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2009



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## REMEMBERING DON ORR, A DEAR FRIEND

by George L. Ohrstom, II, FOSR President

I only met Don a few years ago when I joined the Board of the Friends of the Shenandoah River.

It didn't take me too awful long to figure out that the movers and shakers of the outfit were the "historical" ones.....Meryl, Don, and Fran.

After a couple of months of working with Don, I found a real respect for him. It wasn't just friendship, although there was certainly that; it was his ability to bring problems into focus with that folksy, truthful, honest manner of his. I can't tell you how many high and mighty arguments were broken apart by that.

He was one of the people who urged me on to a bigger role in the Friends, and after I became President, we became even closer. He had an innate understanding of the 'real' Shenandoah Valley people that cared about the River, and his tireless efforts as The lead monitor for so many years made everybody a better person.

Don will be sorely missed by all those who knew him, but he will be missed more by The Shenandoah River that he has helped to save, .....and while we all know that that Old Man River will keep Rollin' along, we also know that he'll be missin' one of his great voices, and advocates....Don

Rest in piece, my friend, and know that we'll keep fighting the good fight in your honor.....



## **Friends of the Shenandoah River is meeting the necessary quality assurance requirements to maintain their accreditation for Level III monitoring of nutrient, *E. coli* and field parameter data.**

On September 29, 2009 the Virginia Department of Environmental Quality (VA DEQ) visited the Friends of the Shenandoah River laboratory located at Shenandoah University to perform an audit of the volunteer ambient water quality and *E. coli* monitoring program.

The audit was a thorough review of all of the FOSR's methodologies and standard operating procedures for both in the lab and in the field. In some causes it was noted that the FOSR lab excels to meet more stringent quality control/quality assurance standards than required by the state.

During the six hour audit, VA DEQ complemented the caliber of work that both the lab and volunteers produce. VA DEQ is currently using the FOSR's nutrient data in their total maximum daily load studies and 303(b) report to the US EPA. The Friends of the Shenandoah River passed the audit with no citations and thus maintains their level III certification with the state.

This accomplishment would not be possible with the dedication of the staff, volunteers, board members and the support of our members and grantors.

## **Treasurer's Report for 9 Months of 2009**, by Bud Nagelvoort, FOSR Treasurer

I am pleased to report that 2009 is shaping up to be a good year from a financial perspective for Friends of the Shenandoah River. Our income through September is almost \$5,000 above the budgeted amount and our expenses are almost \$5,000 below budget. Projections for the full year suggest that we will be in the black at year-end.

Water sample analysis payments are about \$11,000 above budget due to several unexpected items while an anticipated grant of \$7,160 was not received. This combination and a few smaller income items above budget account for the current income surplus over budget.

On the expense side lab costs below budget combined with reduced contract services expenses and a few smaller items coming in below budget more than offset the increase in payroll expenses resulting from a decision in the first quarter to increase our lab assistant's salary from part-time to full time.

While these numbers look good for 2009, I would be remiss if I did not express substantial concern for FOSR funding for 2010.

We anticipate a dramatic reduction in payments next year for lab services related to the Abrams/Opequon Virginia Tech National Fish and Wildlife Foundation program which has now expended most of the grant funds allocated to water quality monitoring. FOSR has received more than \$35,000 this year for lab services related to this monitoring, a major contribution to our overhead costs.

We have been advised that Page County will not be providing funds to us to cover the costs of lab work related to monitoring water quality in streams in the County next year due to budget constraints. We are very uncertain about the continuation of a substantial grant from DEQ also due to likely State budget constraints. And we have been advised to expect another substantial grant to be substantially reduced due to the financial circumstances of the grantor.

A major effort has been underway by our Board of Directors to secure more stable funding sources for your organization. We are hopeful of success in these efforts for next year. At this time, however, we can only advise you of the serious nature of our concerns for 2010.

### **ON THE RIVER '09 FESTIVAL was a great success!**

The ON THE RIVER '09 Festival held this past August at the Front Royal, Virginia VFW was by all accounts a great success.

The festival was designed to reacquaint and connect the community with the Shenandoah River.

