

South River Science Team UPDATE

Keeping you up to date on South River Science Team activities

Summer 2005

At A Glance: Angler Surveys Conducted on Local Rivers This Summer

The South River Science Team and the Department of Game and Inland Fisheries (DGIF) are conducting angler surveys on the South River and South Fork Shenandoah River from mid-April to the beginning of this fall. By asking folks who use the river questions about what types of fishing and recreational activities they do, the Science Team and DGIF will gather the information necessary to determine how to improve the fishing and recreation on these rivers. In addition, information from the South River survey will be used to assess river users' knowledge of the fish consumption advisories. Based on this assessment, the Science

Team will determine if current advisory communications are sufficient. The DGIF is conducting the survey on the 100-mile South Fork Shenandoah River by interviewing folks at public access points (e.g., boat ramps) after they've completed their trip on the river. Because there are few public access points on the South River, the Science Team is sponsoring a roving survey, where two



Billy Flint and Pete Barlow survey the South River

surveyors will ask river users questions from a kayak on the river. This is the first time the user data has been collected on the South River; the South Fork River was last surveyed in 1997.

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About this Newsletter...

In the Fall 2000, the South River Science Team was formed to serve as a focal point for technical issues concerning mercury in the South River and downstream waterways. The Science Team is a cooperative effort between the Virginia Department of Environmental Quality, Department of Health, and the Department of Game and Inland Fisheries and representatives from academia, citizens groups, the Environmental Protection Agency, and DuPont. The Science Team provides technical direction for the mercury monitoring program and ensures that there is effective communication provided to the users of the river. The Science Team's goal is to understand why mercury in South River fish has not decreased over time and to identify potential solutions to improve the situation.

TechCorner: VADEQ Teams with USGS to Begin Mercury Load Study

The Virginia Department of Environmental Quality (VADEQ) has contracted with the U.S. Geological Survey (USGS) to begin a new study of mercury in the South River. This study, called a total maximum daily load (TMDL) study, will examine the amount of mercury that is entering and leaving the river as well as mercury stored in various components of the river (e.g., riverbanks, floodplain areas). TMDL studies are required when surface water is impacted above the state's maximum pollution levels. In the case of the South River, mercury concentrations in fish have triggered the implementation of the TMDL study.



Monitoring equipment out of water

The South River TMDL study is different in two ways from a typical TMDL study. In typical TMDL studies, the first step is to determine how much of the pollutant is entering the water body (i.e., the pollutant loading). Pollutant loading is fairly easy to measure from an existing discharge or “point source” to the river such as a pipe from an industrial site that is discharging to the river. Water quality improvements from point source impacts can be achieved by regulating the amount of a particular pollutant that is allowed to be discharged to the river. However, the mercury discharges to the South River occurred over 50 years ago (1929-1950). Mercury is now dispersed throughout the river system, and the mercury loading is more difficult to measure because it is from a “nonpoint source.” The South River TMDL study will focus on achieving improvements to the river by identifying possible ways to cut off the

pathways by which mercury makes its way into the fish.

The second difference between the South River TMDL and more typical TMDL studies is a result of the unique behavior of mercury in the river. Although the mercury that originally entered



Individual sensors

the South River most likely was elemental mercury (like that in old thermometers), the mercury in South River fish is mostly methylmercury, an organic form of mercury that forms from elemental mercury. Because both forms of mercury are present in the South River, the TMDL study will address both mercury and methylmercury. To track the amounts and fluxes of mercury and methylmercury in the water, sediment, air, and floodplain soils in and around the South River, three continuous water quality monitoring stations have been set up in the South River near Waynesboro. These stations have been continuously measuring water properties such as temperature, pH, specific conductivity (measurement of dissolved cations and anions), and turbidity (optical measurement of suspended solids). Other properties, including mercury and methylmercury concentrations, are measured about once a month. Data will be collected for two years and then used to estimate mercury changes in the South River. The data are available on the web:

