

2006 Water Quality Assessment Wicomico River, Maryland

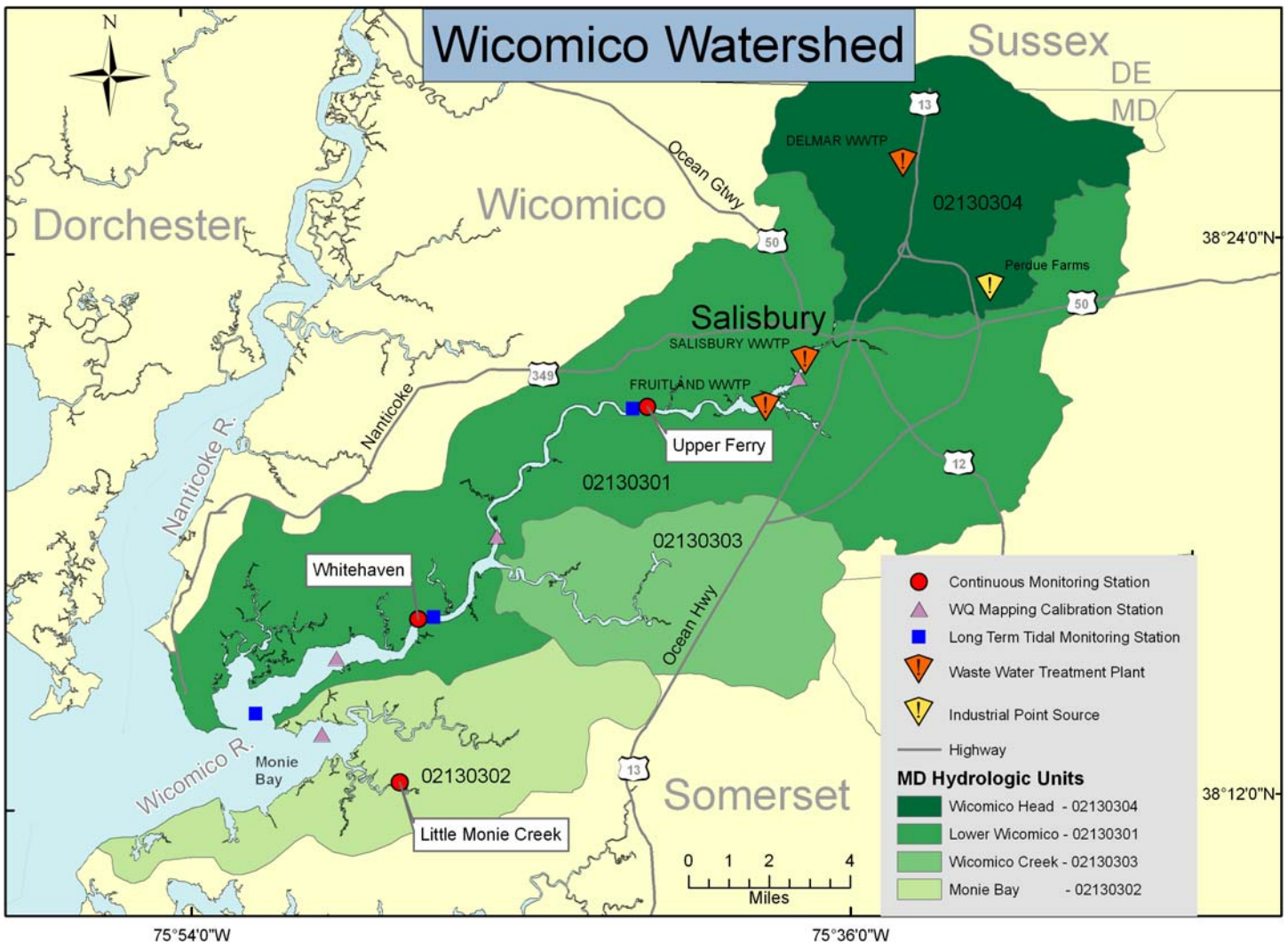


Continuous Monitoring instrumentation is housed in a PVC tube on a pier near Upper Ferry

Wicomico River water quality is impacted by high nutrient inputs, contributing to poor water clarity, tidally-influenced algal blooms and a lack of underwater grasses.

