

# Water Quality Newsletter for South River, Maryland



Thomas Point Shoal Lighthouse guards the entrance to South River. (Photo by Henry Gonzalez)

*Stormwater runoff, increasing urbanization and development, and nutrient inputs are the main factors impacting water quality in the South River.*

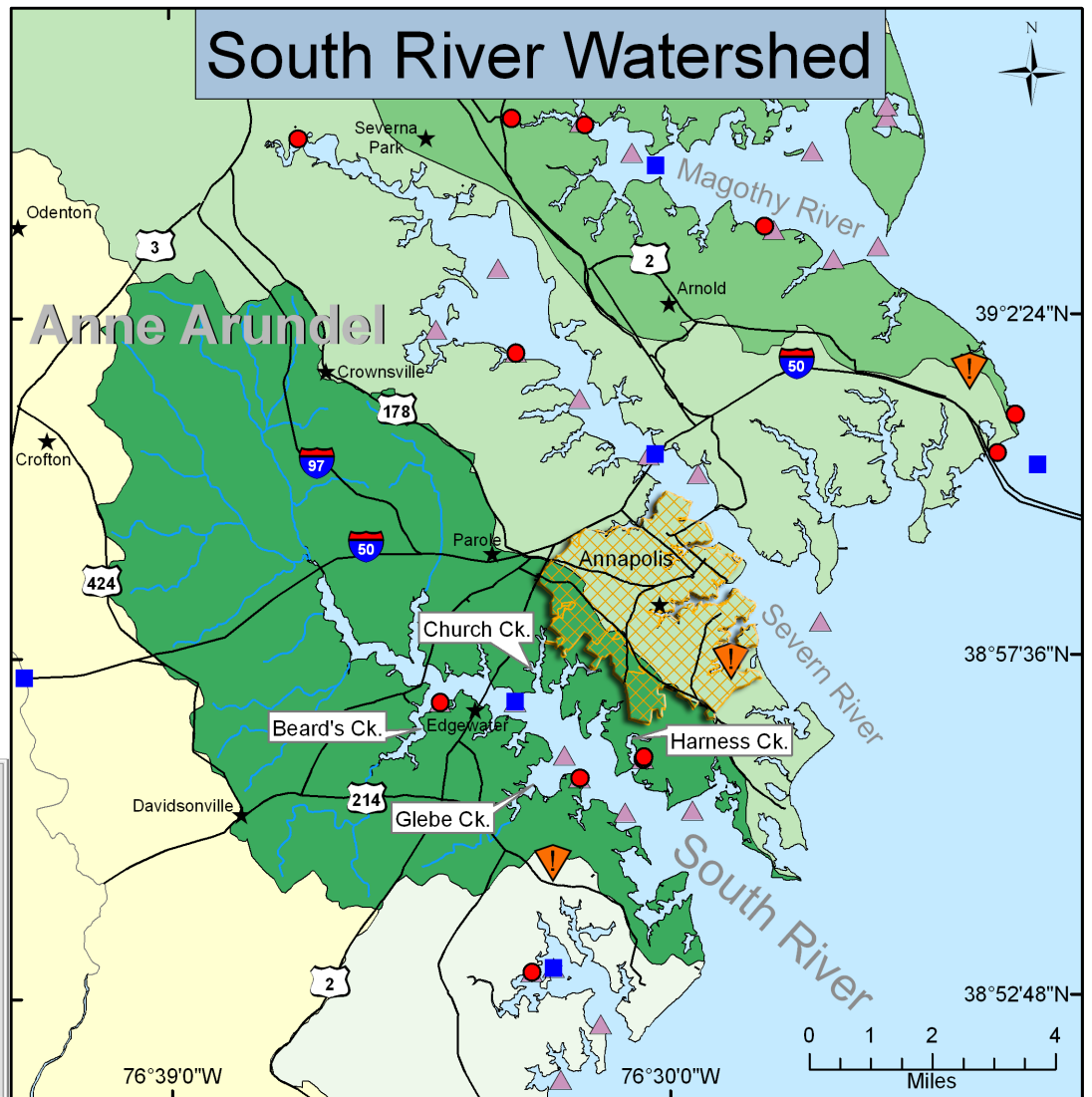
## The South River Watershed

The South River is located in Anne Arundel County and drains approximately 66 square miles of land, including parts of Annapolis, Crownsville, Crofton, Davidsonville, and Edgewater. The watershed lies completely within the relatively flat Coastal Plain, although much of the shoreline is characterized by steep slopes and rolling terrain. The upper watershed is mostly rural, while much of the lower watershed is urbanized. The State of Maryland lists the South River as impaired for nutrients, sediment, bacteria, toxics, and biological indicators.

