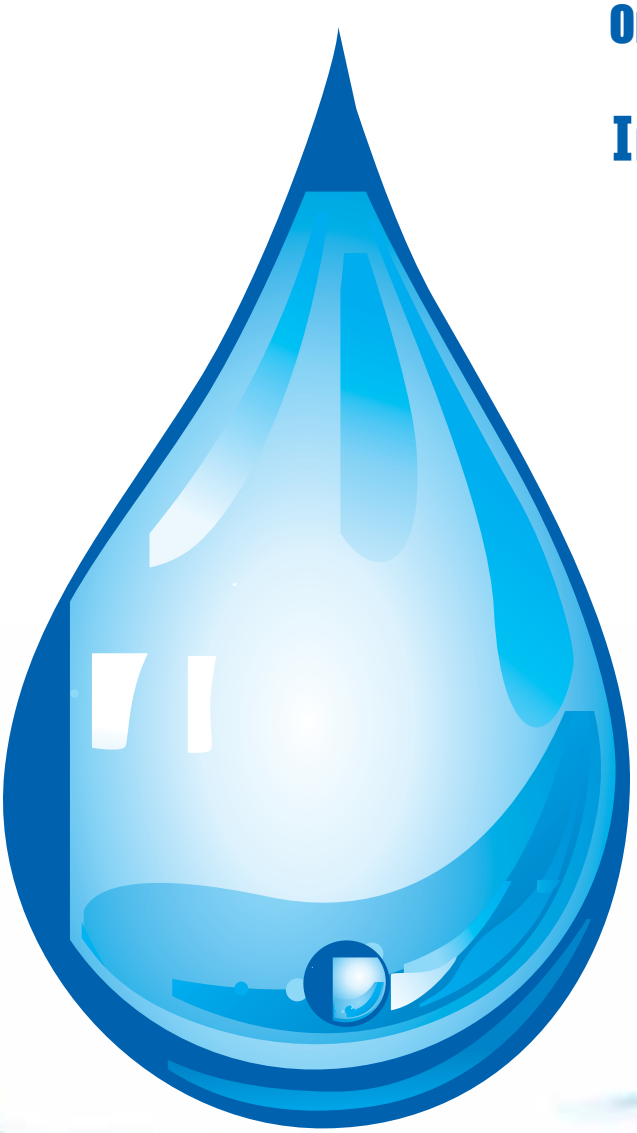
AMERICAN WATER RESOURCES ASSOCIATION

Community, Conversation, Connections

In the Flow

Online newsletter of the PA-AWRA



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In the Flow
Spring 2016

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Did you remember to renew your membership?

PRESIDENT'S MESSAGE

One of the more interesting – and challenging – aspects of water resources management is that the scope and reach of the issues are always changing. New water use demands arise and old demands fade away. Federal and state requirements and standards are updated and expanded. Even the priorities expressed by society for water infrastructure, protection, and allocation priorities shift over time. Pennsylvania's history documents the role and importance of water to our society – rivers and canals charted the course of settlement, while their waters first powered mills and later power plants. Our water quality has been impacted by timber and mineral extraction activities, industrial discharges, and stormwater runoff. Towns and industries rely on sustainable and secure water supplies, but droughts and floods threaten economic activity and inspire us to strive towards resiliency.

With water issues frequently intertwining quality and quantity, biology and chemistry, groundwater and surface water, and engineering and policy, it is few resource management efforts that don't involve interdisciplinary teams. AWRA strives to bring those parties together to foster communication and the sharing of experiences, lessons learned, and technological advances. In the face of economic constraints, water resource managers must recognize and seize opportunities to accomplish multiple objectives with limited resources. For that reason, it is critical that we promote discussions of the emerging issues, the connections between different aspects of water management, and the knowledge gained through coordinated initiatives. We are looking to extend those connections in 2016 by partnering with neighboring AWRA sections to co-host a Mid-Atlantic conference in Delaware later this year. I hope you'll consider joining us in Delaware and for other compelling conversations throughout the year.

