

**NORTH CAROLINA DIVISION OF WATER QUALITY**  
**ENVIRONMENTAL SCIENCES SECTION**  
**August 2010, SWPBA update**

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Hello SWPBA! It has been awhile since we have seen many of you. A lot has been happening here in North Carolina. Despite continued budget challenges, we are finding new ways to more with less. Since the lack of funds prevented us from attending the meeting last year in Kentucky, we wanted to mention a few changes that have occurred here. Specifically, we are excited that vacant leadership positions within the organization are now filled. As of last year, these positions were being administered by interim supervisors who also had the added responsibility of their own positions! Many of you know Jay Sauber. He has been with NC DWQ for a long time and is now officially the Environmental Sciences Section Chief. He replaced the retired Jimmie Overton, who served NC DWQ for many years and was also a SWPBA President. Another past SWPBA President, Trish MacPherson (former Biological Assessment Unit Supervisor), has been replaced by Eric Fleek, a long time member of the Unit. Finally, Jason Green is the new Intensive Survey Unit Supervisor. Below, are some updates from Units whose personnel have been involved with SWPBA activities in the past. We've tried to include all the pertinent projects that you all may be interested in but, being that we are still in the middle of field sampling, may have inadvertently omitted a few. If you are interested in a program that we've mentioned below, the contact personnel are listed. If you don't see something that you've seen or heard about in the past, let us know, and we'll put you onto the right person. We hope to see you all in Florida at the meeting in a couple months.

**NC Division of Water Quality's**  
**Neuse River Rapid Response Team comes to an end**  
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Recent budget shortfalls have required the North Carolina Division of Water Quality to eliminate certain programs and positions. NC DWQ's Neuse River Rapid Response Team was part of these budget reductions. The team, based in New Bern NC acted as a coastal monitoring and response asset, with the ability to quickly assess water quality emergencies such as fish kills as they occurred.

Formed in 1997, the Neuse River Rapid Response team was responsive to public concern about massive Atlantic menhaden fish kills, fish lesion events, and algae blooms in the Neuse River estuary. These events were highlighted by the unknown relation to potentially harmful algal blooms which were thought to have played a role in large fish

kills or fish lesion development. The dinoflagellate *Pfiesteria piscicida* was a major concern in relation to the fish kill events, in that its effects on both fish and humans were largely unknown. The response team's goals were to quickly mobilize sampling crews during fish kill events, collect water, fish tissue, and phytoplankton samples along with evaluating physical conditions. This allowed NC DWQ to more accurately depict what was occurring in its estuarine waters and determine the causes of prevalent fish kills. The Response Team collaborated directly with numerous researchers in its efforts to monitor the Neuse River estuary. Team members also provided response to water quality emergencies such as oil spills, illegal discharges, and wastewater spills acting as regulatory officials for the state of NC. The Response Team also collected juvenile Atlantic menhaden in an effort to spatially and temporally map the incidence of lesions on these fish. Data and results were compiled annually and published to NC DWQ's website for public viewing. The team has also been part of NC's field staff for EPA's National Coastal Condition Assessment (formerly NCAP), which has collected physical, chemical, population, and habitat data at 200 sites in 6 years.

Through its 13 year tenure, the Neuse River Rapid Response Team provided the citizens and officials of NC unbiased and logical information regarding water quality in the lower Neuse River basin. The team also acted as a launch pad for its members over the years by providing experience and knowledge to 15 staff that have all progressed to further their environmental careers. <http://portal.ncdenr.org/web/wq/ess/home>

## AQUATIC TOXICOLOGY UNIT

Contact: Cyndy Moore, 919-743-8442, [cindy.a.moore@ncdenr.gov](mailto:cindy.a.moore@ncdenr.gov)

North Carolina's Aquatic Toxicology Unit (ATU) consists of three main areas:

- Compliance and enforcement of toxicity requirements in NPDES permits
- Biological laboratory certification
- Compliance and watershed testing in ATU's toxicity testing lab.

