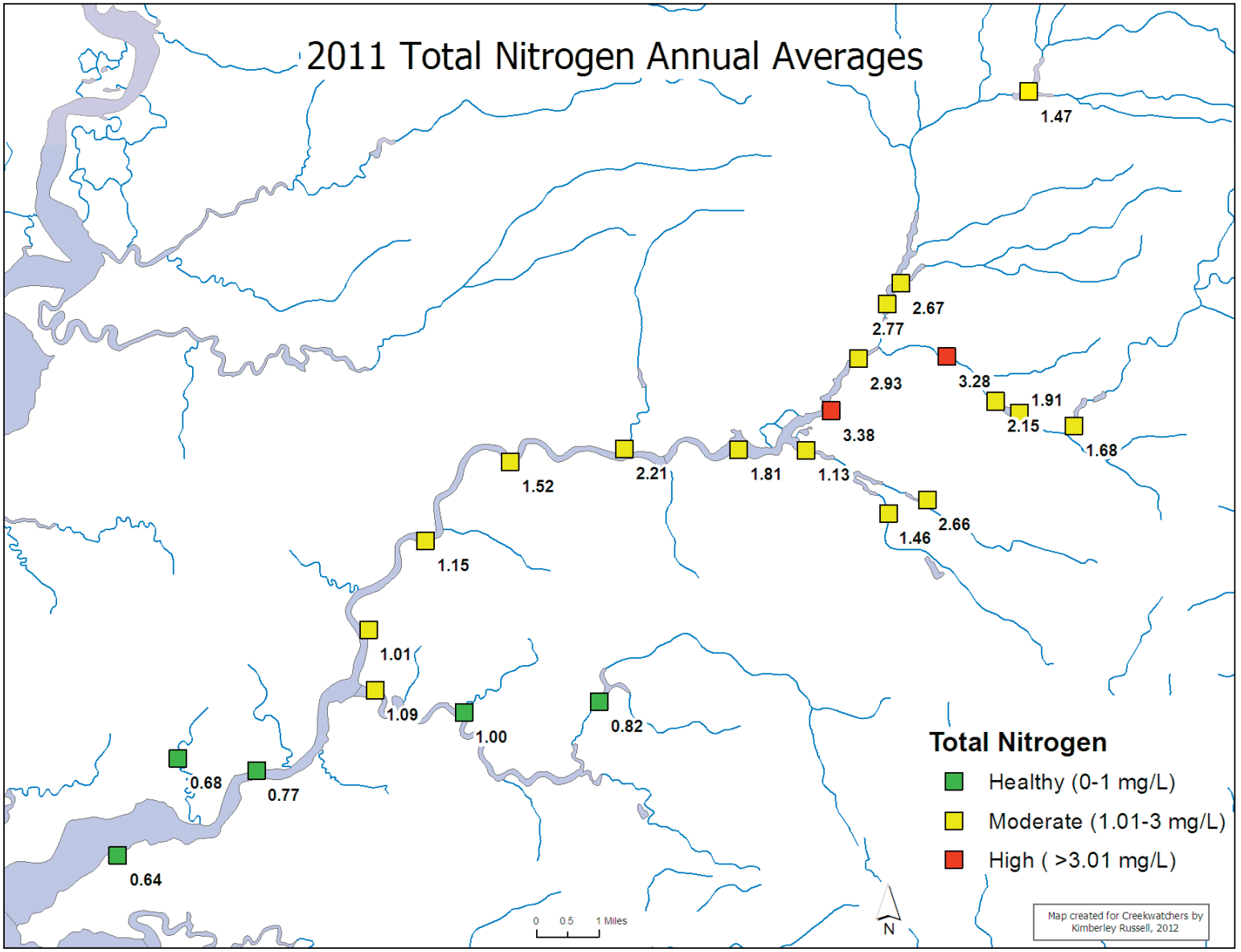
Water Clarity for 2011, 2010 and for the previous 5-year period
Light is critical for growth of underwater grasses. Secchi depth measures the ability of light to penetrate water. Poor water clarity indicates water that is clouded with suspended sediment and algae. Healthy values are above 36 inches (solid black line).

