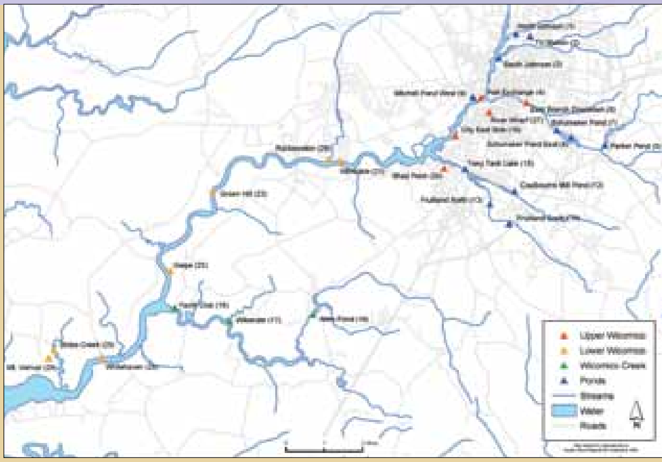
Wicomico Creekwatchers: Five-Year Water-Quality Monitoring Results (2005-2009)

Wicomico Creekwatchers monitors 25 sites throughout the Wicomico River system, collecting samples from the following Wicomico tributaries and ponds (technically known as “impoundments”): Wicomico Creek, Johnson Pond, Parker Pond, Schumaker Pond, the East Prong, Mitchell Pond, Coulbourne Mill Pond, Tony Tank Lake, Allen Pond, Shiles Creek, and Rockawalkin Creek.

Photo by Emily Seldomridge

Each year since it began, Wicomico Creekwatchers has published a detailed report of its annual monitoring results. Creekwatchers has shared those reports with citizens, local and State elected leaders, Maryland Department of the Environment, Maryland Department of Natural Resources, and other agencies and organizations. This report presents four or five years of selected data and analysis from this monitoring program of the Wicomico River. (Prior annual reports are available by request or online at cbf.org/hotc on the Resources page).

The Wicomico River watershed[1] 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 (approximate population 24,000) which lies near the headwaters. Ultimately, all rain water that flows into the river makes its way into Tangier Sound and the Chesapeake Bay.



Summary of Results

This report analyzes Wicomico Creekwatchers’ data for four indicators of river health. Water clarity (also known as “turbidity”) and *chlorophyll a* were analyzed for the last five years. Analysis of total nitrogen (TN) and total phosphorus (TP) began in 2006. Average monthly values were compared against scientifically acceptable levels (“thresholds”) to make judgments about the health of the river and its tributaries.

Water-quality monitoring throughout the report time period (2005-2009) demonstrates ongoing unhealthy conditions within the Wicomico River system.

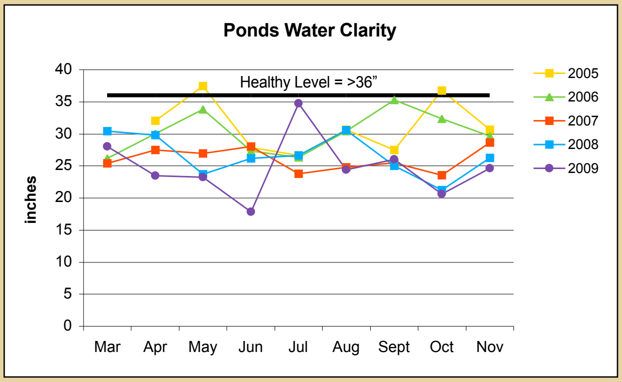
- **Water clarity** was consistently poor, as evidenced by monthly average measurements that almost always fell below the healthy level of 36 inches. Clarity was poorest in the lower sections of the Wicomico River and in Wicomico Creek.
- ***Chlorophyll a*** levels were elevated throughout each of the years sampled, indicating an over abundance of algae growth in the river system.
- **Total nitrogen (TN)** levels were elevated over the four-year period and, while TN is an essential nutrient for both plants and animals, high levels can generate increased algal blooms followed by low dissolved oxygen levels, making life challenging for fish and other aquatic species. TN levels were higher in the Ponds and upper reaches of the Wicomico River.
- **Total phosphorus (TP)** was averaged over all four years in which it was measured. TP was most variable in the pond systems, and consistently higher in the Upper Wicomico. This may relate to the point source[2] inputs from the Salisbury Waste Water Treatment Plant or to higher nonpoint source[3] inputs upstream, or both.

