

FOSR Office  
1460 University Drive  
Winchester, VA 22601  
(540) 665-1286  
[www.fosr.org](http://www.fosr.org)  
Issue II 2012



FOSR Laboratory  
1460 University Drive  
Gregory Hall 152  
Winchester, VA 22601

## **Message from the President,**

Earlier this year, to provide support for the major ongoing fundraising effort for Friends of the Shenandoah River to allow an expanded research and development program, we solicited comments from organizations that have made substantial use of our water quality data. I'm pleased at the response and provide excerpts below. You will also note a short, but dramatically significant article immediately following my message that introduces readers to a new analytical effort being developed by Wayne Webb, a FOSR Board member with strong U.S. Geological Survey credentials. We're dedicated to helping improve water quality in the Shenandoah Valley – and in the process helping to improve water quality in the Chesapeake Bay.

**Sept. 4, 2012**

**Arthur J. Butt, PhD – Water Quality Monitoring & Assessment,  
Water Division, VA Department of Environmental**

*"Since 2003, the Friends of the Shenandoah River have consistently provided quality water monitoring data to DEQ. ....FOSR provides nearly the same list of routinely monitored parameters sampled by DEQ ....adheres to the same quality assurance standards DEQ practices.*

*....the data provided by FOSR has allowed DEQ to expand its monitoring coverage of the State as required by the Clean Water Act. ....FOSR provided water quality data covering 873 stream miles. ....these data represent roughly 20% of the total stream miles monitored by citizen volunteers from 2005 to 2010.*

*....With their support, we can enhance the pool of quality data available in the watershed to strengthen our protection of these highly valued waters. On behalf of the Citizens of the Commonwealth, we extend our appreciation."*

**Sept. 26, 2012**

**Seth Coffman,  
Shenandoah Headwaters Home Rivers Coordinator  
Trout Unlimited**

*....I have found the data FOSR collects and presents on the internet a valuable resource when investigating potential restoration projects and determining baseline water quality conditions for streams that overlap TU's priorities and FOSR's monitoring.*

*....FOSR water quality data....allows me to focus on measuring stream habitat and fish communities.*

*....FOSR's water quality monitoring program....is essential for tracking progress towards cleaning up the river. I look forward to working with the FOSR on future projects."*

*(Continued on page 2)*

(Continued from page 1)

**Sept. 12, 2012**  
**Alison Teetor,**  
**Natural Resource Planner**  
**Clarke County, VA**

*"....Clarke County has been actively involved in water quality protection for the past 3 decades. ....the County has relied heavily on the Friends lab and volunteers as an active partner in this effort. ....the County was actively involved in several Federally funded stream restoration projects....We utilized the FOSR lab for all sample analysis and found them to be professional, accurate, and expedient with both the analysis and reporting.*

*....the Friends of the Shenandoah is a strong grassroots organization that provides a valuable service as stewards and watch dogs of our water resources. We look forward to a long and continued working relationship with the Friends."*

**Sept. 25, 2012**  
**Jeff Kelble,**  
**Shenandoah Riverkeeper**

*"As the Shenandoah Riverkeeper since 2005 one of my first objectives was to search out data on water quality related to the Shenandoah River and its tributaries to get a solid base of understanding as to current water quality conditions. While DEQ's 2X a year monitoring of streams designated for TMDL review was helpful, the Friends of the Shenandoah River's 2X per month monitoring of critical parameters at more than 100 sites in the watershed since 1989 allowed much sharper focus on "hot spots" and long term trends."*

**Sept. 27, 2012**  
**Woodward S Bousquet,**  
**Professor of Environmental Studies and Biology**  
**Director, Blue Ridge Institute for Environmental Studies**  
**Shenandoah University**

*"I am pleased to write this letter of support for Friends of the Shenandoah River....with which I have cooperated for nearly two decades.*

*....having the Friends on our campus is like having an additional member of the natural sciences faculty.*

*The Smith-Endicott laboratory is certified....by the Virginia Department of Environmental Quality and the U.S. Environmental Protection Agency. This recognition allows the use of FOSR data for regulatory purposes, including the listing and delisting of water bodies that have been designated as....impaired.... The FOSR's facility is the only EPA-certified lab in the entire Chesapeake Bay region that is run by a volunteer non-profit organization.*

