



At A Glance: Floodplain Soil Survey Results

The South River Science Team conducted a comprehensive soil sampling survey in 2008 to determine the spatial distribution of mercury in the floodplain (see the Winter 2007 newsletter issue for more details). Over 1,200 samples were collected along 25 miles of the South River. In general, the Science Team found that the majority of samples collected had low levels of mercury when compared to health-based screening values developed by the U.S. Environmental Protection Agency (USEPA). Higher levels of mercury were measured at a small number of sample locations. Most

of these locations were in forested, agricultural, commercial, or industrial areas. The Science Team has evaluated these sample locations and the apparent property uses. Based on the screening values, the USEPA expects potential risks to humans from soil to be limited to nonexistent at the majority of these locations. This information is summarized in a fact sheet entitled *Summary of South River Floodplain Survey*, which is available at <http://www.southernriverstec.org/publications/fact-sheets/index.html>.



The Science Team used a hand auger to collect floodplain soil samples.

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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: Phase II Ecological Study Begins

Members of the South River Science Team began Phase II of the ecological study of the South River to measure the potential impacts on the environment where mercury enters into the river and areas within the river where methylmercury, the dominant type of mercury in fish tissue, enters the food web. The ecological study was designed in consultation with representatives of the Natural Resources Defense Council to complement ongoing Science Team studies. Phase I of the study was completed in 2008 and characterized the physical, chemical, and biological aspects of the river system (see the

Republic, that are now the focus of the Phase II studies.

Part of the Phase II work scheduled for this year involves collecting and evaluating data to determine the effectiveness of the riverbank stabilization pilot project. (This project was highlighted in the Second Half 2009 issue.) The team will collect samples to evaluate potential changes in the river and floodplain interactions, the mercury methylation environment of nearby sediment, and the riverbank erosion and/or sediment deposition. The data collected will be compared with the data collected before the riverbank was stabilized. Scientists will use this before-and-after look to figure out which design elements worked and which need to be adjusted for potential future pilot projects.

In addition, scientists are collecting samples to determine mercury impacts on ecological receptors, such as aquatic insects and birds. A field microcosm study that replicates the river system is planned so that more realistic exposure environments can be used versus those available at commercial laboratories. These results, along with other results from studies on a wide range of organisms, will be synthesized to assess the potential impacts of environmental stressors on natural resources in the South River. (Details on studies of reptiles, amphibians, birds, and bats are provided in previous newsletter issues.)

Science Team members are also evaluating the diet and mercury content of aquatic invertebrates and fish, the mercury content of their food items, and the movement of mercury through the aquatic food web of the South River. This information will be used to identify the main pathways that aquatic organisms consume mercury and simulate the uptake of mercury by resident fish species, such as bass. Understanding these interactions and potential shifts in these interactions is important when developing management strategies for various remedies to improve the situation.

For more information about the Phase II ecological study, contact Greg Murphy at (215) 367-2500 or gregory_murphy@urscorp.com.



L to R: Scientists catch fish for sampling; a tissue sample is collected using a nonlethal technique; a pit tag is inserted in a fish for tracking purposes; the team works in the river gathering data on collected fish

Spring 2008 issue for more details). Phase II work marks the transition from studying the various aspects of the river system to determining whether the mercury situation in the South River can be improved.

Phase II of the ecological study builds on the information gathered and interpreted during Phase I. Based on Phase I results, the Science Team believes that the erosion of mercury-contaminated soil from riverbanks and the mercury present in the river bed are the primary sources of mercury to the South River. Phase I results were used to identify several areas on the South River, from Waynesboro to Port

From the Team... College Students Get Hands-On Experience

This summer, three James Madison University (JMU) students will be helping the South River Science Team with activities for the Phase II ecological study (see article on page 2) and research associated with the Carolina wren bird study. Both studies will allow students to get experience working with environmental professionals outside of the classroom. All three students will be working under the direction of JMU professor Dr. Tom Benzing.

Students Drew Loso and Matthew Whitacre will be working with the team on the South River to collect samples of periphyton, aquatic insects, sediment, and surface water for stable isotope analysis. As field biologists, Drew and Matthew will be involved with studies to measure the uptake of mercury in crayfish and mayflies. They will also participate in various data collection activities associated with fish community and population studies.

Student Marisa Whitacre will be working with Anne Condon (U.S. Fish and Wildlife Service) and scientists from the Biodiversity Research Institute (BRI) to compare the reproductive success of Carolina wrens in mercury-impacted river sections to unimpacted areas. Anne participated on Science Team projects when she was a student. The current wren study is a more detailed approach to a pilot study that the team conducted last year. Marisa will be checking the wren boxes for active nests and documenting the number of eggs laid, number of hatched eggs, number of young fledged, presence of nest parasites, and predation events. Wrens in some areas will be tracked using radio transmitters, and predators in some areas may be “caught on tape” by motion sensory cameras.

The involvement of college students in Science Team activities is not new. Since its inception in 2000, the Science Team has supported over 60 undergraduate and graduate students in their efforts to gain hands-on, real-world experience in their field



L to R: A crayfish waits to be sampled for mercury; periphyton is scraped off a river rock; a radio transmitter is adjusted on a wren; eggs are found in a wren's nest

of study. Students from JMU, the College of William and Mary, Eastern Mennonite University, University of Delaware, Hampton University, Thomas Nelson Community College, Virginia Tech, Virginia Institute of Marine Science, and Rutgers University have participated. For some students, the experience with the Science Team allowed them to complete their Masters thesis or Ph.D. dissertation. For others, the work has allowed them to develop their skills and parlay their South River experience into a career after graduation. Regardless, student involvement benefits the Science Team, the participating academic institution, and the future environmental professional.

For more information about student participation on the South River Science Team, contact Mike Liberati at Michael.R.Liberati@usa.dupont.com or (302) 999-2891.

Did You Know?

College Celebrates Earth Day with Mercury Expo

The Mercury Global Inquiry Group of the College of William and Mary celebrated the 40th anniversary of Earth Day by hosting an International Mercury Expo called “Mercury: A Hazard Without Borders.” The three-day event was held April 22-25, 2010 in Williamsburg, Virginia and featured exhibits, presentations, and performances highlighting the economic, legal, social, health, and policy issues relating to mercury pollution around the globe. To reinforce the global focus of the event, presenters came from around the world, including Belize, Peru, and Japan. The Expo was a success, with 500 W&M students and faculty and over 300 members of the Williamsburg community attending.



Operating out of a mobile trailer, the Mercurial Roadshow entertained students during the Expo.

Also attending were South River Science Team members, who participated in the Expo after their quarterly meeting on the event’s opening day. Members watched the video “South River Research Goes to China” in which Dan Cristol (W&M) and Mike Newman (Virginia Institute of Marine Studies) presented their research during their 2009 visit to China.

Finally, about 650 middle school students from 10 different area schools enjoyed a one-day field trip during the Expo that included everything from a mercury scavenger hunt to a Mercurial Roadshow theater performance. The Mercurial Roadshow will live up to its name in September when actors travel the state of Virginia teaching students about the biology of mercury and mercury pollution in the environment. The roadshow was created to satisfy specific educational standards of learning for Virginia middle and high school students. If you want the roadshow come to your school, contact Dan Cristol (dacris@wm.edu).

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