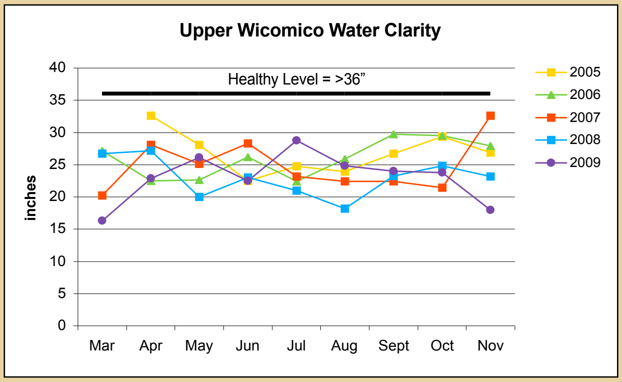
Overall, data collected in the Wicomico River watershed between 2005 and 2009 indicate that this system is continuously overloaded with nitrogen and phosphorus pollution. In general, upriver sites within the Ponds and Upper Wicomico areas exhibited poorer water quality than downriver sites within the Lower Wicomico and Wicomico Creek. This suggests that human land use, stormwater, and wastewater impact water quality more in the upper portions of the watershed than in the lower, less-developed areas. Additionally, the proximity of the lower river regions to the Bay may dilute nutrient pollution while increasing turbidity, likely caused by increased wave action that churns up sediment.

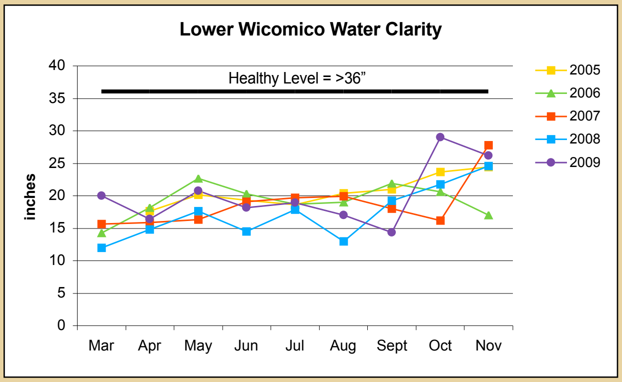
Sources of nitrogen and phosphorus in the watershed, including human inputs from developed lands, fertilizers, and treated wastewater, contribute to poor Wicomico River water quality. Unless those pressures can be adequately remedied, water quality in the Wicomico River watershed is not likely to improve.

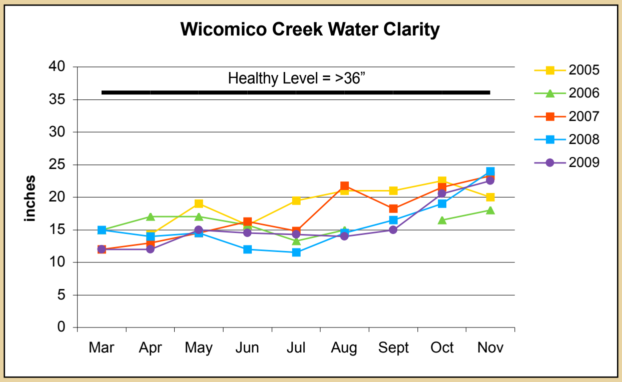
[1] The term “watershed” describes the entire area of land that drains into a particular body of water.
[2] An example of a “point source” would be a pipe or other specific outfall that collects and then directs wastewater or stormwater into a water body.
[3] An example of a “nonpoint source” would be a piece of land that drains its rainwater into a water body, taking sediment and other pollutants along with it.