Approximately 200 paddlers turned out for the free 3-mile river float. Hundreds more enjoyed the festival activities which included live music, great food provided by the Front Royal VFW, fishing demonstrations and environmental theme demonstrations and displays. There was even special events for the kids.

The FOSR received recognition and appreciation from the town of Front Royal for our efforts in recruiting and organizing environmental groups participation in the festival.

Come out and join us next year on August 14, 2010 to make the  
ON THE RIVER '10 Festival  
even bigger and better then this years.



## *South River Science Team Progress over the Last Year*, by Bob Luce

The past year and a half has been pivotal for the South River Science Team's studies of mercury (Hg) in the South River and its consequences. The program now is wrapping up the chemical and geomorphic studies, is continuing investigations into effects on the biological environment, and is initiating work on potential remedial actions.

Goals for remedial actions are now explicit. The Hydrologic Simulation Program—FORTRAN (HSPF) numerical model of fluxes in the South River watershed run by Jack Eggleston of the U.S. Geological Survey to determine the Total Daily Maximum Load (TMDL) of mercury concluded that total mercury loads to the river must be reduced by 99 percent to meet the EPA criterion of 0.3 ppm Hg in fish tissue. Even the low concentrations currently contributed by outfalls of the cleaned-up former DuPont plant exceed the 3.8 ng/L limit for total Hg in the river. Current efforts to further trap residual Hg in ditches and sewer lines on the plant site should be able to eliminate that particular contribution, but these low concentrations illustrate the difficulties of meeting the TMDL requirements being proposed.

Mike Newman and his graduate student Kyle Tom at the College of William and Mary have calculated that only if the concentrations of methyl mercury in periphyton (slime on which macro-invertebrates feed) are below 0.6 mg/g (dry weight) will the concentration of methyl mercury in largemouth bass meet the Virginia Dept. of Health standard for consumption. They arrived at this very low concentration, of similar magnitude to that for the TMDL for total Hg in the South River, by using  $d^{15}N$  to determine not only positions of organisms in the food web from periphyton feeders to top predators, but also the associated biomagnifications.

On a positive note, the TMDL modeling has acted as a framework for a conceptual model that incorporates nine years of field and lab measurements. Overall, the SRST now knows generally where, and to a certain extent in what quantities, mercury, both methylated and unmethylated, resides in the watershed, and how it is transported. The SRST has discovered that the focus should be on the 12 river-mile reach below the plant, especially in the "hump" from 3 to 10 miles, that about 85% of the mercury entering the South River comes from channel margins (mainly from bank erosion), that most Hg is carried downstream attached to silt and clay particles (especially during storms), that tributary streams contribute little Hg, and that the floodplain sediments store a lot of Hg but do not supply much to the river. Recently, the SRST has focused an interest in the hyporheic zone—the zone of gravels and fine sediments below the river proper. This zone stores mercury (in amounts unknown so far), "bleeds" it into the river, and can act as a site for bacterial activity.

Another positive note is the preliminary observation that, with the exception of tree swallows (subtle effects on offspring survival for first-time breeding females in 2006); there is little evidence that populations of fauna in the watershed have been reduced by the levels of methyl mercury in the food web. This notion will be re-examined when a number of faunal studies are completed this year.

However, after all this effort and investigative successes, it may not be possible to reduce (methyl) mercury levels in reputedly the best smallmouth bass rivers around--the South River and the Shenandoah River-- to levels at which we can eat the fish. Nevertheless, the will is there. The SRST is committing many resources to find appropriate remedial options to achieve that goal. Approaches under consideration include bank stabilization, controlling release of Hg from soil and sediment, reducing methyl mercury in the water column, reducing the production of methyl mercury by bacteria, and reducing Hg concentrations at different levels in the food web.