The Wicomico Watershed

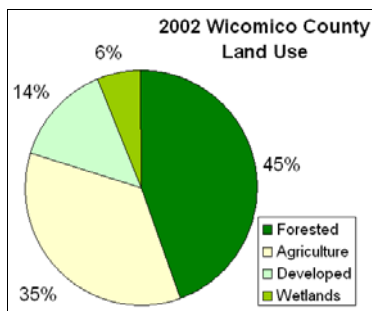
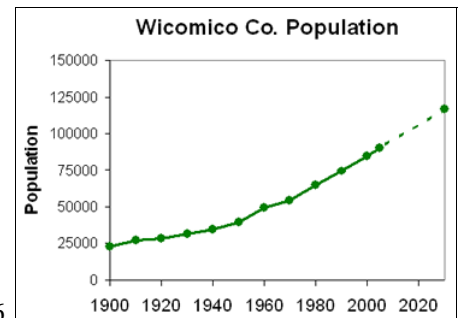
The Wicomico River Watershed is composed of four sub-watersheds: Wicomico Head, Lower Wicomico, Wicomico Creek, and Monie Bay (shown on the map below). It drains 240 square miles across parts of Wicomico and Somerset Counties in Maryland and Sussex County in Delaware. The Wicomico flows into Tangier Sound which in turn flows into the Chesapeake Bay. While much of the watershed is agricultural, Salisbury is a main Eastern Shore urban center. Additionally, three wastewater treatment plants and one industrial point source discharge into the river. In 2006, the Maryland Department of Natural Resources (DNR) began a three year water quality criteria assessment of the Wicomico River. Three Continuous Monitoring stations, located at Upper Ferry, Whitehaven, and Little Monie Creek, record automated water quality measurements every fifteen minutes, April through October. Water Quality Mapping cruises, which survey the length of the river, are conducted monthly April through October.



Residential Development Characterizes Land Use Change

Parts of three counties drain into the Wicomico River, but Wicomico County has the largest impact on the watershed. It has one of the fastest population growth rates on the Delmarva Peninsula and is growing at a faster rate than the state of Maryland. With a current estimated population of more than 90,000 citizens, the county experienced a 13.9% growth rate in the 1990's, and is expected to grow to more than 117,000 people by the year 2030.

Wicomico County leads the Eastern Shore in the loss and fragmentation of farmland due to development. Between 1973 and 2002, 11% of the county's agricultural land and forests were lost to development. Of this loss, 17,100 acres were converted to residential use, representing roughly 75% of the total developed acreage. Within the last 26 years there have been two different patterns of development in Wicomico County. From 1980 to 1989, nearly half of the observed development was at the expense of forests and wetlands, with most new development occurring along the county's waterfront and urban areas. From 1989 to 1995, development was chiefly at the expense of agricultural land and was much larger and scattered in distribution. Between 1978 and 2002, the number of farms in the county decreased by 44%. In addition, large ecologically important tracks of forested land as well as linear remnants of natural areas (such as those along streams and tributaries) have become smaller and more fragmented. The conversion of forests, wetlands, and agricultural lands to development has degraded the wide-ranging ecological, and recreational benefits provided by these areas.