*....the Friends of the Shenandoah River publishes its findings periodically and provides them without charge to the DEQ, local and regional decisionmakers and members of the public.*

*Additional funding would help the Friends reach its full potential as an organization, building on three decades of research, monitoring and public education. I am pleased to endorse their efforts."*

**And I thank our newsletter readers for their interest in Friends of the Shenandoah River,**  
**George Ohrstrom II**

## **EVOLVING DATA BREAKTHROUGH; FOSR to Calculate County Nutrient Loads, by Wayne Webb**

Meeting the Chesapeake Bay TMDL (CB TMDL) is becoming a substantial issue for Shenandoah River Counties. To help the Counties gage their progress in meeting the CB TMDL FOSR plans to calculate and share the Water Year (October through September) nitrogen (N) and phosphorus (P) loads to the Shenandoah River from Augusta, Clarke, Page, Rockingham, Shenandoah, and Warren Counties beginning with the 2012 water year. The loads will be based on stream gages within the Basin and FOSR dissolved nitrogen and phosphorus concentrations with adjustments to total loads based on concurrent USGS data collected at North Fork Shenandoah River near Strasburg, South Fork Shenandoah River at Front Royal and other current USGS and DEQ stations.

When FOSR begins measuring total N and P concentrations the calculations for total loads will be based on FOSR data.

The Water Year load is the product of concentration and stream flow thus a dry year will have a lower load than a wet year by a factor that can be as much as 5. To measure progress in reducing nutrient loads will require records that document reduction in concentration at all flows throughout the year. FOSR records can provide that information with the continued support of the Counties, State, USGS and other contributors.

to include an entry for the discharge at the gage at the time of sampling. Sample collectors will not be required to obtain the flow at the gage. The flow data will be obtained from the USGS web site and recorded with the chemical data in the database. The FOSR web site has links to all the USGS gages that can be used to obtain flow information if the observer would like to add that data to the field observations. The online real time flow data are provisional. When the USGS approves the flow records we will review the flow information and edit the information as necessary.

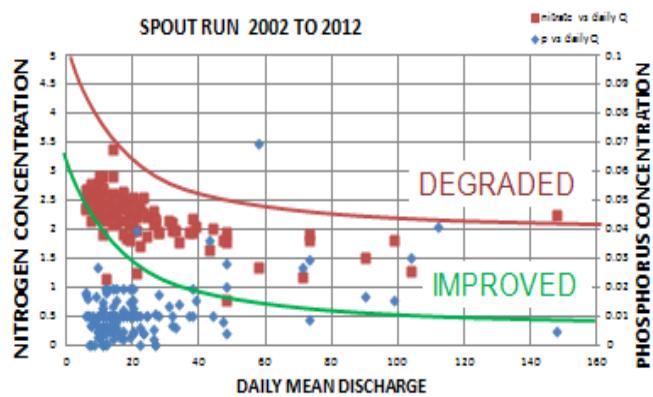
Plotting concentration on the y-axis and flow on the x-axis can show increases or decreases in the nutrient yield of a stream. Then as time progresses if the relation between flow and concentration shifts up the yield of the stream is increasing. If the relation shifts down then the stream yield is decreasing. Changes in stream yield cannot be shown by comparing annual loads because of the large range in annual stream flow and the generally small range in concentrations. Concentrations versus flow plots have two general shapes. If the concentration goes down as flow goes up it indicates the stream is diluting the constituent. Go to a real time USGS gage web site and look at specific conductance, Spout Run in Clarke County is a good example. At high flows conductance goes down because the overland flow is diluting the dissolved constituents in the stream. The other common situation is that concentration goes up as flow goes up. Sediment concentrations and turbidity usually increase as flow increases. The sediment type relation indicates the source of the constituent is overland runoff.