From 2004 - 2006, the Maryland Department of Natural Resources (DNR) conducted its Shallow Water Monitoring Program to assess water quality criteria for the South River. This program consisted of several Continuous Monitoring stations, which sample water quality every 15 minutes, and monthly Water Quality Mapping cruises along the length of the river. In addition to these projects, a long-term station near Shadow Point has been sampled monthly since 1985. Currently, Continuous Monitors remain in Harness Creek, sampling water quality for an oyster restoration study.

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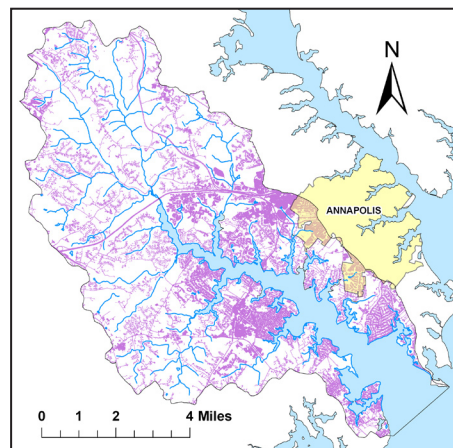
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## Development Threatens South River Watershed

A 2004 survey by Anne Arundel County indicated that nearly half of the land in the South River watershed was forested. However, the amount of residential land use is increasing. According to 2000 Census data, the county population was 489,656 residents, 44,404 of which lived in the South River watershed. The county experienced rapid growth in the mid-1900's, but the rate of growth has been levelling off since its peak in the 1970's. Nevertheless, a 2003 report from the county Office of Planning and Zoning projects that population will continue to grow, in part due to development pressure from the Washington D.C. metropolitan area. In addition, state planners estimate that nearly 4,500 more households could be added in the county due to the Base Realignment and Closure (BRAC) process, which intends to add nearly 22,000 jobs to Fort Meade, located in northwest Anne Arundel County.

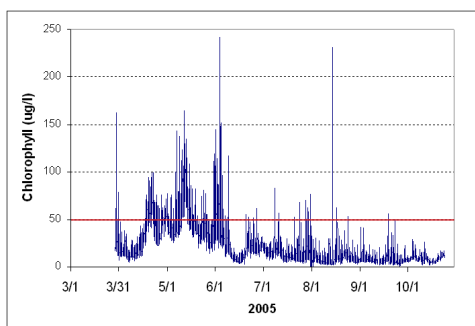
Development and urbanization have major impacts on the watershed. According to recent data collected by Anne Arundel County, the South River watershed had an impervious surface (roads, rooftops and parking lots) area of approximately 15%. The bulk of the impervious surface was found in the developed areas of Annapolis and Edgewater (see map at right). Environmental researchers and watershed models indicate that when impervious surface is greater than 10% of a watershed, living resources will be impaired. In contrast to the urbanized lower watershed, the state lists the South River headwaters as an Area of Critical State Concern because of its significant natural features. This area also composes the largest Upland Natural Area in the county, totaling over 3,000 acres of contiguous woodlands and swamps. Concern about preserving the remaining undeveloped areas has led to recent land acquisitions by Anne Arundel County, including a 546 acre forested parcel purchased in Crownsville in March, 2007.