A summary of each ATU area and their recent activities are described below. ATU staff welcomes input from other SWPBA members about toxicity work in their areas, so please contact us with questions, comments, etc. Staff contacts and additional ATU information can be found on our webpage at: <http://portal.ncdenr.org/web/wq/ess/atu>

**ATU Compliance and Enforcement:** All permitted dischargers of complex wastewater in the state are required to perform self-monitoring of aquatic toxicity of their wastewater. Currently this totals over **586** industrial and municipal facilities. The ATU reviews all toxicity data reported by these facilities to verify data quality, track compliance with established permit limits, and make enforcement recommendations for non-compliant situations.

In 2009, ATU Compliance reviewed and documented over **2232** self-monitoring aquatic toxicity tests. ATU reviewed over **201** permits, verifying all information was correct for bioassay monitoring requirements.

In FY 2009, ATU Enforcement sent out **79** Notices of Violation (NOVs) for noncompliance of the Whole Effluent Testing (WET) NPDES requirements. Included in these were **55** NOVs for limit non-compliance, of which **21** were for NPDES permits that included the copper and zinc action level policy notices. There were **3** NOVs for non-reporting or late reporting. ATU issued **1** Notices of Deficiency (NODs) in lieu of NOVs. NODs rather than NOVs are issued for deficiencies such as reporting WET data on the monthly DMR but then not sending the toxicity test report ATU. There are various other reasons that ATU assesses severity in issuing NODs versus NOVs. There were no warning letters sent for minor monitoring infractions.

ATU Enforcement had **22** civil penalty assessments over the course of 2009 for either late/non-reporting or for limit violations.

Overall facility compliance with self-monitoring limitations established by a facility's NPDES permit averaged **98%**.

**ATU Lab Certification:** All toxicity analyses reported by dischargers must, by water quality regulations, be performed by a biological laboratory certified by the State for these tests. The ATU operates this certification program, which includes laboratory inspections, data tracking, and performance evaluation testing (PE testing). PE testing is an annual “blind round robin” testing procedure in which our lab (ATU) prepares an unknown chemical mixture and submits it to all North Carolina certified WET labs. The data is statistically interpreted in order to determine if all certified labs are able to meet the performance parameters.

For the year 2009, ATU certified/recertified **15 labs** for WET testing and Aquatic Population Survey Analysis. One lab was decertified during the year but regained certification after a month. ATU performed **8 laboratory inspections** and reviewed all Standard Operation Procedures for these labs. Contact: Lance Ferrell, 919-743-8440, [lance.ferrell@ncdenr.gov](mailto:lance.ferrell@ncdenr.gov)

**ATU Lab:** The lab conducts toxicity testing to support the Whole Effluent Toxicity (WET) monitoring program as well as a variety of special studies. Primarily, ATU uses modified EPA methods for measuring acute and chronic toxicity of wastewater and surface waters to freshwater and marine organisms. The principle testing organisms are *Ceriodaphnia dubia* (water fleas), *Pimephales promelas* (fathead minnows), and *Mysidopsis bahia* (mysid shrimp). Additionally, ATU has used a variety of micro-biotests and *Daphnia* feeding inhibition tests to support special studies, such as Total Maximum Daily Load (TMDL) development or watershed toxicity assessments. Micro-biotests are small scale biological tests that provide a variety of sublethal endpoints over a range of ecological functional groups, such as algae, yeast, bacteria, and crustaceans. Contact: Carol Hollenkamp, 919-743-8450, [carol.hollenkamp@ncdenr.gov](mailto:carol.hollenkamp@ncdenr.gov)