Andrew Dehoff

DELAWARE RIVER BASIN REPORT
Submitted by R. Scott Hughes
Basin Director, PA-AWRA, Delaware Basin

Basin Updates

Delaware River Basin Commission Updates

The Delaware River Basin Commission (DRBC) held four (4) meetings in 2015. Some of the highlights included:

- Adoption of the DRBC Water Resources Program FY 2015 – 2017. It discusses general conditions in the basin and establishes the proposed work program for those three years as it relates to water supply sustainability and quality protection, waterway corridor management, integrated water resource management, institutional coordination and cooperation, and education and outreach. It also touches on emerging issues facing the basin and includes a special section on natural gas development.
- In October, the DRBC announced it would change the format of its normal two consecutive day hearing/meeting on a trial basis. The public hearing on draft project dockets and applicable resolutions will now be held about one month earlier than the business meeting. This will allow DRBC staff more time to address and respond to comments received at the public hearing before the commissioners take action at the business meeting. The plan is to see how this new format works over the course of several meetings before a permanent change is made. The first trial run (public hearing on November 11 and business meeting on December 9) was apparently well received.
- In December, DRBC approved its One Process/ One Permit Rulemaking to allow for greater administrative efficiencies between the DRBC and the regulatory agencies of the four basin states when permitting projects. The hope is that this will lead to greater interagency coordination and more timely review and approval of projects while achieving the same or more protective environmental outcomes. The regulated community is supportive of efforts to streamline permitting activity and avoid confusion and duplication during the process. The new process initially only applies to New Jersey projects as the administrative agreement between DRBC and New Jersey Department of Environmental Protection allows for its use. Hopefully the new process is effective and successful, which will lead to the other signatory states amending their administrative agreements with DRBC.

Updates *continued on page 4*

About the DRBC

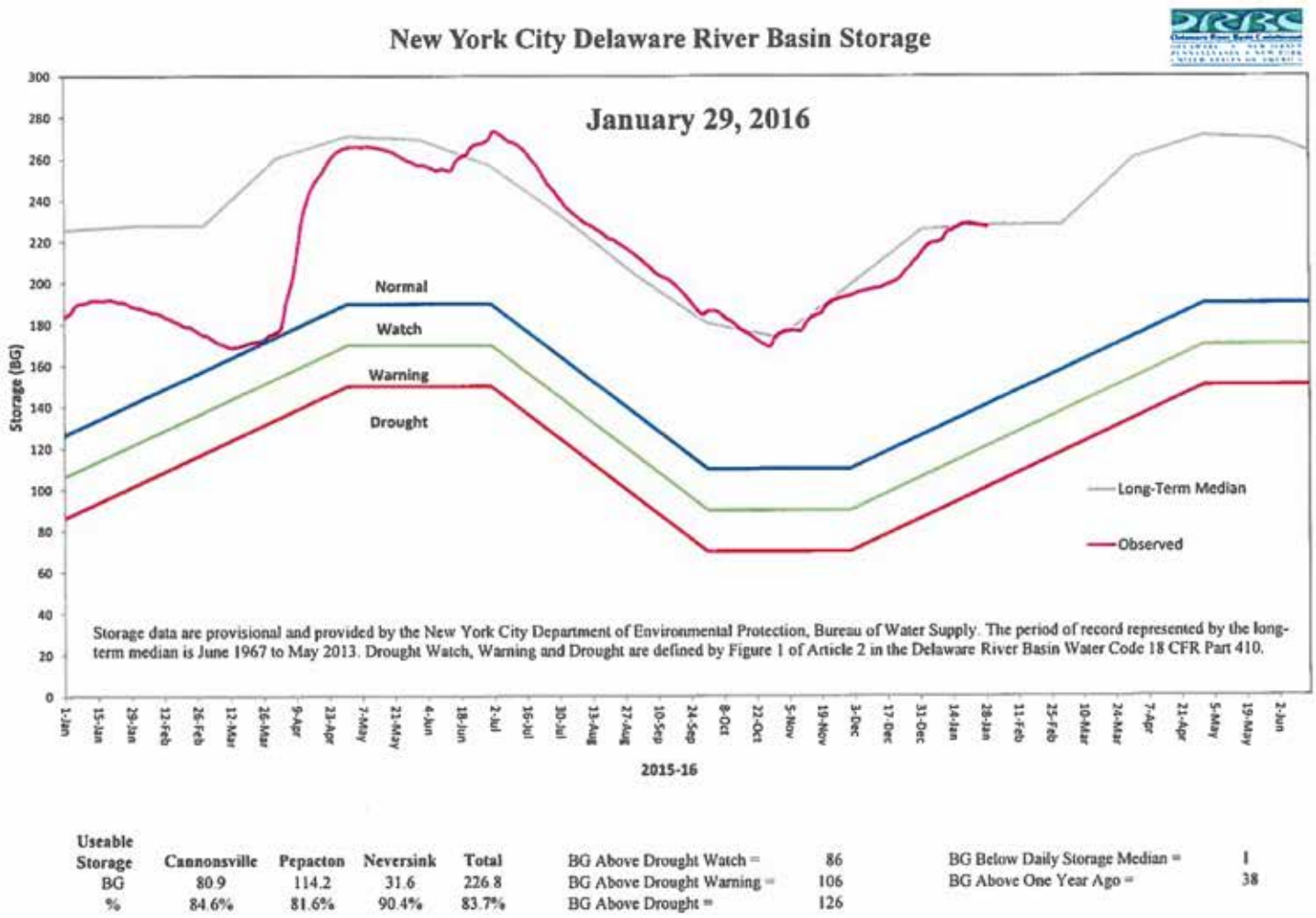
A breakthrough in water resources management occurred in 1961 when President Kennedy and the governors of Delaware, New Jersey, Pennsylvania, and New York for the first time signed concurrent compact legislation into law creating a regional body with the force of law to oversee a unified approach to managing a river system without regard to political boundaries.