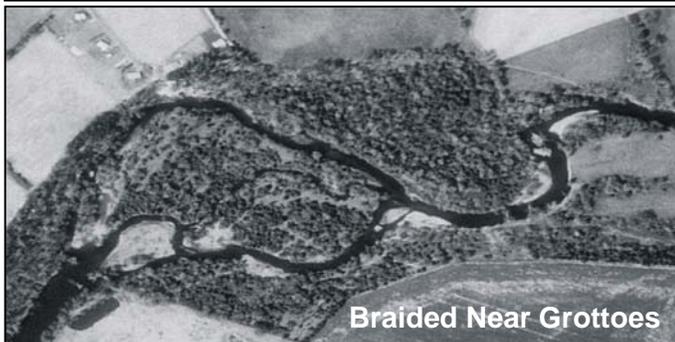
- ❑ http://waterdata.usgs.gov/nwis/uv?site_no=01626920
- ❑ http://waterdata.usgs.gov/nwis/uv?site_no=01627500
- ❑ http://waterdata.usgs.gov/nwis/uv?site_no=01626000

The VADEQ will use the results of the TMDL study to set goals for addressing mercury contamination in the river. *For more information, contact Robert Brent (VADEQ) at (540) 574-7848 or Jack Eggleston (USGS) at (804) 261-2652.*

From the Team...

DuPont and the University of Delaware Conduct Mapping and Geomorphic Survey

Researchers from the University of Delaware Department of Geology are conducting a geomorphic survey on the 26-mile span of the South River from Waynesboro to Port Republic. The primary goal of the survey is to understand the movement of fine-grained materials (e.g., mud, silt, fine sand, clay) in the South River and their interaction with different landforms (e.g., floodplain, riverbank, riverbed). Because the mercury in the South River is chemically bound to the fine-grained material, understanding fine-grained material movement will allow the team to understand mercury movement in the river. Furthermore, because fine-grained materials collect in areas that are conducive to methylmercury production, understanding the interaction of these fine-grained materials with different land forms will allow the team to attempt to locate sources of methylmercury production. The two-year study focuses on combining new and existing data and information to develop a model capable of predicting fine-grained material transport in the river.



Aerial photos showing that the South River flows in a single channel in its upstream portion, but is braided downstream of Crimora

An important initial result of the project has been to divide the study area into two sections with different characteristics. The upstream section from Waynesboro to Crimora has fewer islands and the river tends to flow in a

Geomorphology is the study of landforms and the processes that form them.

single channel. The slope of the river is relatively gentle. Floodplain deposits created by the river are extensive and occupy most of the width of the valley. The downstream section from Crimora to Port Republic is considerably different. Islands and multiple channels are common, the river slopes more steeply, and much of the valley is composed of very old deposits, many dating from tens to hundreds of thousands of years ago. The upstream section of the river is more likely to accumulate mud and fine sand with high mercury concentrations, while the downstream section is more likely to transport these sediments past Port Republic into downstream reaches.

Starting in January, team members began mapping and sampling fine-grained deposits in the upstream section of the river. They have found that mud and fine sand tend to accumulate in characteristic locations, typically in slow moving, shallow sections of the stream. Fine-grained deposits are almost always associated with downed trees and logs in the river. The team is planning to take core samples in these deposits to perform detailed analysis and dating. These studies will help determine how these deposits form and how long sediments remain in them before they are remobilized and transported farther downstream.

Because available computer modeling does not simulate fine-grained material transport, it will be necessary for the team to develop a new computer model. The new understanding that will arise from geological studies of fine-grained deposits in the river, combined with existing information, will provide the basis for new mathematical models needed to predict fine-grained material transport in the river. *For more information, contact Jim Pizzuto at (302) 831-4158.*

Did You Know? Science Team Opening Office in Waynesboro

The South River Science Team has obtained a storefront location on Main Street in Waynesboro. The location is the former Red Cross office at 508 Main Street (across the street from the City buildings). The space is currently being renovated to provide offices, support areas for scientific investigations, and a public display and information area. The team office is expected to be complete by the end of summer. Dr. Ralph Turner will be implementing a range of studies that complement the work of the Science Team and will be available at the office to talk to visitors and answer questions concerning the South River investigations.

James Madison University (JMU) interior design students (under the direction of Dr. Ronn Daniel) developed the concept and completed the design of the public display and information area. The public area will contain exhibits of information and materials from the South River's past, the current efforts of the Science Team, and visions for the future. The public information area will have a computer station that will use a geographical information system (GPS) to access all of the data collected from fish, sediment, water, soil, and plant sampling. This area will also provide information about all of the organizations involved with the Science Team. A display area will also be available to post community events and current information concerning the team's work.



The new South River Science Team office replaces the Red Cross office

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To be added or deleted from our distribution list or to obtain past issues, contact Kathy Adams at (302) 892-8301.

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