**Special Projects:** ATU collaborated with the NCDOT and the USGS on the development of a time-variable toxicity testing method for stormwater runoff from bridges. Time-variable bioassay methods modify organism exposure time to reflect the duration of exposure in the natural environment. For example, exposure time to stormwater may equal the duration of the storm event rather than the entire 7-days of a traditional *Ceriodaphnia dubia* whole effluent toxicity (WET) test. Over the past year, bridge runoff samples were collected at 15 bridge sites around the state. 4 sites had quarterly collections of bridge water runoff, instream storm conditions, and instream normal flow conditions. Bioassay testing has been completed for the project and NCDOT is compiling the information into its final report. Contact: Carol Hollenkamp, 919-743-8450, [carol.hollenkamp@ncdenr.gov](mailto:carol.hollenkamp@ncdenr.gov)

ATU assisted the US Fish and Wildlife Service and the USGS with effluent sampling for a mussel toxicity study. This study will evaluate the sensitivity of mussels to effluent compared with the sensitivity of two common test species, *Ceriodaphnia dubia* and *Pimephales promelas*. This testing is conducted as part of a U.S. Fish and Wildlife Project to assess point and nonpoint pollution effects on the endangered Tar Spinymussel in North Carolina. Contact: Carol Hollenkamp, 919-743-8450, [carol.hollenkamp@ncdenr.gov](mailto:carol.hollenkamp@ncdenr.gov)

## **BIOLOGICAL ASSESSMENT UNIT**

Contact: Eric Fleek, 919-743-8469, [eric.fleek@ncdenr.gov](mailto:eric.fleek@ncdenr.gov)

### **Fish Community Program**

#### **Basinwide Monitoring**

Fish community monitoring activities in 2009 focused on the Roanoke River Basin (24 sites), the Piedmont region of the Cape Fear River Basin (25 sites), Little Tennessee River Basin (12 sites), and Hiwassee River Basin (13 sites). The complete data, ratings, analyses, and reports for these river basins will be available in Spring 2010 at: <http://www.esb.enr.state.nc.us/BAU.html> and <http://www.esb.enr.state.nc.us/bar.html>). Files of the indigenous and nonindigenous fauna for North Carolina, updated every spring, may be found at: <http://www.esb.enr.state.nc.us/Native%20and%20Introduced%20Freshwater%20Fish%20in%20North%20Carolina.2-1.htm>). In 2010, activities have focused on the Broad River (28 sites) and Neuse River (22 sites) basins. Contact: Bryn Tracy, 919-743-8474, [bryn.tracy@ncdenr.gov](mailto:bryn.tracy@ncdenr.gov)

#### **Use Attainability Studies**

In 2009 Use Attainability Studies (the reclassification of a waterbody to Outstanding Resource Waters, High Quality Waters, or Trout waters) were conducted in the Yadkin River Basin (8 sites), Watauga River Basin (10 sites), New River Basin (8 sites), Little Tennessee River Basin (14 sites). The sites sampled in the New and Watauga River basins were nominated as Trout waters based upon data collected by the NC Wildlife

Resources Commission and reviewed by the Environmental Affairs Committee of the North Carolina Chapter of the American Fisheries Society and submitted to DWQ on behalf of the Chapter by the Chapter President. In 2010, Use Attainability studies have been conducted on the Cane River (Yancey County, French Broad River Basin), upper Yadkin River and Buffalo Creek (Caldwell County, Yadkin river Basin), and Tuskegee creek (Graham County, Little Tennessee River Basin). Contact: Eric Fleek, 919-743-8469, [eric.fleek@ncdenr.gov](mailto:eric.fleek@ncdenr.gov)