The water quality results for 2011 were quite mixed (see graphs above). All groups showed an improving trend in Total Nitrogen; however, Chlorophyll a, water clarity and Total Phosphorus (TP) were worse for all groups except for TP in the Upper Wicomico.

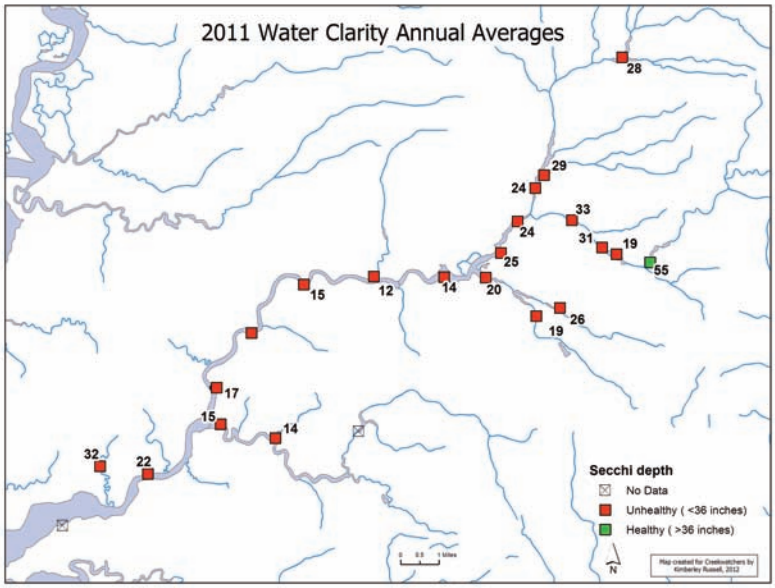
GIS mapping of annual averages for each site (right and next page) illustrates spatial patterns of water quality for each index.

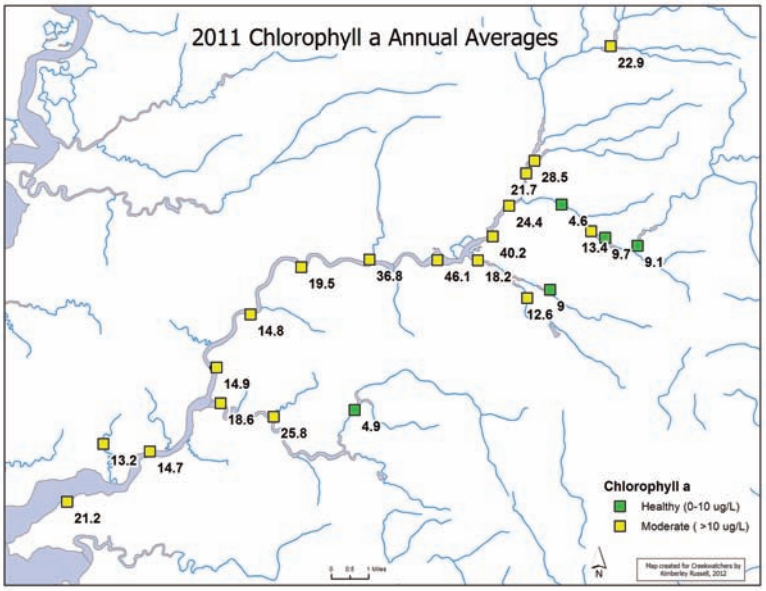
TP was in the healthy range in the East Prong and most Salisbury Pond sites, as well as in the lower river, but levels were higher in the North Prong, Upper River and Wicomico Creek, and one site (near the mouth of Rockawalkin Creek) showed annual average levels in the high range. Phosphorus is carried in sediments, and its delivery to the river and to the ponds should be reduced during low rainfall, as was present in 2011 as in 2010.





