Susquehanna River Basin Commission (SRBC)
Water Quality Advisory Committee (WQAC) Meeting Minutes
U.S. Geological Survey (USGS) Office
215 Limekiln Rd
New Cumberland, PA

September 27, 2011
10:00 a.m. – 3:00 p.m.

A. Introduction and Opening Remarks (Dave Heicher, SRBC)

Dave Heicher, SRBC, opened the meeting with introductions (see Participant List in Attachment A). The WQAC usually meets twice each year, in spring and fall.

B. Follow-up from Spring 2011 Meeting: Organization of Water Resource "Grey Literature" for the Susquehanna River Basin (Sarah Whitney, PA Sea Grant and Dave Heicher, SRBC) and Susquehanna Research Consortium (Dave Heicher, SRBC)

Sarah Whitney, PA Sea Grant, and Dave Heicher, SRBC, have been working on an online database for grey literature on the Susquehanna River Basin. The purpose of this site is to create a "one-stop shop" where interested parties can find information, data, and materials about the basin. Grey literature refers to reports, papers, and other documents that are not commercially published (as in books or scientific journals) and are produced by government agencies, universities, or other organizations.

Sarah and Dave looked at the following models of publication databases. the Bibliography of Chesapeake Bay Grey Literature (http://mddnr.chesapeakebay.net/irc/dnr_search_form.cfm), the International Joint Commission Research Inventory (http://ri.ijc.org/), Sea Grant Publication Library (http://nsgd.gso.uri.edu/), and Bucknell University's Marcellus Shale Initiative Publications Database (http://www.bucknell.edu/script/environmentalcenter/marcellus/). Bucknell also has a web site about finding publications that might be useful for consideration: http://www.bucknell.edu/x67061.xml. Contact Dave or Sarah with any additional thoughts or ideas on this issue.

Dave Heicher spoke about the planning and draft framework for a Susquehanna Research Consortium. The mission of this consortium would be to promote applied research to support comprehensive planning and management of water resources in the Susquehanna River Basin. The consortium would be a collaborative partnership benefitting both water resource agencies needing sound scientific data for decision making, and institutions of higher education that provide supporting research. The primary areas of management and research to be supported by the consortium are water supply, water quality, flooding, ecosystems, and the Chesapeake Bay.

Research priorities would be developed collectively with input from all members. SRBC would provide administrative and coordination support, including publication of activities on SRBC's web site. Jim Shortle from Penn State University has been working with Dave to

develop consortium concepts and offered to help identify potential consortium members from various universities.

C. Maryland's Ion Monitoring Program to Inform Potential State Chloride Criterion (Adam Rettig, Maryland Department of the Environment)

Adam Rettig, MDE, gave a presentation on Maryland's Ion Monitoring Plan. Maryland adopted a Stressor ID Program in 2002 to try to identify causes of impairment to stream biology. MDE identified chloride as a stressor, which prompted the start of a Total Maximum Daily Load (TMDL) report. Adam would like input from colleagues in Maryland and committee members.

Elevated chloride levels in Maryland are clearly associated with transportation since higher occurrences of chloride are concentrated along transportation corridors (e.g., Baltimore and D.C. beltways). Elevated levels are also temporally dynamic in that they are present during base flow conditions via groundwater sources in late summer and fall. Inconsistent, extreme levels of chloride enter streams during snow melt events in winter and early spring.

There are established USEPA and MD Stressor ID thresholds. USEPA based its thresholds on lab results, while Maryland took environmental stressors into account. Maryland considered instream field data and determined that 50 mg/L was an appropriate threshold level. The ion matrix, which is a mixture of all ions and metals in surface waters, was not accounted for, so it needs to be considered. This is important because the ion matrix has the ability to ameliorate and/or compound the toxicity of particular ions.

Recognizing that that there are spatial and temporal variabilities, two objectives were proposed. Objective A would be to identify the natural background ion matrix in streams within each ecoregion across Maryland at base flow, and to identify how these background ion matrices affect the toxicity of chloride. Objective B would be to identify the ion matrix in a stream that has been documented as being impaired by chloride, and to identify how that matrix affects the toxicity of the maximum chloride concentration achieved during storm flows.