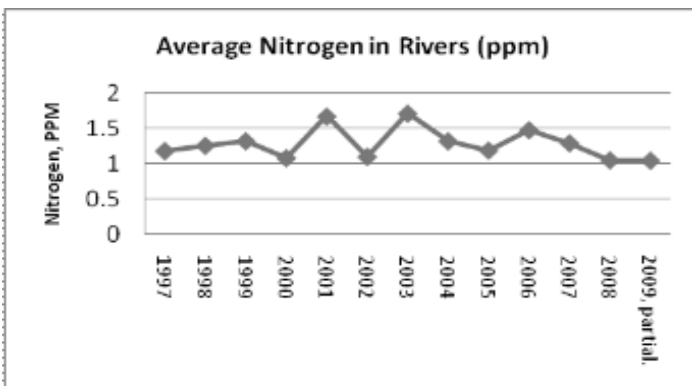


## STATE OF THE RIVER, *by Charles Vandervoort*

This section of the newsletter focuses on the extent and trend of nitrate-nitrite (nitrogen) and turbidity pollution at the 79 sampling sites that were regularly sampled since January 1, 1997. Not included are sites that were sampled only during part of the 1997 – 2009 time period.

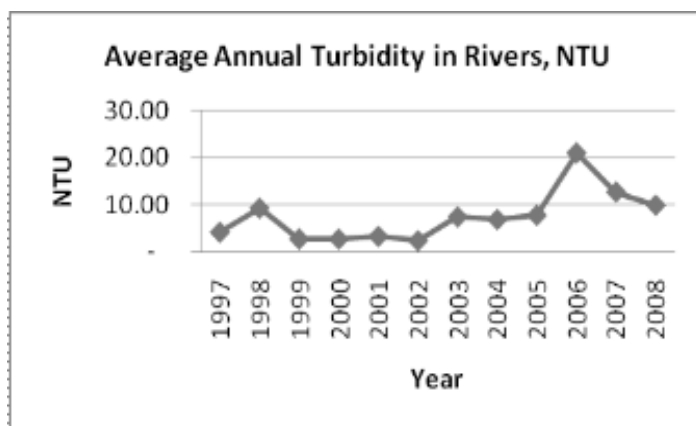
**Nitrogen:** The graph below shows that the overall average concentration for nitrogen in the rivers that, although elevated, may have been declining somewhat. The drop in concentration is of course good news: it could be that measures to reduce nitrogen concentrations such as improvements in best management practices, better regulation, and better enforcement of regulations are slowly taking effect. The fact that the lower levels of rain and snow fall were lower in recent years could also be an important factor in reducing runoff of pollutants. As discussed below, the average concentration of turbidity shows the same pattern, but the drop in recent years is not as pronounced as for nitrogen.

The EPA has not yet developed criteria for nitrogen with regard to its impact on aquatic health and eutrophication in fresh water. Research by the FOSR on criteria developed by other States, academia, and environmental organizations however, suggests that nitrogen concentrations above 0.75 start harming aquatic life and start contributing to eutrophication. Concentrations above 1.5 ppm could cause severe harm.



The graph shows that, for many years, average concentrations for nitrogen in the rivers were well above the unimpaired level of 0.75 PPM. In fact, 19 of the 27 monitoring sites (70 percent) reported average levels above the impaired levels. Nitrogen concentrations in the tributaries (not shown) were somewhat lower than for the rivers: 33 of the 52 monitoring sites (63%) in the tributaries reported average nitrogen concentrations above the unimpaired level.

**Turbidity:** As shown in the graph below, turbidity starts off at a relatively low concentration early in the eleven-year time period, but then starts increasing rapidly after the year 2002 to more than 20 NTU during 2006 – a level believed to be very harmful to aquatic life. After 2006, however, the turbidity seems to be on the decline.



As discussed previously for nitrogen, the decline in turbidity concentration could be robust, and could be caused by improvements in best management practices and regulation. Factors such as changes in the weather may also have played a role. More time, more data, and more research is required to confirm that the trend is indeed down.

**Hot Spots:** Although the graphs showing average concentrations of nitrogen and turbidity are useful for trend analysis, they do not provide much information on some of the serious problems that exist at a number of monitoring sites. This is examined in the tables on the next page where the sites are divided into two groups, each containing seven sites. The first group shows the seven sites with the highest average nitrogen concentration – the hot spots. The second group shows the sites with the lowest nitrogen concentration.

The table on the next page shows the seven sites recording the highest concentrations of nitrogen. The concentrations are all well above the severely impaired level, and can cause harmful algae blooms and eutrophication in both the Shenandoah River and downstream waters such as the Potomac River and Chesapeake Bay. For example, the concentration of nitrogen in Pleasant Run (JR10) at 4.6 PPM is well above the severely impaired level. Note that the hot-spots are all for monitoring sites on tributaries – none of the river monitoring sites made it into the top seven although some came close..