### **Re-Introduction Projects**

**Richland Creek** – Richland Creek, draining southwestern Haywood County in the far western reaches of the state, is the largest tributary to the Pigeon River before it flows into Tennessee. The creek is on North Carolina's §303 (d) list of impaired waters due to historic and long-term poor water quality, hydrologic modifications, and habitat degradation. However, recent watershed enhancement projects upstream from Lake Junaluska have resulted in improvements in the stream's water quality. And although positive changes in the biological integrity of the fish community were documented between 2001 and 2007 (e.g., increases in overall species diversity and abundance, and decreases in the percentage of tolerant fish), further improvements are hampered by the existence of the Lake Junaluska dam which is a barrier to upstream fish re-colonization and migration. To restore the biological integrity of the fish community and ultimately remove Richland Creek from the §303 (d) list, a multi-partner reintroduction project began in April 2010 funded in part by the American Recovery and Reinvestment Act. This innovative project (i.e., removing a stream from the §303 (d) list and restoring the biological integrity of the stream by re-introducing indigenous species, long absent from the watershed) is a cooperative effort among the the North Carolina Division of Water Quality, North Carolina Wildlife Resources Commission, Haywood Waterways Association, and the University of Tennessee-Knoxville. The low-cost water quality project involves the collection, transport and release of fish of several species twice a year for three years or until the species establish permanent, reproducing populations. The project is patterned after the successful and on-going bi-state Pigeon River Re-introduction Project led by UT-Knoxville, TN DHEC, TNWRA, and NCWRC. In April 2010, almost 2,500 fish representing seven species (Warpaint Shiner, River Chub, Mottled Sculpin, Rock Bass, Fantail Darter, Greenfin Darter, and Tuckasegee Darter) were released upstream from Lake Junaluska. For a podcast of the project, please click on: [http://www.fws.gov/asheville/htmls/podcast\\_transcripts/Richland-Creek.html](http://www.fws.gov/asheville/htmls/podcast_transcripts/Richland-Creek.html) or <http://www.fws.gov/asheville/podcasts/Richland%20Creek.mp3> Contact: Bryn Tracy, 919-743-8474, [bryn.tracy@ncdenr.gov](mailto:bryn.tracy@ncdenr.gov)

1. **Pigeon River** – In 2009 and 2010, 2,064 Tennessee Shiner (*Notropis leuciodus*), 668 Mirror Shiner (*N. spectrunculus*), 474 Silver Shiner (*N. photogenis*), 448 Telescope Shiner (*N. telescopus*), 403 Gilt Darter (*Percina evides*), 314 Highland Shiner (*N. micropteryx*), 183 Banded Darter (*Etheostoma zonale*) and 16 Bigeye Chub (*Hybopsis amblops*) were translocated from various source populations elsewhere in the French Broad River system to the Pigeon River in NC. Monitoring surveys continued to find Silver and Telescope Shiner in good numbers, multiple year classes, and occupying as much as 10 river miles in the

target reach. Translocations of both species ceased in 2009 since they are now believed to be reestablished with total numbers translocated sufficient to include most genetic diversity present in source populations. Tennessee Shiner appear to be well on their way to recovery, however, little evidence of recovery has been seen for Gilt Darter, of which 819 have been released since 2005. The Pigeon River was severely polluted for most of the 20th century until improvements in waste water treatment were made at a paper mill in Canton, NC in the late 1980's & 1990's. Partners include University of Tennessee, NC Wildlife Resources Commission, NCDWQ, Evergreen Paper Company, and US F&WS.

### **Fish Tissue Program**

**NC Division of Air Quality fish mercury monitoring** – The North Carolina Division of Air Quality is responsible for tracking mercury reductions from the state's 14 major coal-fired power plants as part of North Carolina's commitment to the Clean Air Mercury Rule. As new scrubber technologies are put into use, the Division of Water Quality is assisting with monitoring of fish-mercury levels at 13 strategic locations across the state. This data is intended for future fish-mercury end-point trend analysis among top predator species that are susceptible to mercury bioaccumulation (i.e. Largemouth Bass). 2010 will mark the third year of this monitoring effort. Results are scheduled to be reviewed by the NC Environmental Management Commission (EMC) in 2012. Contact Jeff Deberardinis, 919-743-8473, [jeff.deberardinis@ncdenr.gov](mailto:jeff.deberardinis@ncdenr.gov)