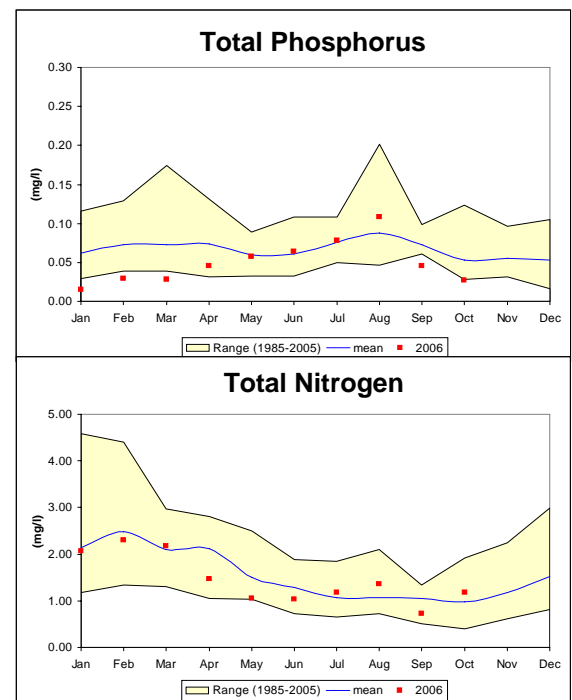


In 1998 the Wicomico County Rural Lands Policy was adopted as part of the county's comprehensive plan to reduce uncontrolled development through better growth management. This policy has thus far had only a limited effect on county development practices. From 1986 through 2004, new subdivisions outside main metropolitan areas accounted for more than 60% of all lots developed and 81% of newly developed land. Programs, such as the Maryland Environmental Trust, are currently in place to permanently protect lands from development. To date, this program has protected more than 7,500 acres in Wicomico County. However, this land represents only 17.7% of all green infrastructure acreage in the county. To preserve the county's rural heritage, future efforts must focus on strengthening policies that protect rural areas from development pressures.

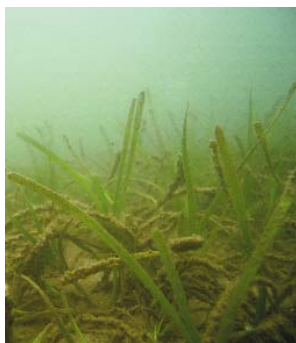
Nutrient Monitoring Reveals High Levels of Nitrogen and Phosphorus

Nutrients enter the Wicomico River from a variety of man-made and natural sources. The nutrients of greatest concern to natural resource managers, nitrogen and phosphorus, provide food for phytoplankton (i.e., algae) which serve as the base of the aquatic food chain. When nutrient levels are excessive, phytoplankton experience a virtually unlimited food supply and reproduce to massive levels (i.e., blooms), clouding the water and contributing to low dissolved oxygen levels. In response to observed high nutrient levels over many years, all hydrological divisions except Monie Bay (see map on first page) of the Wicomico River have been listed by the Maryland Department of the Environment (MDE) as impaired for nitrogen and phosphorus.

A comparison of the 2006 monthly data to average monthly data collected between 1985 and 2005 indicated that phosphorus was higher than average in August (see graph at right). Late June and early July rainfalls could have accounted for this. However, phosphorus concentrations were generally lower than average throughout 2006 due to a dry spring. This may indicate that levels continue to decline following the 1985 ban on phosphate detergents and the 1989 introduction of phosphate removal at the Salisbury sewage treatment plant. Agricultural nutrient management plans have likely contributed to phosphorus decline as well. In contrast, the Wicomico had the highest nitrogen concentration among the major lower Eastern Shore tributaries. While both nitrogen and phosphorus contribute to nutrient loading, the Wicomico is more heavily impacted by nitrogen.



Underwater Grasses not observed in the Wicomico



Bay grasses such as eelgrass (shown above) are absent in the Wicomico

The Wicomico River did not support submerged aquatic vegetation (SAV) during the 2006 growing season (March - November). According to yearly field observations by Chesapeake Bay scientists and aerial photography by the Virginia Institute of Marine Science, this river has not supported underwater grasses for the past 35 years (1971-2006). The river's inability to support SAV is likely due to poor water clarity. Underwater grasses need sunlight to survive; if the water is too turbid, or cloudy, then light cannot pass through the water column to reach the grasses. Continuous Monitoring turbidity data (measured in units known as NTUs) from the Whitehaven and Upper Ferry stations recorded an average turbidity of 19 NTU, which is well above the basin threshold of 7.