Average monthly clarity measurements for each year by river section.



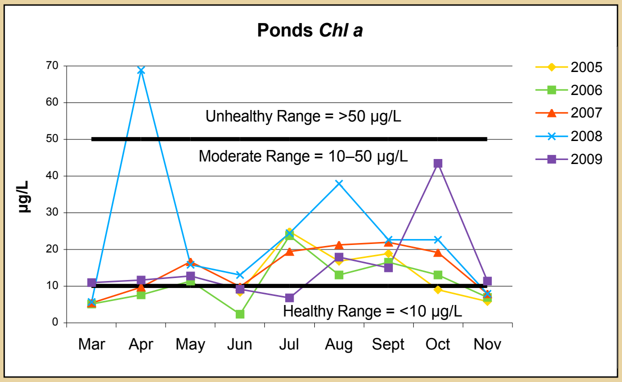


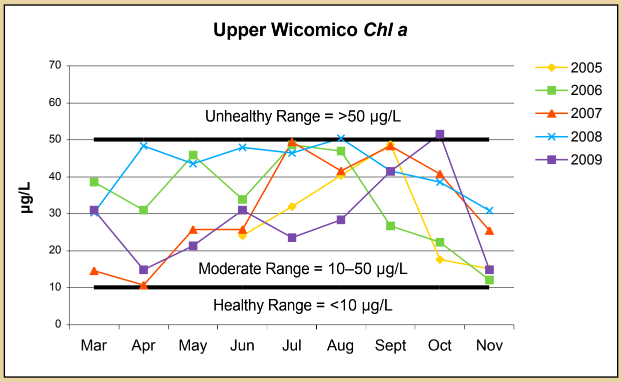


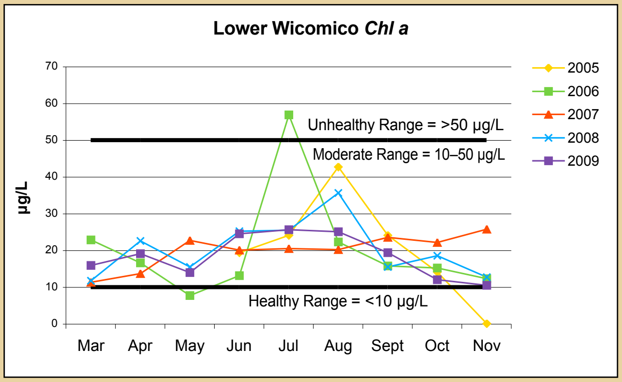


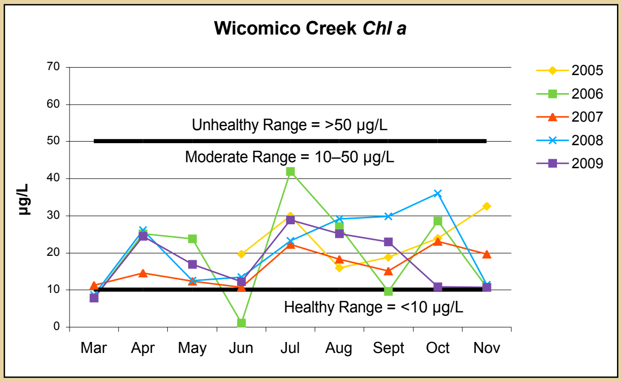
Turbidity/Water Clarity: Light is critical for plant growth. Turbidity measurements refer to the ability of light to penetrate through water. Poor water clarity indicates water is too clouded with suspended sediment and algae to support the growth of underwater grasses. Turbidity levels above 36 inches are considered healthy.

Average monthly *chlorophyll a* measurements for each year by river section.