Impervious surface (purple area) in the South River watershed. (Data from AA County)

## Nutrients Fuel Algae Blooms in South River

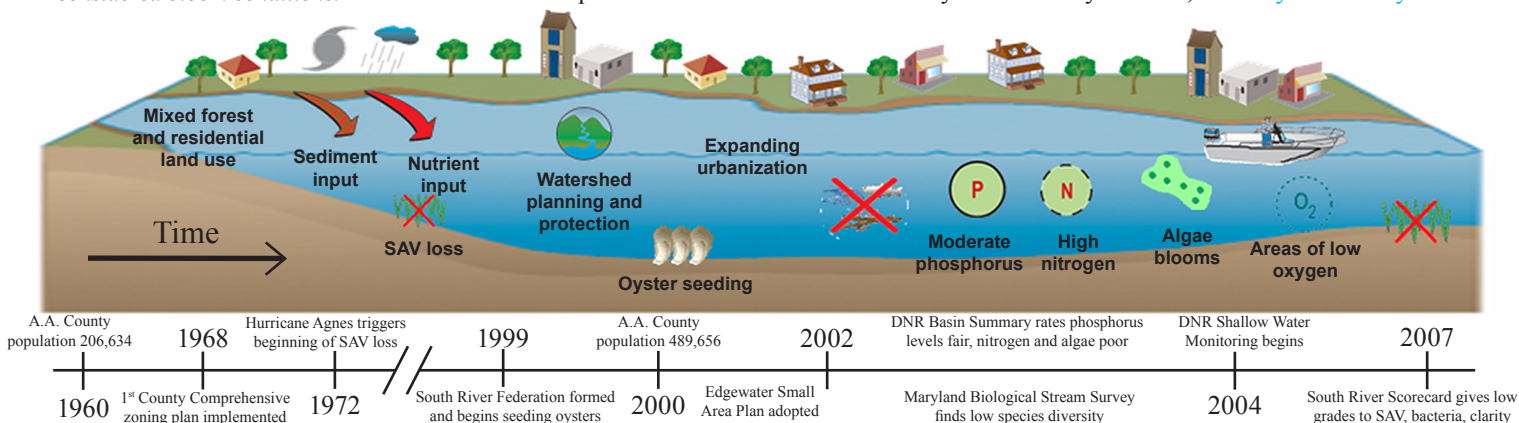
The Maryland Department of the Environment (MDE) lists the South River as impaired for nutrients. Nitrogen and phosphorus, the two nutrients of greatest concern, are naturally occurring in the river. However, excess nutrients resulting from human activities contribute to many water quality problems. Algae blooms, poor water clarity, and low dissolved oxygen can result from too much additional nutrients in the ecosystem. Since the South River watershed has no waste water treatment plants and very little agriculture, most of the nutrients result from urban/suburban sources, such as septic and stormwater run-off. Besides conveying nutrients, run-off can also contain sediments, toxins, and bacteria, all of which are also listed as impairments in the South River.



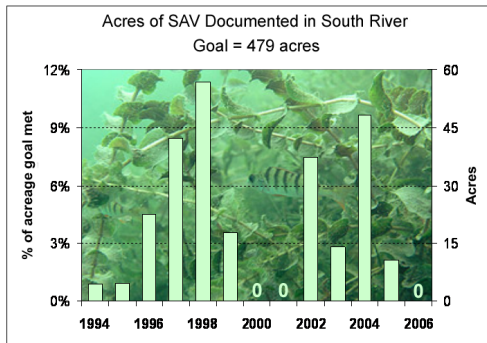
2005 chlorophyll data from Beards Creek indicates a prolonged algae bloom in late spring. Chlorophyll levels above 50 ug/l are generally considered bloom conditions.

Analysis of nutrient data from the long-term monitoring station near Shadow Point indicates that although total phosphorus levels have slowly but steadily declined since 1985, total nitrogen levels have remained nearly unchanged. The most recent trends indicate that algae abundance, measured in chlorophyll, and water clarity are degrading in South River. Several severe algae blooms have been recorded since the Shallow Water Monitoring Program began in the South River. Persistent algae blooms block sunlight from reaching submerged aquatic vegetation (SAV). Algae blooms also consume oxygen at night, potentially creating low oxygen levels which are harmful to aquatic life. Water Quality Mapping cruises documented low oxygen and poor clarity in several South River creeks during high chlorophyll events. Some species of algae are capable of producing toxins which are harmful to aquatic life and humans.