For Objective A, MDE staff developed field methods for collecting appropriate samples. Streams with a macroinvertebrate (bug) and fish Index of Biological Integrity (IBI) of greater than 3 and greater than 4, respectively, are to be sampled, as well as sites located at bridge crossings. Samples will be taken during base flow seasons, and hydro-lab data and discharge will be measured. A sample size estimate is 400 over the three ecosystems in Maryland: 50 for Coastal Piedmont, 50 for Piedmont, and 300 for Highlands.

For Objective B, staff will coordinate with the TMDL Development Program's sampling effort. The number of samples will be based on the number of storms (hopefully, as many as 10). Ion and metal concentrations in samples will be assessed in a lab. The relationships between chloride and measures of the ion matrix will be applied to historical datasets to identify negative biological responses. Future synoptic sampling could be adapted to incorporate the ion matrix. Sampling for Objective A should be completed by Fall 2011 and Spring 2012 for Objective B.

D. The Pennsylvania Department of Environmental Protection's Triennial Review of Water Quality Standards (Tom Barron, Pennsylvania Department of Environmental Protection)

Tom Barron, PADEP, gave a presentation on PADEP's triennial review of water quality standards. Like all states, Pennsylvania is required by the federal Clean Water Act to review water quality standards once every three years. The latest review, TR08, was approved by the Environmental Quality Board in May 2009, and approved by USEPA in April 2010.

In July 2010, PADEP started updating the parameter list for testing water quality, especially for public water supplies to protect human health. The list included unregulated emerging contaminants, temperature, dissolved oxygen, in addition to the existing parameters of total dissolved solids (TDS), manganese, chloride, sulfate, etc. USEPA and the public will be able to make recommendations, and the final publication date in the PA Bulletin will be May 15, 2013.

PADEP's goal is to revise 12-15 criteria in the existing water quality standards, and to be more consistent, especially with USEPA's Warm Water Fishery (WWF) standards. Some of these criteria include a Chromium 3 update, human health criteria, and aquatic life. PADEP developed about 8-10 criteria for the region based on requirements from industry, especially with the issue of emerging contaminants. Some examples of parameters with criteria are bromide, strontium, and benzochloride.

PADEP wants to improve the public notification process for stream redesignation, specifically for special protection streams. PADEP is waiting for USEPA's feedback on bacteria/recreation use criteria. USEPA is planning on releasing new, updated recreation criteria by 2012. Pennsylvania is currently working on compiling research data and extensively reviewing literature to update the state's nutrient criteria by 2014.

E. New York's Nutrient Criteria Effort (Jeff Myers, New York State Department of Environmental Conservation)

Jeff Myers, NYSDEC, gave a presentation on New York's nutrient criteria effort. The objective is to develop specific numeric criteria to be proposed as guidance values to aid in the interpretation of the Narrative Nutrient Standard: "None in amounts that result in growths of algae, weeds and slimes that will impair the waters for their best usages."

USEPA has been working on national nutrient criteria for over 10 years, but individual states can develop their own. NYSDEC developed a Nutrient Standards Plan, which is available on its web site. The plan details which waterbodies and parameters are being considered. The top 10 causes and sources of impaired and impacted waters are urban stormwater runoff, aging wastewater infrastructure, nutrient eutrophication, atmospheric deposition (acid rain), legacy pollutants, habitat/hydrologic modification, invasive aquatic weeds, pathogens, and inadequate septic systems. However, there are a few issues in dealing with nutrients, which are naturally occurring and ubiquitous, and have acceptable levels that depend on the individual waterbody.

Nutrients are an indicator of impairment, but unlike other parameters, they generally are not toxic. There also is not a lot of funding available to deal with the nutrient issue.

NYSDEC staff is trying to develop nutrient criteria modules with an appropriate range for nutrients. The criteria will affect the assessment and listing process with USEPA, including TMDLs, 303(d) and 305(b) reports. NYSDEC wants to protect recreation in lakes, protect aquatic life in rivers, and protect water supplies in both lakes and reservoirs. These three needs are critical, but NYSDEC also wants to protect recreation in rivers, aquatic life in lakes, and water supplies in rivers. It will be a challenge to phase in reasonable, stringent criteria.

Nutrients are a national issue that has been in the news, so the environmental and regulatory communities are aware of this important issue. Jeff said that the Nutrient Standards Plan is available on the NYSDEC web site. He hopes that the draft criteria will be released in 2012, with final criteria possibly being released in 2013.