The members of this regional body - the Delaware River Basin Commission (DRBC) - include the four basin state governors and the Division Engineer, North Atlantic Division, U.S. Army Corps of Engineers, who serves as the federal representative.

When the DRBC was created, some 43 state agencies, 14 interstate agencies, and 19 federal agencies exercised a multiplicity of splintered powers and duties within the watershed, which stretches 330 miles from the Delaware River's headwaters near Hancock, N. Y., to the mouth of the Delaware Bay.

The Compact's signing marked the first time since the nation's birth that the federal government and a group of states joined together as equal partners in a river basin planning, development, and regulatory agency.

For more information visit http://www.nj.gov/drbc/about/ online.



For the most up to date data please visit http://www.nj.gov/drbc/hydrological/reservoirs/nyc/ online.

Updates *continued from page 3*

- Also in December, DRBC issued its report titled "Water Resources Plan for the Delaware River Basin – FY 2015 Achievements". The report focuses on the various programs and projects that have helped DRBC and its partners achieve Plan goals by Key Result Area (KRA), and highlights many of the initiatives and projects underway to restore and conserve the water resources of the basin; the report can be accessed at http://www.state.nj.us/drbc/library/documents/BasinPlan-ProgressFY2015.pdf online.

Delaware River Basin Commission Updates

In 2015, from a hydrologic standpoint, the Delaware River Basin, based on flow and storage data through December, is generally in decent shape. Flows in December are slightly below normal in the river and its major tributaries, and New York City Delaware River Basin Storage is currently 7percent below normal. However, flows have not been critically low, and overall 2015 flows are considered to be average to above average.

Likewise, the observed actual NYC storage has been tracking very close to normal (slightly above or slightly below) since April of 2015 (see January 29, 2016 NYC Storage graph on page 4). Drought is not currently a concern in the Delaware Basin, and major, wide-spread flooding has not been a concern recently either. Reports of near normal flows and storage capacity is always a good thing.

Delaware River Basin Commission

DELAWARE RIVER SOJOURN
June 18-25, 2016

FIND YOUR RIVER: CELEBRATING 100 YEARS OF THE NATIONAL PARK SERVICE

The Delaware River Sojourn gives people of all ages and experience levels a chance to have a truly "hands-on" river adventure. Each day includes a guided paddle, camping, meals, educational programming, and camaraderie. Join us for the entire event or the day(s) of your choice!

www.delawareriversojourn.org

FIND YOUR PARK

2016 National Park Service CENTENNIAL

2016 Stretches to be Paddled:

- Saturday, June 18: Skinners Falls, N.Y. to Ten Mile River, N.Y.
- Sunday, June 19: Zane Grey Museum, Pa. to Landers' Pond Eddy Base
- Monday, June 20: Worthington State Forest, N.J. to Driftstone on the Delaware, Pa.
- Tuesday, June 21: Driftstone on the Delaware to Martins Creek, Pa.
- Wednesday, June 22: Tinicum Park, Pa. to Lambertville, N.J.
- Thursday, June 23: Belle Mountain/Fireman's Eddy, N.J. to Yardley, Pa.
- Friday, June 24: Florence, N.J. to Burlington Island, N.J., and back to Florence with the tide
- Saturday, June 25: Morrisville, Pa. to Quaker Penn Park, Pa.

Registration Fees Include:

Guided Paddle, Kayak Rental, Shuttle/Livery Transport, Campsites, Catered Meals

MEMBERS FORUM

The Delaware River: Wild, Scenic ... and Managed

Submitted by Steve Tambini, DRBC Executive Director and
Amy Shallcross, P.E., DRBC Operations Section Supervisor

The Delaware River has no reservoirs or dams on its main stem (See map on next page). Water flows freely from the headwaters to the estuary. Approximately half of the river miles on the main stem are designated as part of the National Wild and Scenic Rivers System, which preserves certain rivers or sections of rivers in a free-flowing condition.