<b>The seven sites with highest Nitrate-Nitrite (N) impairment in 2008</b>				
<b>Site ID</b>	<b>Avg. Nitrogen in 2008, PPM</b>	<b>Avg. Turbidity in 2008, NTU</b>	<b>Site Name</b>	<b>County</b>
JR10	4.6	31.4	Pleasant Run - North River watershed	Rockingham
JR01	4.4	12.9	Muddy Creek @ Rte 737 Rushville Rd	Rockingham
JR07	3.8	31.5	Cooks Creek - North River watershed	Rockingham
FP13	3.2	10.3	Mill Creek	Page
FC06	2.6	15.9	Dog Run	Clarke
FC02	2.5	3.9	Spout Run	Clarke
FC03	2.4	12.4	Lewis Run	Clarke

Because turbidity is high, and is such an important parameter, the table also shows the levels of turbidity for the hot spots. Turbidity measures the level of sedimentation in the water. Although the EPA has not yet developed definitive criteria for turbidity in streams, research by the FOSR suggests that a concentration above 20 NTU (nephelometric turbidity units) can be considered harmful to aquatic life. At such concentrations the high sedimentation, among other things, blocks sunlight and suffocates small bottom dwelling organism. A high average annual turbidity level is therefore of great concern.

But there are also some good parts of the rivers and tributaries. The next table shows the average nitrogen concentrations at the seven least impaired monitoring sites in the Shenandoah River Basin. These are located in Warren, Shenandoah, Page and Augusta counties For these sites, nitrogen concentrations are well below the impaired level, and turbidity levels are also much lower than for the seven highly impaired streams. These "good" sites are shown to suggest by how far concentration levels can be reduced by accelerating measures such as Best Management Practices

<b>The seven sites with lowest Nitrate-Nitrite (N) impairment in 2008</b>				
<b>Site ID</b>	<b>Avg. Nitrate PPM</b>	<b>Avg. Turbidity NTU</b>	<b>Site Name</b>	<b>County</b>
NS52	0.07	4.9	Cedar Creek at Rt. 606	Shenandoah
FW21	0.09	6.8	Flint run	Warren
FW22	0.10	5.9	Gooney Creek	Warren
GA37	0.12	0.9	North R-Elk	Augusta
FP15	0.14	1.6	Cub run	Page
NS30	0.15	3.7	Stony Creek, Route 675 bridge	Shenandoah
FP07	0.17	2.0	Pass Run	Page

Summary:

Average levels of concentration for nitrogen and turbidity in the rivers and tributaries of the Shenandoah River Basin are high, although there is a suggestion that the concentration for nitrogen may be slowly declining. And the analysis of "hot spots" shows that there are many locations where deviations from the average are far too high concentration, are very substantial.

More detailed analysis based on larger samples and inclusion of more parameters is presented in the comprehensive FOSR report available on the FOSR website ([www.fosr.org](http://www.fosr.org)). That report analyzes in

considerably more depth the extent of water quality deterioration in the Shenandoah River Watershed, the efforts and effectiveness of the various groups that are implementing possible solutions to halt and reverse the deterioration, and prospects for the future.



Friends of the Shenandoah River  
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JOIN THE FRIENDS OF THE SHENANDOAH RIVER IN THEIR MISSION

“To protect and restore the aquatic environment of the Shenandoah River and its tributaries”

Yes, I would like to be a member of The Friends of the Shenandoah River (FOSR)

\_\_\_ \$20 Supporter NAME \_\_\_\_\_

\_\_\_ \$35 Friends & Family ADDRESS \_\_\_\_\_

\_\_\_ \$50 Patron \_\_\_\_\_

\_\_\_ \$75 Guardian Telephone \_\_\_\_\_

\_\_\_ \$100 Steward E-mail: \_\_\_\_\_

\_\_\_ Other/Donation

Please make checks payable to: ***Friends of the Shenandoah River***  
and mail to:

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\*If you do not wish for the FOSR to exchange your info with other environmental groups, please check box