The high turbidity in the Wicomico River may result from inputs of suspended sediment and nutrients from its highly agricultural watershed. As a result, this river historically has failed to meet the SAV habitat criteria for light, suspended solids, and nitrogen, and has only met borderline conditions for algal bloom (chlorophyll) and phosphorus concentrations.

Monie Bay is Part of National Reserve System

Monie Bay is one of three sites that form the Maryland Chesapeake Bay National Estuarine Research Reserve system (CBNERR). Funded by the National Oceanic Atmospheric Administration (NOAA), NERR is a national network of 27 protected areas that have been established for the purpose of research, education, and coastal stewardship. Specialized habitat and wildlife monitoring studies have been conducted at Monie Bay by various academic institutions and the Maryland DNR. This research is described in a literature review prepared by researchers at the University of Maryland Horn Point Laboratory in Cambridge, MD.

Most recently, Monie Bay has become a site for NOAA's Mussel Watch Program, which sampled oysters in the reserve in Maryland in January 2007. Mussel Watch is a national program that uses bivalve mollusks as sentinel organisms to monitor trends in metal and organic contaminant levels over time. Measured contaminants included a suite of polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and trace elements.



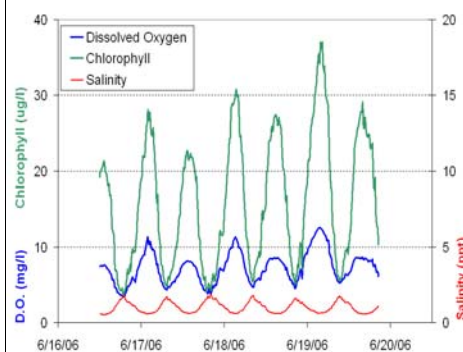
Monie Bay saltmarsh (photo by Jude Apple)

Eyes on the Bay: Water Quality Info Available on the Web

The Maryland Department of Natural Resources' Eyes on the Bay website, www.eyesonthebay.net, provides easy-access to water and habitat quality data for the Chesapeake and Coastal Bays. It is a portal for all of the state's tidal water quality monitoring data including Continuous Monitoring, Water Quality Mapping, Long-Term Fixed Site monitoring, and Harmful Algal Bloom information. Satellite imagery of the Chesapeake Bay (Eyes in the Sky) is also available.

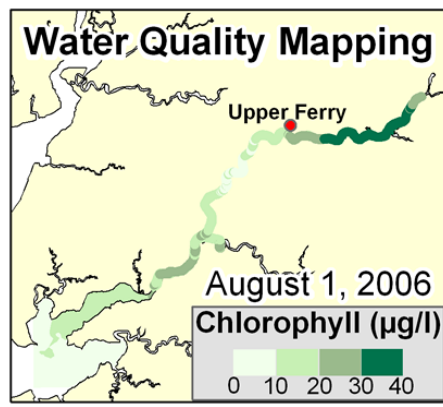
Water Quality at Upper Ferry - Strong Tidal Influence

Continuous Monitoring data from Upper Ferry shows a highly variable cycle in several parameters. Diurnal, or daily, fluctuations in dissolved oxygen (D.O.) and pH are often seen in estuarine waters due to algae producing oxygen during daylight hours. However, as seen in the graph below, the variations at Upper Ferry are related instead to the salinity level, which indicates a tidal influence.



Graph of chlorophyll and dissolved oxygen vs. salinity at Upper Ferry Continuous Monitoring station

Water Quality Mapping data of the Wicomico (below) shows that the maximum chlorophyll levels are usually found just upriver of the Upper Ferry station. This area is where the freshwater/saltwater boundary is located. The observed tidal variation suggests that these higher levels of chlorophyll in the upriver freshwater zone are swept downriver on the ebb tide. These levels then recede with the flood tide as higher salinity water returns.