Data from Continuous Monitoring and Water Quality Mapping are available on the Department of Natural Resources' Eyes on the Bay website, [www.eyesonthebay.net](http://www.eyesonthebay.net).



## Oysters Could Improve Underwater Grass Growth in South River



Historical accounts from the 1950's and 60's indicate that underwater grasses, known as submerged aquatic vegetation (SAV), were abundant in the South River. SAV are an important natural resource, as they improve water quality, provide food and shelter for waterfowl and aquatic life, and protect shorelines from erosion. However, recent surveys have found very sparse coverage in the river. The South River showed an increasing trend in SAV between 1994 and 1998, but then a sharp decline in 1999 and 2000, likely due to algae blooms blocking light. In 2004, the best recent SAV year, the amount of SAV measured was less than 10% of the goal of 479 acres. Analysis of water quality data shows that for 2004 - 2006, the South River failed the SAV habitat requirements for water clarity and chlorophyll (a measure of algae).

An ongoing project led by Maryland DNR is investigating the effectiveness of native oysters in improving water quality, specifically to support SAV survival. In 2003, an oyster reef was created in Harness Creek and seeded with oyster spat, as well as one- and two-year old oysters. Water quality has been monitored within Harness Creek since 2003 as part of Maryland DNR's Shallow Water Monitoring Program. Oysters have periodically been added to the reef, and currently an estimated 119,000 oysters filter the surrounding water in Harness Creek once every two days. Modest decreases in algae and suspended solids have been observed in areas adjacent to the oyster reef. Unfortunately, these reductions are still not yet conducive to SAV survival and growth. Once the oysters provide significant increases in water quality, SAV restoration plantings will take place inshore of the oyster reef.

## Streams in Poor Shape

Since 1994, the Department of Natural Resources has been collecting information on the health of Maryland's watersheds through implementation of the Maryland Biological Stream Survey (MBSS). Biologists have collected and analyzed biological, habitat, and water quality data from over 2,500 sites in Maryland streams to assess overall stream health. In 1997 and 2002, the MBSS sampled sites in the South and West River watersheds. These data were analyzed and stream health classified as good, fair, or poor. Results indicated that the majority of streams found within these watersheds have relatively low scores when compared to other streams across the state.



*Eastern Mud Salamander.*  
(photo by Robert Zappalorti)

In the South River, none of the stream miles are in good condition, 40% are in fair condition, and 60% have been rated as poor. Across the state, similar results have been shown to be associated with an increase in the amount of impervious surfaces due to urbanization. Similar results have been seen in data gathered by Stream Waders, a stream monitoring program comprised of over 800 volunteers. Since 2002, Stream Waders has sampled 49 sites in the watershed, with 48 rated as poor. Additionally, four imperiled species have been observed in the South and West River watersheds: bluespotted sunfish, warmouth, eastern mud salamander (at left), and queen snake.

## Research Underway in Stream Restoration Projects

Degradation of small streams is a common consequence of development and urbanization of watersheds. With the number of degraded streams increasing every year, stream restoration has become an important tool used by water resources managers to return the functionality provided by small streams. Recently, several stream restoration projects have been implemented in the region, including the South River watershed. To date, there have been very few quantitative measurements of nutrient reductions and water quality improvement in restored streams. However, research currently being conducted by University of Maryland Center for Environmental Studies (UMCES) scientists at eight different streams throughout Anne Arundel County will provide much needed data for use in watershed restoration planning. Although it is too early to make conclusive statements, preliminary findings at the Wilelinor restoration site on Church Creek in South River are promising. Scientists hope that their research will show the effectiveness of restored streams in reducing nutrient pollution loads, and that while the impact of each individual stream restoration project may be small, their cumulative effect may contribute to substantial reductions in nutrient delivery to the Bay.