TN generally improved in the downstream direction, indicating high N sources upstream and dilution with lower N tidal waters coming from Tangier Sound. Water clarity was consistently poor, with Secchi depth at all but one station below the threshold of 36 inches (91.4 cm). This is likely influenced by the shallow, well-mixed nature of this system, which may result in higher suspended sediments. However, water clarity is also affected by nutrient-supported algal growth. Most sites did not show a clear correlation between chlorophyll a and water clarity. As in previous years, there were a few upstream or pond sites with healthy (low) levels of chlorophyll a, but most sites showed substantial algal abundance.





WICOMICO CREEKWATCHERS

Photo by W. Hocutt

Wicomico Creekwatchers are supported by the City of Salisbury, Wicomico Environmental Trust, George Miles and Buhr Engineering, Chesapeake Bay Foundation, Chesapeake Bay Trust, Salisbury University Henson School of Science and Technology, and SU Department of Biological Sciences.

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For more information or to see past reports, go to
www.salisbury.edu/wicomicocreekwatchers

METHODS

Photo by P. Mysak

Trained citizen volunteers – Creekwatchers – collect water samples and data from 23 sites along the Wicomico River at regular two-week intervals from March to November. No samples are collected in December, January or February, since biological activity and its effects on water quality are lower during the winter months.

At each monitoring site, volunteers collect river water in standard BOD (biochemical oxygen demand) sampling bottles, measure water clarity with a calibrated Secchi disk and record other valuable information (such as water temperature, tide stage, recent rainfall and wind speed). Samples are chilled and delivered to Salisbury University the same day. Chlorophyll a, pH and salinity are measured with a YSI 6920 MDS unit, nitrate with an ion selective electrode and phosphate with a Hach DR/2000 spectrophotometer. Total nitrogen (TN) and total phosphorus (TP) are determined at the Horn Point Laboratory of the University of Maryland Center for Environmental Science (UMCES) using a Technicon Autoanalyzer II.

For this and previous reports, monthly averages for each site were calculated and then grouped to provide averages for the four functional groups that make up the Wicomico River system: the Ponds (areas upstream of manmade barriers and impoundments); the "Upper" Wicomico (the region that is tidal but does not experience salinity intrusion); the "Lower" Wicomico (the region that is tidal and subject to salinity intrusion); and the major tributary, Wicomico Creek.

Results are evaluated using guidelines developed for surface waters by the Delaware Department of Natural Resources and Environmental Control. They are generally consistent with the threshold values used by the Mid-Atlantic Tributary Assessment Coalition, UMCES, for report card assessments for oligohaline waters (waters of low salinity).

SUMMARY

The 2011 Wicomico Creekwatchers results show mixed results, with improved total nitrogen averages compared with the past several years, but higher levels of total phosphorus (except in the upper river) and chlorophyll a, and reduced water clarity. Generally, water quality is still impaired in many sections of the river but appears to have improved slightly in the upper river. Uneven progress may be underway, but more substantial efforts will be needed to reduce pollutants to acceptable levels.

What You Can Do

In many Chesapeake Bay tributaries, excessive nitrogen and phosphorus pollution has decreased water quality and the health of aquatic habitats. Nitrogen and phosphorus pollution stimulates algae growth, diminishes water clarity and ultimately reduces dissolved oxygen levels within the water. These changes reduce a water body's aesthetic and recreational values, and impair its ability to support healthy populations of aquatic life.

Photo by E. Seldomridge

You can help improve the health of your river and the Bay:

- Get involved locally – your local organizations and government can't do it alone;
- Use lawn chemicals and fertilizers sparingly and only as directed;
- Create "buffers" – areas that will soak up excess rain water – by planting native trees, shrubs and grasses;
- Use rain barrels to catch rain water from your roof and plant rain gardens to trap it on the ground;
- Support your local and regional conservation groups; and,
- Become a Creekwatcher!