**Mercury in NC's commonly consumed inland fish** - The Division of Water Quality has completed a three-year effort to identify mercury concentrations among the ten most commonly consumed inland fish species in North Carolina. This is an inter-agency effort that is intended to provide NC's health officials with comprehensive guidance for the protection of citizens who consume locally caught fish. The news is good for most of the 15 fish species collected for this study (i.e. low mercury fillet burdens, and therefore safe to eat). However, elevated mercury levels were detected in some of the top predator species, (e.g. Walleye) resulting in Fish Consumption Advisories on three North Carolina lakes (Lake Gaston, Fontana Lake, Santeetlah Lake). Monitoring efforts in 2009 (year 3) were focused on western lakes where data gaps still existed among NC's most frequently harvested species (Hiwassee Lake, Chatuge Lake, Nantahala Lake). Results for 2009 were recently released, and are currently being reviewed by the NC Health Department.

**PCBs in Mountain Island Lake** - Fish from two locations on Mountain Island Lake (along the border of Gaston and Mecklenburg counties) were also sampled in 2010 for Polychlorinated Biphenyls (PCBs). The purpose of this effort was to follow up on suspected PBC contamination in the upper part of the lake near a power plant outfall. Data is being shared with South Carolina officials. Composite sample analyses of PCBs in Largemouth Bass, Redear Sunfish and Channel Catfish are pending.

### **Benthic Macroinvertebrate Program**

Two papers published in 2010:



**“Insecta, Ephemeroptera, Ephemerellidae, *Attenella margarita* (Needham, 1927): Southeastern range extension to North Carolina, USA.”** Luke M. Jacobus (Indiana University) and Eric D. Fleek (NCDWQ).

**“Caddisfly (Trichoptera) Records for North Carolina.”** David R. Lenat (Lenat Consulting Services), David E. Ruiter, Charles R. Parker (U.S. Geological Survey), Jason L. Robinson (University of Tennessee), Steven R. Beatty (NCDWQ), and Oliver S. Flint, Jr. (Smithsonian Institution).

Tolerance values (TVs) for North Carolina taxa were redetermined in spring 2010 by the Biological Assessment Unit (BAU), generally following the method published by Dave Lenat in 1993. The BAU had collected several years’ worth of data since the prior determination, so values incorporating those new data should result in more accurate assessments. During the process, the need to tie tolerance values to stressors was discussed. It was decided that addressing this specifically would require much more time than we had available to us, so for this iteration we used the published method. A comparison of bioclassifications for those North Carolina assessment methods that use tolerance values (Full Scale, Swamp, and Small Stream) using old and new values showed little difference in results for Full Scale and Swamp methods. However, threshold values for classifications for the newly developed Small Stream method will need to be adjusted.



**Nantahala River (Little Tennessee River Basin) Macon County, NC**

Nearly 200 benthos samples collected between February 2010 and October 2010 including work in 12 river basins.

Two enforcement cases which included benthic macroinvertebrate data: asphalt sealant runoff and a 7,000 gallon gasoline spill. Both were upstream/downstream studies and both demonstrated significantly adverse effects on the benthos.

Continued a long-term study of the effects of pesticides associated with tomato farms on the Mills River. The Mills River serves as the drinking water supply for the city of Hendersonville.

Study initiated examining the efficacy of stream restoration projects installed by the Ecosystem Enhancement Program and its contractors.

Several studies initiated examining the effects of trout farms and quarries on benthos communities.

High Quality Waters (HQW) and Outstanding Resource Waters (ORW) reclassification studies conducted on the Cane River, the Upper Yadkin River watershed, and the John's River watershed.

Resampling and subsequent removal of several streams that were previously listed on the 303d list.

In addition, the BAU has collected the first North Carolina larval specimens for the stonefly *Hansonoperla appalachia*, and the caddisfly *Triaenodes taenia*.

### **INTENSIVE SURVEY UNIT, LAKES GROUP**

Contact: Jason Green, 919-743-8496, [jason.green@ncdenr.gov](mailto:jason.green@ncdenr.gov)

North Carolina lakes and reservoirs are monitored by the Intensive Survey Unit, Environmental Sciences Section as part of the EPA's Clean Lakes Program. Lakes are sampled monthly from May through September with a minimum of five sampling events. Water chemistry and physical data are analyzed and a summary report prepared and placed on the NC DWQ, Intensive Survey Unit web site for public access (<http://portal.ncdenr.org/web/wq/ess/reports>).