## Tumors Found on Catfish

In 2005, U.S. Fish and Wildlife (USFW) scientists noticed fleshy bumps on the lips of several brown bullhead catfish that were collected in a routine study on the South River. To investigate this phenomenon, USFW then collected a random sample of 30 bullheads for a fish health study. Bullhead tumor surveys are often used as an indicator for measuring habitat quality. Of the 30 bullheads, 16 (53%) had visible skin lesions, which laboratory analysis identified as tumors. Six bullheads (20%) also had liver tumors. According to USFW, areas are considered highly contaminated when skin tumor rates are above 12% and liver tumor rates are above 5%. These tumors can result from exposure to cancer-causing chemicals in the sediment and/or water. In other rivers with high tumor rates, high concentrations of polynucleic aromatic hydrocarbons (PAHs) were found, but so far, available monitoring data has not indicated high PAHs in South River sediment. Further monitoring is currently under way.



*Brown Bullhead, (Ameiurus nebulosus) with lip tumors.*  
Photo by Fred Pinkney, USFW

## More Information and Acknowledgements

- **Watershed Profiles** can be found on DNR's Surf Your Watershed page: [www.dnr.state.md.us/watersheds/surf/index.html](http://www.dnr.state.md.us/watersheds/surf/index.html)
- The South River is part of the **Lower Western Shore Tributary Team**. The team meets on the third Thursday of each month. Call 410-260-8711 for more information. [www.dnr.state.md.us/bay/tribstrat/](http://www.dnr.state.md.us/bay/tribstrat/)
- Information on DNR's **Maryland Biological Stream Survey (MBSS)** can be found on [www.dnr.state.md.us/streams/mbss/index.html](http://www.dnr.state.md.us/streams/mbss/index.html)
- **South River Federation** is a non-profit organization striving to restore, protect, and preserve the South River and its ecosystem. [www.southriverfederation.net](http://www.southriverfederation.net)
- The **Scenic Rivers Land Trust** is a private, non-profit corporation devoted to protecting land in Anne Arundel County and educating landholders on issues of conservation and stewardship. [www.srlt.org](http://www.srlt.org)
- Learn about local land trusts and conservation easements available to landowners on the **Maryland Environmental Trust** website: [www.dnr.state.md.us/met/](http://www.dnr.state.md.us/met/)
- The US Fish and Wildlife report on **Brown Bullhead tumors** conducted by Fred Pinkney is available at: [www.fws.gov/chesapeakebay/pdf/SouthRiverFS.pdf](http://www.fws.gov/chesapeakebay/pdf/SouthRiverFS.pdf)
- Information on how MDE assesses **impaired water bodies** is available on their website: [www.mde.state.md.us/Programs/WaterPrograms/TMDL/index.asp](http://www.mde.state.md.us/Programs/WaterPrograms/TMDL/index.asp)
- The **Wilelinor Stream Restoration** research is being conducted by Dr. Solange Filoso and Dr. Margaret Palmer of the University of Maryland. For more information on this or other similar projects, see [www.palmerlab.umd.edu/](http://www.palmerlab.umd.edu/)
- For more information on **Submerged Aquatic Vegetation (SAV)** and the Harness Creek oyster restoration project, visit: [www.dnr.state.md.us/bay/sav/restoration/hc\\_gen\\_info.asp](http://www.dnr.state.md.us/bay/sav/restoration/hc_gen_info.asp)
- **Impervious Surface data** was compiled by Anne Arundel County, Office of Environmental and Cultural Resources, Watershed Management Program: [www.aacounty.org/LandUse/OECCR/WatershedManage.cfm](http://www.aacounty.org/LandUse/OECCR/WatershedManage.cfm)
- Anne Arundel County land use data was taken from the county's Water and Sewer Master Plan, compiled by the Long Range Planning Division of the **Office of Planning and Zoning**. [www.aacounty.org/PlanZone/](http://www.aacounty.org/PlanZone/)
- Icons for the South River Timeline (page 2) courtesy of the **Integration and Application Network**, University of Maryland Center for Environmental Science: [www.ian.umces.edu/symbols](http://www.ian.umces.edu/symbols)



Kayakers paddle up the river in South River Federation's annual sojourn. (photo by L. Candon)

## What Can You Do?

There are many things you can do to help improve water quality in the South 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 state, county, and local officials know that South River water quality is important to you.

South River water quality data is available on the web:

[www.eyesonthebay.net](http://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

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](http://www.dnr.maryland.gov)



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