F. Lunch

G. Investigating the Sensitivity of US Streamflow and Water Quality to Climate Change: The USEPA Global Change Research Program's "20 Watersheds" Project (Tom Johnson, USEPA, Office of Research and Development, Global Change Research Program)

Tom Johnson, USEPA, gave a presentation on USEPA's 20 Watersheds Study. The USEPA Office of Research and Development (ORD) program has been working with staff from Tetra Tech, Inc., AQUA TERRA Consultants, Texas A&M University, and Stratus Consulting on this project.

Annual temperatures in the U.S. have risen approximately 1.79°F per century from 1901-2006. Annual precipitation has risen 8.26 percent per century during the same time period. Climate change can have an effect on streamflow, water quality, infrastructure, and ecosystems. Planning for climate change can be somewhat unpredictable because we do not have accurate, multi-decadal forecasts at local to regional spatial scales. However, simulation models (e.g., climate, hydrology) are excellent tools for understanding system behavior and can be used to explore the implications of alternative futures, actions, and policies on management and regulatory goals. These models can help identify vulnerabilities and guide development of strategies for reducing risk.

The goal of the 20 Watershed Modeling Project is to assess the sensitivity of U.S. streamflow, nutrients (primarily nitrogen and phosphorus), and sediment loading to climate change. There are potential interactions of climate change with increasing urbanization in these watersheds. There are 20 study sites in this project, with five of those sites being part of the pilot project. The Susquehanna River Basin is a pilot site. USEPA is using daily simulations of streamflow, nitrogen, phosphorus, and sediment for historical (1970-2000) and future (2040-2070) periods in their modeling approach.

USEPA is using two watershed models (HSPF and SWAT) in the five pilot watersheds. The models simulate the effects of climate change and land use change. There are 14 climate change scenarios and two land use scenarios. Sensitivity studies will assess influence of different methods of downscaling. One watershed model, SWAT, is being used in the 15 non-pilot watersheds. There are six climate change scenarios and two land use scenarios in these watersheds. The North American Regional Climate Change Assessment Program (NARCCAP) has information on climate change scenarios on its web site (http://www.narccap.ucar.edu/).

Responding to climate change is a challenge due to scale, complexity, and inherent uncertainty. Climate change will occur over time along with significant, short-term variability; no single event will signal the arrival of climate change. Although subject to uncertainty, we know enough to start identifying the range of potential impacts, and where necessary, start developing strategies for managing risk. Simulated sensitivity to climate change varies with different endpoints; some scenarios result in reduced flow and increased loading. Different approaches for developing climate change scenarios can increase the variability of simulated watershed response to climate change (e.g., downscaling, change factors).

H. Long-Term Water Quality Monitoring Sites in the Susquehanna River Basin (Katie Foreman, USEPA, Chesapeake Bay Program)

Katie Foreman, USEPA, gave a presentation on long-term water quality monitoring sites in the Susquehanna River Basin. The Chesapeake Bay Program's (CBP's) Nontidal Water Quality Monitoring Network has 88 sites in Maryland, Virginia, West Virginia, Pennsylvania, New York, and Delaware. It is a cooperative effort including SRBC and USGS to establish consistent sampling and analytical methods across the Chesapeake Bay Watershed. Staff reports on trends, loads, and streamflow, and calibrates watershed models. CBP communicates findings to the scientific and management communities and the public on an annual basis.

CBP is making enhancements to its monitoring program based on recommendations from the Scientific and Technical Committee (STAC) Monitoring Realignment Action Team in 2009 and recent findings of the National Academy of Scientists' (NAS) report from 2011. The STAC team found that smaller watersheds need more monitoring, especially those in the coastal plain, as well as those in urban and agricultural settings. NAS recommended additional monitoring in targeted, smaller watersheds with urban and agricultural influences. At the moment, most of the monitoring sites are in large, forested watersheds, with some in agriculture and very few in urban settings. Increasing monitoring in agricultural, urban, and suburban areas will help track progress towards meeting the Bay TMDL. Enhanced monitoring in watersheds with increased Best Management Practice (BMP) implementation will help document water quality improvements. Increased monitoring in the coastal plain and small watersheds will also cover existing gaps in the CBP watershed model, which will enhance the 2017 TMDL re-evaluation.

CBP worked with the Nontidal Workgroup to develop 35 new sites and five upgraded sites, with a total of 120 sites by the end of 2012. In 2010, the shared cost of the network was $3.7M, and the additional sites will be supported by an additional $2M of USEPA funds provided to the jurisdictions. In 2011, the focus will be on smaller urban and agricultural

watersheds. In 2012, the focus will be on small/medium agricultural and urban watersheds in order to fill spatial gaps.