The flow in the Delaware River is somewhat managed by flow management policies and dams located on upstream tributaries. The dams and resulting reservoirs store water for multiple purposes such as flood damage reduction, water supply, recreation, and hydropower. Combined, these reservoirs control roughly 21 percent of the drainage area above the head of tide at Trenton, N.J.

Reservoir releases support ecological systems and reduce locally high in-stream temperatures. They can be made to maintain a constant reservoir elevation (normal pool), support recreation, or create flood storage. During low flow periods, reservoir operators make minimum releases to meet flow objectives at Trenton and Montague, N.J., which ensure a specific amount of freshwater flows downstream to the estuary.

The flow objective at Trenton ranges from 2,500 cfs to 3,000 cfs, depending upon reservoir storages, season, and salinity in the estuary. Prior to the establishment of the flow objective in the 1980s, the minimum recorded daily flow at Trenton was 1,240 cfs. By increasing freshwater flows, the reservoirs and flow objectives have improved the river basin's drought resilience.

The flow objective at Montague ranges from 1,100 cfs to 1,750 cfs and is met by releases from three N.Y. reservoirs. Cannonsville, located on the Delaware's West Branch, is the reservoir that is typically used to do so. Releases are also made from Neversink and Pepacton reservoirs. Releases from Lake Wallenpaupack and the Mongaup System, used to generate hydropower, may reduce the amount of water that is needed from the other reservoirs to meet the Montague objective.

In Pennsylvania, there are five reservoirs, operated by the United States Army Corp of Engineers (USACE), specifically constructed for flood damage reduction. Jadwin and Prompton are located in Northeast Pennsylvania and have uncontrolled outlets. During high flow events, water is stored because inflows to the reservoirs exceed the capacity of their outlet works. The other three USACE reservoirs are F.E. Walter and Beltzville in the Lehigh Basin and Blue Marsh in the Schuylkill Basin (downstream from Trenton). F.E. Walter is used for flood damage reduction and recreation releases (white water). Beltzville and Blue Marsh are used to increase freshwater flows into the estuary during dry periods and for water supply. When these reservoirs are full, releases are made to maintain the normal pool elevation. With the exception of refilling when below the normal pool elevation, releases will be nearly equal to the reservoirs' inflow.

Some water within the basin is controlled by reservoirs and flow management programs. However, much of the Delaware River's drainage area is uncontrolled. During low and high flow events, the reservoirs and flow management programs result in beneficial outcomes, particularly drought resiliency and flood damage reduction. The development of these reservoirs in tributary basins has allowed the Delaware River to remain the longest undammed river in the eastern U.S.


Delaware River Basin
Cannonsville Reservoir
Pepacton Reservoir
Neversink Reservoir
Jadwin Dam
Prompton Dam
Mongaup System
Lake Wallenpaupack
F. E. Walter Reservoir
Beltzville Reservoir
Merrill Creek Reservoir
Blue Marsh Reservoir
Nockamixon Reservoir
Marsh Creek Reservoir
New York
Pennsylvania
New Jersey
Maryland
Delaware
Chesapeake Bay
Delaware Bay
Atlantic Ocean
N
0 10 20
Miles
Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA
WWW.DRBC.NET

OHIO RIVER BASIN REPORT
Submitted by the Western Pennsylvania Conservancy

Recent Water Resource Efforts in the Ohio River Basin

Clarion River Mussel Reintroduction

The Pennsylvania Fish and Boat Commission (PFBC), U.S. Forest Service (USFS), and the Western Pennsylvania Conservancy (WPC) partnered on a pilot study with the purpose of determining whether common freshwater mussels could be restored to the Clarion River. Until recently there were no historical records of the Clarion River's mussel fauna. Dr. Arnold Ortmann, a preeminent scientist and curator at the Carnegie Museum during the early 1900s wrote off the possibility of the Clarion River having any living mussels in it because it ran "black as ink." More recent efforts by USFS, WPC, and Chuck Williams (Williams Ecological Inc.) revealed the presence of at least two living species – the wavy-rayed lampmussel (*Lampsilis fasciola*) and creeper (*Strophitus undulatus*) - along with relic shell evidence of a common Allegheny River species, the mucket (*Actinonaias ligamentina*).

Wavy-rayed lampmussels

In September 2015, more than 300 common mussels representing eight species were collected from the Allegheny River Hunter Station Bridge (PA Route 62) replacement site. These mussels were fitted with small Passive Integrated Transponder (PIT) tags and stocked at ten Clarion River locations within the Allegheny National Forest where colonizing mussels had been previously observed. Seven new species were added to the river after careful consideration of the mussel faunas of comparable streams in close proximity or with similar geological characteristics (e.g., Tionesta, Little Mahoning, and Allegheny River). The partners will monitor the survival of these common mussels in 2016 and these data will be used to determine whether additional mussels can be relocated to the Clarion River.