More Information

- Wicomico Creekwatchers, a local watershed advocacy group, is a community partnership between the Chesapeake Bay Foundation (CBF), Salisbury Area Chamber of Commerce, and Salisbury University. Contact Alan Girard at 410-543-1999.
- A Watershed Profile can be found on DNR’s Surf Your Watershed page: www.dnr.state.md.us/watersheds/surf/index.html
- The Wicomico River is part of the Lower Eastern Shore Tributary Team. Find out more on the DNR Tributary Strategies Implementation Plan: www.dnr.state.md.us/bay/tribstrat/implementation_plan.html
- Learn about local land trusts and conservation easements available to landowners on the Maryland Environmental Trust (MET) website: www.dnr.state.md.us/met/
- Information on how MDE assesses impaired waterbodies is available on their website: www.mde.state.md.us/Programs/WaterPrograms/TMDL/index.asp
- The NOAA NERRS site has information on the Chesapeake Bay Reserve System, including Monie Bay: <http://nerrs.noaa.gov/ChesapeakeBayMD/welcome.html>
- The Mussel Watch program is part of the NOAA Center for Coastal Monitoring and Assessment: www8.nos.noaa.gov/cit/nsandt/download/mw_monitoring.aspx
- Kemp, W.M. 2006. *Monie Bay NERR Site Literature Review and Synthesis: Final Report* is available in the Publications Section of www.eyesonthebay.net
- Data from the following sources was utilized to assess land use in Wicomico County:
 - 1) *Vanishing Lands: The Erosion of Rural Character in Wicomico County, Maryland*. A Chesapeake Bay Foundation publication.
 - 2) Shen, Q. and F. Zhang. 2005. In press. *Land-Use Changes in a Pro-Smart Growth State: Maryland, USA*. Environment and Planning A. Vol. 39.
 - 3) Chen X. M. 1997. *Airborne/GIS: Monitoring Land Use Transformation...* Earth Observation Magazine 6(3).



Aerial view of an agriculturally developed tidal creek draining into the Wicomico River (Photo by Jude Apple)

What Can You Do?

There are many things you can do to help improve water quality in the Wicomico River.

- **Plant trees along streamside property.** Tree roots will slow erosion and absorb the flow of nutrient runoff.
- **Pump out septic tanks regularly (every 3-5 years).** A failing system can contaminate groundwater.
- **Conserve water.** Use rainwater for plants, take shorter showers, and turn off the faucet when brushing your teeth.
- **Drain gutter spouts into rain barrels or grassy areas.** This will reduce erosion, which adds sediment to the river.
- **Carpool, or try biking or walking.** Exhaust fumes contain nitrogen oxides, which can end up in the river and bay.
- **Dispose of household chemicals properly.** Toxic chemicals poured down the drain could end up in the river.
- **Use fertilizer sparingly.** If you must fertilize, try doing it in autumn, when it will have less of an impact on the river.
- **Support land protection initiatives.** Preserving existing green space is much easier than restoring degraded areas.
- **Get involved.** Let county, state, and local officials know that Wicomico River water quality is important to you.

Wicomico water quality data is on the web:
www.eyesonthebay.net

Please report fish kills, algae blooms, or any other events or problems to the toll-free Chesapeake Bay Safety and Environmental Hotline at **1-877-224-7229**

Martin O’Malley, Governor

John R. Griffin, DNR Secretary



Maryland Department of Natural Resources; Tawes State Office Building; 580 Taylor Avenue; Annapolis, Maryland 21401
 Toll free : 1-(877)- 620-8DNR(8638) in Maryland Out of state call: 410-260-8638 TTY users call via the Maryland Relay
www.dnr.maryland.gov



THE FACILITIES AND SERVICES OF THE DEPARTMENT OF NATURAL RESOURCES ARE AVAILABLE TO ALL WITHOUT REGARD TO RACE, COLOR, RELIGION, SEX, AGE, NATIONAL ORIGIN, OR PHYSICAL OR MENTAL DISABILITY.

This document is available in alternative format upon request from a qualified individual with a disability.

*This document prepared by the DNR Intensive Monitoring Assessment and Development Team
 Mark Trice—Program Manager
 Chris Aadland, Julie Baldizar, Ben Cole, Matt Hall, and Chris Trumbauer*