Funding for the Susquehanna River Basin will be around $2.5M per year. The network is funded by multiple partners, with CBP funding about a quarter of it. USGS also funds about a quarter of the network, with the rest of the funds coming from grants and local areas, especially for the stream gages. The network is vulnerable to budget shortfalls, so a multi-agency commitment to maintain the network is necessary.

There are currently 30 sites in the Susquehanna River Basin. These sites are monitored by SRBC, USGS, PADEP, and Maryland Department of Natural Resources (MDNR) for monthly and storm sampling of nutrients, sediment, and stream flow. In addition to these 30 sites, there will be 11 new sites in the basin in 2011-2012: seven new gages, five sites with BMP implementation, eight sites in agricultural areas, two in urban areas, and 3 in small watersheds. Future plans for the network include maintaining current network funding at the FY-2012 level ($5.3M/year) and incorporating additional non-traditional partner data into the network to improve the spatial scale of monitoring and local involvement in the watershed-wide network.

Analytical products derived from network data include long-term, flow-adjusted concentration trends in total nitrogen, total phosphorus, and suspended sediment from 1985 to 2009. Overall, reductions in total nitrogen and total phosphorus levels have improved water quality at the majority of sites, while a few other sites have had no significant trends or degrading water quality. Suspended sediment has also improved, although quite a few sites had no trend detected and a few had degrading water quality. Relative conditions and short-term trends can also be calculated over a five-year median. Maps and data are available on the Chesapeake*Stat* web site (http://stat.chesapeakebay.net/).

I. East Conewago Showcase Watershed Project (Michael Langland, USGS)

Michael Langland, USGS, gave a presentation on the East Conewago showcase watershed project. This project is part of the CBP nontidal water quality monitoring network. USGS cooperated with USDA/NRCS, USEPA, PADEP, conservation districts, Penn State University, Millersville University, Elizabethtown College, and Tri-County Conewago Conservation Association (TCCCA) on this project. Many studies collect data for characterization of water quality patterns; however, few studies are able to relate BMP implementation and land use change to water quality because of the high cost and length of time needed to monitor projects to document improvements.

The objective of a small watershed study is to describe responses in water quality within small watersheds and relate those changes to watershed processes, BMP implementation, and other watershed changes. USGS and its partners are currently monitoring five small watersheds: three agricultural and two suburban. The three agricultural watersheds are Conewago Creek, PA, Smith Creek, VA, and Upper Chester River, MD. The suburban watersheds are Difficult Run in Fairfax County, VA, and Montgomery County, MD.

Each small watershed study has unique potential study designs: before and after implementation (pre-post), nested watersheds (upstream-downstream), and paired watersheds (most costly). Concerns include maintaining the budget for the five sites and avoiding spreading staff too thin. Core monitoring at multiple sites would detect changes in water quality. Monitoring stations will include a stream gage, autosampler, routine sampling, and continuous water quality monitoring (turbidity, DO, specific conductance, pH, and temperature). Seasonal synoptic water quality sampling will be used to quantify base flow nitrate contributions. Ecological health monitoring is also a concern. USGS will rely on its partners (USDA/NRCS) to help with BMP implementation tracking, changes in watershed sources, and land use change analysis.

To interpret the effects of the conservation practices on nutrient discharges, watershed monitoring alone is not sufficient. It will be necessary to collect detailed data on the practices and other agricultural activities that affect nutrient discharges, including the following: areas, spatial distribution, and types of agricultural lands; fertilizer application rates; livestock populations; and the locations of riparian buffers and wetlands. Study designs will be geared to identify the sources, sinks, and transport processes within each watershed. The ultimate goal is to find out how the watersheds change in relation to management actions in the short- and long-term.

The Conewago Creek Watershed is a 54-square-mile watershed, with 53 percent in agricultural land use. It is in Dauphin, Lancaster, and Lebanon counties. The Conewago was selected as one of three "showcase watersheds" by USDA, NRCS, USGS, and USEPA. There is a strong partnership between USGS, NRCS, conservation districts, universities, and volunteer groups. The partners wish to implement targeted BMPs and long-term water quality monitoring.