Wetland Program Development in Support of Pennsylvania's Aquatic Resource Protection and Management Action Plan

Beginning in late 2012, the WPC began a project to examine the patterns of vegetation associated with high quality headwater streams in selected watersheds across Pennsylvania. In the past, much of the riparian vegetation work done by WPC ecologists and botanists focused on plant communities associated with larger river systems like the Allegheny, Delaware, and Susquehanna Rivers. This current project provides the opportunity to expand our understanding of the vegetation composition along smaller streams in Pennsylvania and develop profiles for headwater aquatic resources, a designated focus area of Pennsylvania's Aquatic Resource Protection and Management Action Plan.

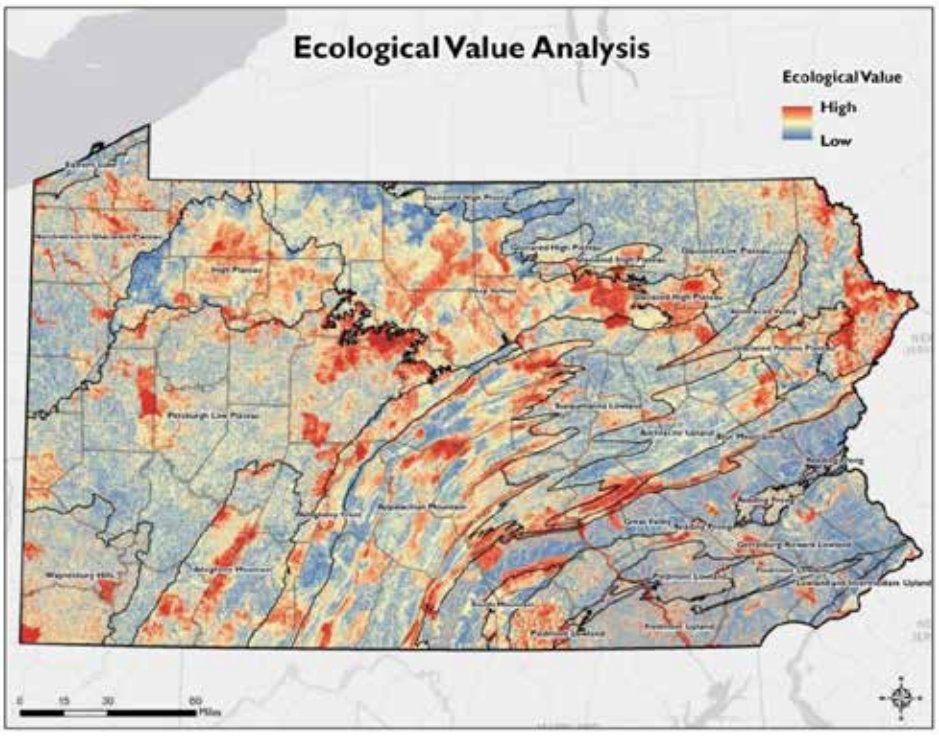
Headwater setting

Six HUC10 watersheds were selected across Pennsylvania that contained high quality, first and second order streams on mostly public lands. Three of the watersheds sampled, Tionesta Creek, Raccoon Creek, and Youghiogheny River, are located within the Ohio River basin. A combination of field methods were used to assess the vegetation associated with each focal stream reach. Temporary transects

Typical vegetation sampling plot

were established perpendicular to the stream and across the entire floodplain to document stream channel and floodplain characteristics. Vegetation plots were also established to quantify the vegetation associated with the floodplain and surrounding upland area. During the field seasons of 2013 – 2015, a total of 47 streams were assessed.