In 2009, the Intensive Survey Unit, Lakes Group sampled and reported on reservoirs in four river basins (the Hiwassee, Little Tennessee, Roanoke and White Oak River Basins) along with special study conducted on one lake in the Pasquotank River Basin for a total of 27 lakes and reservoirs. During the summer of 2010, one reservoir is being sampled in the Chowan River Basin, four reservoirs in the Broad River Basin, and 21 reservoirs in the Neuse River Basin for a total of 26 reservoirs. Expanded water quality monitoring is being conducted on one of the reservoirs in the Broad River Basin as part of a water quality standard reclassification request to designate that lake as a water supply source. In addition, a reservoir in the Catawba River Basin is being monitored five times this summer to investigate a report of low pH value observations made in 2008.





**Merchants Millpond, (Chowan River Basin) Gates County, NC**

**SURFACE WATER SECTION  
WETLANDS and STORMWATER BRANCH  
Program Development Unit**

Contact: Larry Eaton, 919-715-3471, [larry.eaton@ncdenr.gov](mailto:larry.eaton@ncdenr.gov)

The Program Development Unit would like to introduce its new biologist. Ross Vander Vorste is a recent graduate of South Dakota State University, where in May he defended his thesis looking at bugs in headwater streams in South Dakota. In the two months he has been here, we have thrown at him most of the things that make the south famous (rhododendron thickets in Georgia, chest high poison ivy in Mississippi, Smilax, kudzu and ticks all over, fire ants and yellow jackets in Alabama, alligators in Mississippi, rattlesnake in Tennessee, cottonmouths in Alabama and Florida, heat indices near 120 in Mississippi, Alabama and Florida and NASCAR in Alabama) and he is still smiling. His favorite southern item so far is BBQ, so he may adapt to the south eventually. We hope to introduce Ross around at the next SWPBA meeting where there is hope he will give a short travelog about his southeastern travels and how streams start in the different ecoregions.

Since Ross has come on board, the effort to sample headwater streams throughout the southeast has taken a leap forward and now all states have been visited at least twice and over 100 samples have been collected. Now we have to get out of the car for awhile and start working up the samples. Thanks to the cooperation of SWPBA members, I have developed lists of

macroinvertebrates that live in Traditionally Navigable Waters for Tennessee, Kentucky, South Carolina and am half way through the Florida data set (really big). Then I will be getting in touch with folks from Georgia, Alabama and Mississippi to see if I can talk you into doing some data diving for me. So far, every headwater stream we have sampled has had at least two, and usually many more, species that also live in a Traditionally Navigable Water in that State, which shows just how interconnected the stream network is, where ever you live.

While this project has been underway for over a year, several other headwater stream initiatives have started. Rusty Weinerick is heading up the effort in South Carolina to develop a stream determination methodology that is currently in the data collection phase. Jim Glover is graciously lending bug collecting assistance to this endeavor. In Tennessee, Jimmy Smith is dodging legislative mandates also to develop a stream form in a ridiculously short span of time. EPA has hired Jim Gregory (NCSU professor emeritus) to develop a stream determination form that works for all streams in the southeast. He will be teaching classes in Kentucky and Alabama in late October and November, so if you are interested in attending and finding out more about this, start agitating for travel now. Also let Larry Eaton or Bill Crouch know, and we can get you more information on dates and agendas. We may even put you to work. Finally, the Army Corps of Engineers has developed an HGM-based method for quantifying stream function in headwater streams in coal country in West Virginia and Eastern Kentucky. Greg Pond (EPA, Ex-Kentucky) had a hand in this, so it might be worth a read <http://el.erdc.usace.army.mil/elpubs/pdf/trel10-11.pdf>