The Conewago has about 40 percent impaired streams with excess nutrient and sediment loads from agriculture. The majority of pastured stream corridors have free livestock access, and there is streambank erosion with few riparian buffers. Some recommended practices have been started, but the partners would like to see more of the following BMPs: riparian buffers, stream access control, alternative or instream watering facilities, streambank stabilization, conservation plans, cover crops, and waste management. USGS proposes water quality sampling for resultant changes. Currently, TCCCA, Dauphin County Conservation District, PADEP, and USGS are sampling water quality at various points and will be compiling data.

J. Proposed Enhancements to SRBC's Lower Susquehanna Subbasin, Large River, and Interstate Streams Programs (SRBC Staff)

Andy Gavin, Ellyn Campbell, and Tyler Shenk from SRBC's Monitoring and Protection Program shared information relating to proposed enhancements to SRBC's Lower Susquehanna Subbasin, Large River, and Interstate Streams Programs. The Interstate program includes over 50 sites along the PA/NY and PA/MD borders that have been monitored for over 20 years. Fish, macroinvertebrates, habitat, and field and lab water quality sampling parameters are measured every year. In addition, staff is incorporating gas industry-related parameters such as strontium, lithium, barium, TDS, and bromide to the sampling rounds. Some water quality and fish

sampling will be shifted to alternating years in order to balance funding and work efforts. SRBC is currently working on a web portal for customized access for the public.

The Lower Susquehanna Subbasin will be studied in 2011-2013. The Year-1 study will involve data collection of macroinvertebrates, habitat, and water quality data for field and lab water quality analyses in 2011. Approximately 100 sites were sampled in spring and summer for the subbasin, but Hurricane Irene and Tropical Storm Lee hindered sampling in August. Basic analysis of the data will be consistent with past Year-1 studies. SRBC will use the upcoming PADEP IBI (watershed-size dependent) to enhance the Lower Year-1 analysis. The IBI will also be used to analyze historical Year-1 datasets and look for basinwide trends and patterns. Staff will also attempt to develop and test a biological stressor identification model with historical Year-1 datasets. The Year-2 study will focus on the Lower Susquehanna mainstem as a single hydrologic system, with specific focus on large rivers and pool regimes. Sampling is expected to occur in 2012. SRBC is still brainstorming and is open to suggestions on this project. Staff will meet internally to identify potential interests and needs, and externally with resource agencies in order to enhance other proposed projects within the subbasin. The Year-2 study will also complement the Large River Assessment Project.

SRBC is revisiting protocols for its Large River Assessment program. There are currently 25 sites: 22 on the mainstem and north branch and one at the mouth of each of the Chemung, West Branch, and Juniata Rivers. Some sites will be shifted to encompass more of the large tributaries. Some sites will be aligned with SRBC's Early Warning System for continuous monitoring of field parameters. Staff will continue to use the existing protocols for macroinvertebrate collection. SRBC is currently in the pilot stage of implementing electrofishing at five to seven sites and is planning to expand the fish sites by alternate testing every other year. Staff may add other methods of testing such as seine fishing and/or electric trawling. SRBC currently samples 26 water chemistry parameters ranging from nutrients to metals, and is in the process of revisiting parameters for all projects with a possible regional approach.

K. Open Discussion

L. Adjourned

The meeting was adjourned at approximately 3:00 p.m.

Attachment A

Participant List

Name	Organization
Ballaron, Paula	SRBC
Barron, Thomas	PADEP
Campbell, Ellyn	SRBC
Campbell, Harry	Chesapeake Bay Foundation
Cook, Scott (via webinar)	NYSDEC
Foreman, Katie	USEPA Ches. Bay Program
Fox, Tim	MDE
Gavin, Andrew	SRBC
Grisé, Sara	PA Sea Grant
Heicher, Dave	SRBC
Helfrich, Michael	Susq. Riverkeeper/Stewards of the Lower Susq.
Hoffmann, Michael (via webinar)	USEPA
Hollier, Hilary	SRBC
Karns, Josh	PA Environmental Council
Koch, Ryan	USDA-NRCS
Myers, Jeff (via webinar)	NYSDEC
Rettig, Adam	MDE
Sachs, Herb (via webinar)	MDE
Schreffler, Curtis	USGS
Shaw, Tony	PADEP
Shenk, Tyler	SRBC
Smith, Geoff	PA Fish & Boat Commission
Spontak, Jim	PADEP
Sowers, Angie (via webinar)	USACE
Swartz, Paul	SRBC
Whitney, Sarah	PA Sea Grant