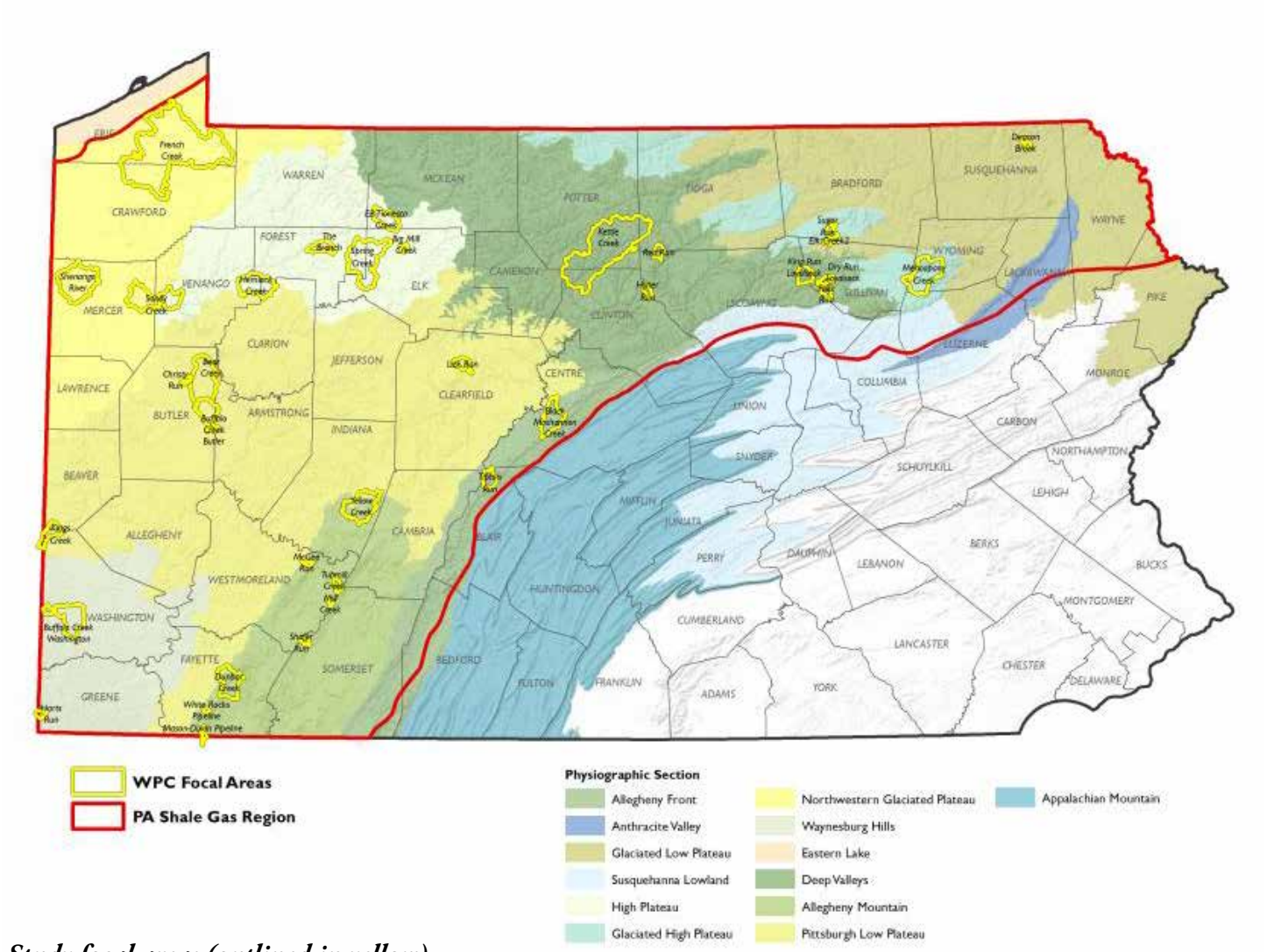
WPC ecologists are now in the data analyses and interpretation phase of the project. The data will be used to help define the characteristics of plant communities associated with headwater streams, examine the similarities and differences of headwater streams across the areas sampled, and develop ecological profiles for headwater streams in the state. Results from this project will provide reference information that the Pennsylvania Department of Environmental Protection (DEP) can incorporate in their mitigation strategies for headwater streams. This data will also be used to further expand the Terrestrial and Palustrine Plant Communities of Pennsylvania, a component of the Commonwealth's Natural Diversity Inventory.



Areas of high conservation value are shown in orange and red

Energy Impacts Status Assessment and Monitoring

In 2013, Western Pennsylvania Conservancy (WPC) initiated an ecological assessment of areas of high conservation value that would likely be impacted by activities associated with natural gas development and production. These "unconventional" resources are thought to provide considerable economic benefit to the region; however the scale of the development, water resources needed, and the amount of waste produced pose substantial challenges to our ecosystems. Aquatic ecosystems are potentially threatened by water withdrawal, erosion and sedimentation, and potential inputs of salts, heavy metals, and chemicals associated with the hydraulic fracturing process and flowback and produced waters coming from deep in the shale formation. Just over 60 percent of the 85,623 miles of streams in Pennsylvania are within the shale gas region.