## **FOSR Has LOAD in Mind, by Wayne Webb**

When the total nitrogen and phosphorus methods are in place at our laboratory FOSR will select some existing sampling stations near stream flow gages throughout the Valley. Samples from these sites will be analyzed for total nitrogen and phosphorus in addition to the regular suite of parameters.

This information in time will elevate FOSR into being able to evaluate the progress of the Chesapeake Bay TMDL effort. The reason sites will be selected near gages is that the load of nitrogen or phosphorus the stream is transporting is the product of flow times concentration. Usually expressed in tons per day. The database will need

A SUBSTANTIAL SHIFT IN THE CONCENTRATION VERSUS DISCHARGE RELATION WILL DEMONSTRATE A CHANGE IN THE NUTRIENT YIELD OF A STREAM



## **FRIENDS OF THE SHENANDOAH RIVER DATA IMPORTANT TO VA DEQ**

The Virginia Department of Environmental Quality has asked for and received FOSR permission to utilize our water quality monitoring data for major elements in its programs to improve the quality of surface waters in the Commonwealth as noted in its request form printed below.

FOSR's Nitrate/Nitrate, Ammonia and Orthophosphate data and E. coli enumeration analyses meet DEQ's criteria at Level III., parameters measured at our laboratory at Shenandoah University. pH, dissolved oxygen and temperature collected in the field using specialized equipment provide data at Level III. Dissolved oxygen and pH measurements performed in our laboratory are at Level I.



### **Use Authorization Form for Water Quality Data**

**On behalf of the group identified above, we agree that the Virginia Department of Environmental Quality (DEQ) may use water quality monitoring data we generate per our selection(s) below. Our choice(s) will remain in effect unless or until our organization submits changes in the future.**

#### **Options for Uses of Your Data (may select more than one):**

**Information about each of the three levels of citizen data is available on the previous page**

**1. List and delist impaired waters on the 303(d) Impaired Waters List**

Data recognized by DEQ as Level III can be used to list or delist water on the 303(d) impaired waters list. We understand that 303(d) listed waters do not meet minimum water quality standards in Virginia and a Total Maximum Daily Load (TMDL) may eventually be developed to improve water quality.

**2. Source identification for TMDL development for waters already listed as impaired**

Level III data can be used in conjunction with DEQ monitored data to identify sources of pollution for 303(d) listed waters for TMDL development. We understand that our data will not be used by itself, without water quality data collected by DEQ, wherever possible.

**3. Track progress of a TMDL Implementation Plan and other restoration**

Level II or III data can be used to track the progress of restoration in a TMDL waterbody including installed Best Management Practices or to identify areas where other restoration efforts are taking place.

**4. Identify waters for future DEQ monitoring**

Level II or III data can be used to identify a waterbody for follow-up monitoring by DEQ. We understand that DEQ may not be able to monitor at these locations and/or assess water quality for some period of time.

**5. Educate land owners on the water quality impacts of land use activities**

All levels of data can be used to help in educating the community about water quality and land use activities.

**Signature (if submitting by mail): George L Ohrstrom, II**

## **South River (Mercury) Science Team in 2012 and the Near Future. by Bob Luce**

The last meeting of the year for the South River (Mercury) Science Team (SRST) was held on October 24 and 25, 2012, at DEQ in Harrisonburg. Attending were members—from DuPont, DEQ, EPA, state agencies, and citizen groups—as well as the SRST expert panel. The programs conducted in 2012 were reviewed and the programs slated for future years were presented for comment. Earlier, on October 23, there was a meeting of the Remedial Options Planning Group. This group is concerned with planning what should become a major focus of the team in the immediate future. I will discuss that and two other aspects of the meeting below.

### **Remedial Options**

The conceptual site model (CSM), which provides the foundation for devising remedial actions, has recently been completed. It integrates 12 years of exceptionally well carried out multidisciplinary scientific studies. Among other things, the CSM quantitatively shows the amounts and locations of sources, pathways, and receptors of mercury in the South River and environs, including biologic populations. It is subject to revision, but all agree that significant changes are unlikely to be made.