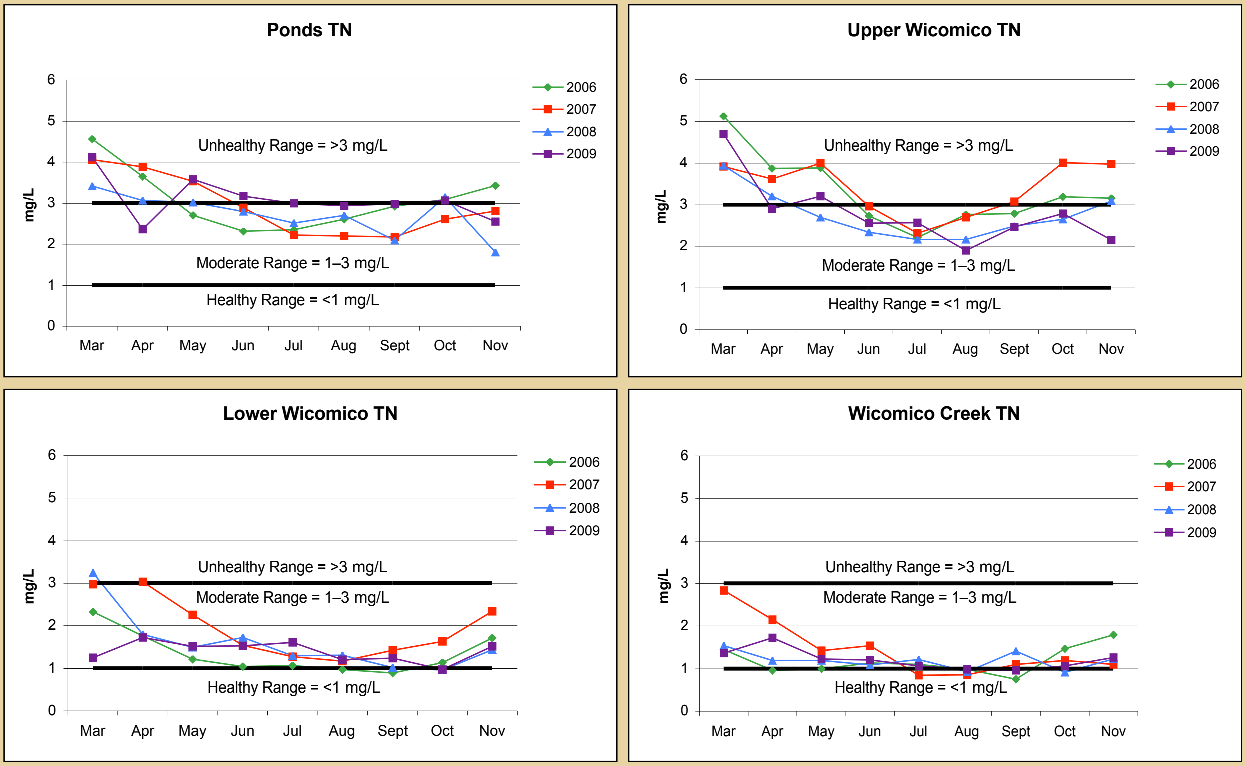






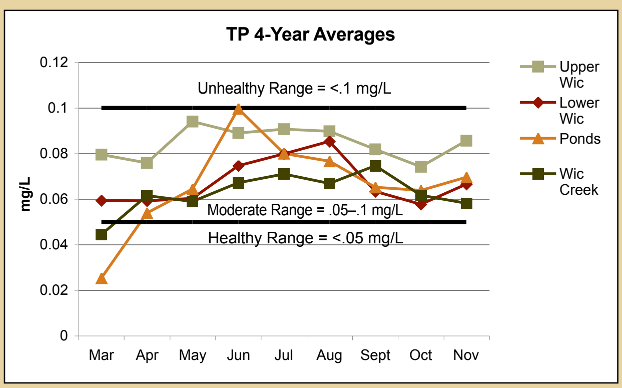
Chlorophyll a: Chlorophyll is the pigment that allows plants—including algae—to convert sunlight into organic compounds in the process of photosynthesis. *Chlorophyll a* is the predominant type found in algae and cyanobacteria (blue-green algae), and its abundance is a good indicator of the amount of algae present in the water. *Chlorophyll a* values below 10 micrograms/Liter (ug/L) are considered healthy. Values between 10 ug/L and 50ug/L suggest elevated levels of algae may be present, while values above 50 ug/L are considered unhealthy.