Study focal areas (outlined in yellow)

Nearly 63 percent of streams designated as High Quality and 64 percent of streams designated as Exceptional Value are found within the shale gas region. Most striking of these statistics, nearly 90 percent of streams classified by the Pennsylvania Fish and Boat Commission (PFBC) as "wilderness trout streams" in Pennsylvania are found within the shale region.

WPC conducted a two-year baseline assessment of target sites within 35 high value ecological areas, referred to as "focal areas," situated across the shale region of Pennsylvania. The 35 focal areas were selected because of their ecological value, the quality of aquatic and terrestrial resources within, and potential threat from development of shale gas resources. The primary targets of our assessment and monitoring efforts were Landscape and Fragmentation, Water, Forests, Rock Outcrops, and Rare and Important Species. The water-related effort and results are summarized below.

- Water quality was assessed at 51 sites quarterly using chemical and biological indicators of site condition and visual assessments for habitat quality. The majority of sites were located on headwater and second order streams.
- In addition to shale gas development, issues that can affect water quality include faulty septic systems, poorly maintained dirt and gravel roads, improper agricultural practices (leading to sedimentation and nitrification of streams), and historic activities such as coal mining, shallow gas extraction, and industrial activity.
- Average reach scores for the habitat assessments completed at each of the water quality monitoring sites indicated that the riparian and aquatic habitats were somewhat already impacted across all sites; scores

ranged between "optimal" and "sub-optimal" for all sites indicating that even the best sites in Pennsylvania are less than pristine.

- Analysis of macroinvertebrate data indicates that organic pollution is generally low across monitoring sites with few exceptions. Most sites ranked "very good" or "good" and two sites ranked "excellent." Five sites were ranked "fair." The sites that ranked "fair" with regards to macroinvertebrate communities also had habitat assessment scores in the sub-optimal range
- Water quality analysis activities provide a baseline to assess future impacts. Analysis of the baseline data suggests that there are minimal impacts to surface water quality that can be attributed to shale gas development at most sites. We expected this as water quality was assessed prior to development in most focal areas. The pH of streams in this survey ranged from 4.3 to 9.4, conductivity was between 16.7 to 772.9 µS/cm, and water temperature varied from 0.0 and 26.2 degrees Celsius.
- Conductivity levels varied across all sites; this was expected due to the variation in the physiographic sections and possible changes in underlying geologic formations.
- We obtained baseline information and assessed potential pollution from shale gas by looking at specific chemicals associated with development impacts. Barium and strontium are two of these elements that are often associated with pollution events from unconventional gas development. These elements occur naturally at higher concentrations in the Marcellus and Utica Shale formations, but at lower levels in surficial geology and surface waters, and thus are considered potential indicators of pollution. We found that focal areas with shale gas development had significantly higher concentration of barium than in focal areas without shale gas development. Strontium was also higher, on average, in focal areas with shale gas development; however results were not statistically significant. While these elements are associated with shale gas development, pollution effects from other heavy industries and coal mining could also contribute to higher levels in surface waters of the Commonwealth of Pennsylvania.

Our water quality analyses indicated that most of our sites were of high ecological quality, as most have yet to be impacted by effects of shale gas development. While the intent of the project was to obtain baseline data prior to intense shale gas development, some sites were impacted leading up to and over the course of our study. We found correlations between shale gas drilling activities and certain chemicals associated with shale gas development pollution in surface waters. We must continue to look for historic water quality data for our focal areas to determine if current levels of salts and elements associated with shale gas development have changed since drilling took place. Pre-drilling baselines for chemicals such as barium, strontium, and chloride would be very valuable in assessing impacts from current drilling activities. Coal mining and other industrial activities were common to many watersheds of Western Pennsylvania and this may have influenced the amount of barium and strontium detected in the water. Winter road maintenance and agriculture often contribute to high chloride levels and total dissolved solids (TDS).

For the full report and recommendations, please visit the WPC website or contact us at info@paconserve.org.

SUSQUEHANNA RIVER BASIN REPORT
Submitted by Nate Merkel,
Basin Director, PA-AWRA, Susquehanna Basin

"Acid Mine Drainage"

Pennsylvania has been blessed through geologic time with the deposition of organic material that has been heated, compressed, and solidified to what we know today as coal. Coal mining runs deep in Pennsylvania's heritage and will continue for some time to come.

Along with coal mining, especially strip mining, if improperly abandoned, comes the potential hazard of acid mine drainage (AMD). AMD is not limited to coal mining, it can be associated with construction sites, roadways, copper mining, or any place where the earth has been disturbed and exposed to high concentrations of sulfide minerals. During the construction and completion of Interstate Highway 99 (I-99) near State College, Pennsylvania, AMD became a large hindrance to the project. This acid rock drainage occurred when pyritic rock was unearthed during the road building process and was later used as back fill in the I-99 construction project.