From the CSM we see that the three main mercury sources as of now are:

1. Floodplain sediments—the largest potential reservoir of mercury
2. River sediments—including suspended and embedded sediments
3. Plant outfalls—still more mercury reductions needed at the plant site

What are the means available for remedial options to isolate or reduce mercury, especially methylmercury, within the South River and its surrounding environment? At present, the ones most investigated are bank stabilization and adsorption by carbon. Pilot projects for both are underway to test their efficacy and determine if there are any unintended consequences from their application. Of course, there is a variety of ways that each can be specifically implemented. There is also the possibility that more innovative remedies may come to light from geochemical studies now in progress. A large and detailed matrix of potential options has just been circulated to members for pro and con comments.

Note that accessibility is an important consideration for selecting a site-specific remedy. Guidance for evaluating remedial options will be provided by two complementary Relative-Risk Modeling studies now underway. An Adaptive Management approach will be used throughout the remediation process. Finally, there will be a long-term monitoring program that will call attention to when and where adjustments should be made.

### **Future Work**

There are a number of regulatory drivers to the programs of the SRST that will demand attention soon. These are, with their deadlines:

1. RCRA Corrective Action documents—August 2013
2. NRDC/ Sierra Club Settlement (ecological study revision)-- 2013
3. Natural Resources Damage Assessment Restoration data—2013?
4. TMDL studies for mercury (submitted); for benthics ?; for bacteria?

For RCRA, the Corrective Measures must be formally proposed within nine months. Also, I believe that the Risk Assessment for Human Health must be completed in that time frame. New data is being collected for both efforts.

It was brought up at the meeting that deliverables must be in the strict formats required by the agency (EPA).

### **New Website**

The SRST is revising their website to make it accessible to non-members and to make it more user friendly. There is much in it that should interest the Friends of the Shenandoah River members. The studies concerning river hydrology and geomorphology, sediment transport, contaminant transport, populations of biota and their interactions apply not just to the South River but to the Shenandoah Valley as a whole. I'll notify you of the details as soon as they come out.

Friends of the Shenandoah River  
1460 University Drive  
Winchester, VA 22601

Non-Profit Org.  
U.S. Postage  
**PAID**  
Winchester, VA  
Permit No. 99

**We at the Friends of the Shenandoah River, extend a warm thank you  
to all of the volunteers that help to make the water quality monitoring program the  
success that it is.**

Below is a list of active volunteer monitors that are carrying on the legacy of the retired volunteer water monitors that helped to build the Friends of the Shenandoah River's long-term water quality program into the premier program that it is today.

Hollie Faulkner, Bob Hearn, Molly Smith, Fred Boyer, Robert Friedensen, Tim Lawrence,  
Terry Lay, Bud Nagelvoort, Bill Prokopchak, Nolan Thomas, Charles Vandervoort,  
Jim Peters, Fran Tamas, Trudy Peterson, Chris Anderson, Jim Cotter, Ken Johnson, Richard  
Kilburne, Charlie Newton, Paul Otto, Alice Pence, John Sylvester, Harold Skinner,  
U.S. "Jack" Rinca, Jr., Roger Bolland, Ross Clem, Lee Dieter, Ron Falyar, Jim Fitzsimmons,  
Hugh Hanson, Frank Hovermale, Jody Jenkel, H. B. Lantz, Jr., Katherine Layton, Steve Lowe,  
Remy Luerssen, Margaret Nelson, Ken Ownes, Darnice Pettigrew, John Proudman,  
Zoe Sollenberger, Ibby Stratton, David Timer, Beverly & Chuck Veatch,  
Leslie Mitchell-Watson, Skylar & Susan Wolf, Ric Aldhizer, Tom Benzing, Jim Benedict, Otis  
Bilkins, Jim Boland, Robbie Brown, Paul Bugas, Kemper Eagel, Emerson Fike, Rolf Gebel,  
Sandy Greene, Lyle Hood, Dave Horn, Charlie Huppuch, Bob & Betty Kite, Tom Long, Joe  
McCue, Jane Morriss, Dennis Patzig, Ray Pine, Roger Robinson, RoxAnna Theiss, Neil  
Tucker, Herb Wiegle, Bruce Wiggins

Wishing you and your family  
Happy Holidays!