Average monthly total nitrogen measurements for each year by river section.



Total Nitrogen (TN): Nitrogen is an essential nutrient for both plants and animals, but an overabundance generates algal blooms and subsequent low dissolved-oxygen levels. Nitrogen can be found in aquatic systems in several chemical forms, in both dissolved form and attached to particles. One form of nitrogen, nitrate, is particularly important in aquatic systems because it is easily taken up by algae. Total nitrogen levels below 1 mg/L are considered healthy.

Total Phosphorus Four-Year Averages



Total Phosphorus (TP): Phosphorus is another key nutrient in aquatic systems with the same overabundance problems as nitrogen. Phosphorus can occur in dissolved organic and inorganic forms, often attached to particles of sediment. The dominant form of phosphorus in the Bay ecosystem is phosphate. Total phosphorus was averaged monthly by river section, rather than year, to explore possible annual trends in TP levels upstream and downstream. Averages over the last four years show that TP was most variable in the Pond systems and consistently higher in the Upper Wicomico. Levels below 0.05 mg/L are considered healthy.

Photo by Margaret Enloe

Annual Wicomico Creekwatchers Water-Quality Monitoring results are available online at cbf.org/hotc on the Resources page.

For more information on Wicomico Creekwatchers contact us at: hotcinfo@cbf.org or 410/543-1999.

Launched in 2002, Wicomico Creekwatchers is a community partnership between the Chesapeake Bay Foundation (CBF) and Salisbury University (SU). Data collection and sample analysis are conducted by the Salisbury University Department of Biological Sciences and University of Maryland's Horn Point Environmental Laboratory.

The mission of Wicomico Creekwatchers is to collect and develop objective, scientifically credible water-quality data by recruiting and mobilizing a grassroots volunteer force that monitors the waters of the Wicomico River and its tributaries on Maryland's Lower Eastern Shore. Through its work, Creekwatchers advances efforts of citizens, businesses, and public officials to ensure that public policies and other management tools adequately protect and preserve Wicomico River water quality.

Since its inception, Wicomico Creekwatchers has established a set of baseline data for identifying water-quality conditions and trends over time.

Methods

Photo by Richard Prince

Trained Wicomico Creekwatchers' volunteers collect water samples and data 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 is lower during the winter months.

At each monitoring site, volunteers collect river water in standard BOD (biochemical oxygen demand) sampling bottles, measure turbidity with a Secchi disk, and record other valuable information (such as recent rainfall, tide, etc.). Samples are delivered to Salisbury University the same day and frozen before going on to Horn Point Laboratory for further analysis. Analysis of total nitrogen and total phosphorus began in 2006.

For this and previous reports, monthly averages for each site were calculated and then grouped to provide averages for the four areas that make up the Wicomico 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 for TN, TP, and *chlorophyll a* are compared against guidelines developed for surface waters by the Delaware Department of Natural Resources and Environmental Control, since Maryland does not currently have criteria for these parameters. The water clarity baseline of 36 inches is within the range of water clarity criteria that are used by Delaware and Maryland for regulatory purposes.

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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.

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!**

SAVE THE BAY · SAVE THE BAY · SAVE THE BAY · SAVE THE BAY

CHESAPEAKE BAY FOUNDATION

HEART OF THE CHESAPEAKE PROJECT

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