AMD occurs when the oxidation of metal sulfides occurs. This is most common when rock containing pyrite, which is an iron-sulfide, is exposed to air and water. When this occurs it creates a chemical reaction that produces an acidic discharge with a pH generally less than 4.5. The U.S. Environmental Protection Agency estimated in 1995 that nearly 3,107 miles of streams in the Northern Appalachian region have been impacted by some form of AMD. In 1990, United States coal companies spent more than $1 million dollars a day on active treatment for AMD.

When the reaction occurs in the system that produces AMD, the temperatures can reach as high as 117ºF (47ºC). The pH of the water within that system can be lower than -3.6; the negative pH is possible because water evaporates from already acidic pools thereby increasing the concentration of hydrogen ions.

When the pH of the AMD is raised above a pH of 3, which can occur when the fluid comes in contact with fresh water, precipitation of the iron minerals occurs. This precipitation is iron (III) hydroxide which clings to the rocks in the stream or water body. This precipitation gives the stream an orange rust color, which is known as a yellow boy stream. Once this precipitation of iron (III) hydroxide occurs it tends to smother out all aquatic life and disrupts the water bodies' aquatic ecosystem.

There are several different treatment methods for AMD. A few treatments options are lime neutralization, carbonate neutralization, and construction of wetlands. Lime neutralization

Photo next page: Road construction for Interstate Highway 99 (I–99) exposed pyrite and associated Zn-Pb sulfide minerals beneath a >10-m thick gossan to oxidative weathering along a 40-60-m deep roadcut through a 270-m long section of the Ordovician Bald Eagle Formation at Skytop, near State College, Centre County, Pennsylvania. The pyritic sandstone from the roadcut was crushed and used locally as road base and fill for adjoining segments of I–99. Within months, acidic (pH<3), metal-laden seeps and runoff from the exposed cut and crushed sandstone raised concerns about surface- and ground-water contamination and prompted a halt in road construction and the beginning of costly remediation. The state remedied the situation by removing 1,000,000 cubic yards of pyrite and replacing it with a mix of limestone and fill, a process that took two years and cost $83 million. The Skytop experience highlights the need to understand dynamic interactions of mineralogy and hydrology in order to avoid potentially negative environmental impacts associated with excavation in sulfidic rocks. Source: http://pubs.usgs.gov/of/2005/1148/.

is done by applying lime that is dispersed into a tank which contains acid mine drainage and recycled sludge. The two elements of this process will increase the pH of the water to about 9. It is at this pH, that most toxic metals will become insoluble and precipitate. Air may be introduced in this tank to oxidize the iron and manganese and assist in their precipitation. The resulting mixture is then sent to a clarifier. Once in the clarifier, clean water will be discharged for release, the settled metal precipitates will be recycled to the acid mine drainage treatment tank.

Carbonate neutralization occurs when Limestone pellets are introduced into the water body. This can be done with limestone wire baskets or dumping limestone ballast into the water body. Once the limestone enters the water a chemical process begins which will raise the pH of the water.

Constructed wetlands are a third method of treating AMD. Constructed wetlands are engineered systems designed to simulate natural wetlands to exploit the water purification functional value for human use and benefits. Through a variety of physical, chemical, biological processes, these wetlands are effective in reducing acidity of AMD. The iron (III) hydroxide in the AMD will precipitate out after the pH is raised above 3, which is typically done by a limestone-based treatment process.

Approximately half of the coal mining discharges in Pennsylvania have a pH that is generally in the alkaline range, which is normally 8 or above on the pH scale. This alkaline discharge is thought to be caused by contact of the discharge with Pennsylvania's naturally occurring carbonate bedrock, limestone and dolostone, which raises the pH.

For questions regarding acid mine drainage, contact the Pennsylvania Department of Environmental Protection.

According to the Pennsylvania Department of Environmental Protection, more than 300 million gallons of polluted water from decades of coal mining operations, flows into the state's rivers and streams every day and more than 184,000 acres of abandoned mine lands exist across the state, resulting in 4,000 miles of biologically dead rivers and streams due to mine pollution.

Above photo: Iron precipitate on Quaker Run, caused by acid mine drainage.

Photo next page: Quaker Run looking downstream The entirety of Quaker Run is designated as impaired due to metals and siltation from abandoned mine drainage Quaker Run is a tributary of Shamokin Creek in Northumberland County, Pennsylvania, in the United States. It is approximately 3.7 miles long.

Photos: https://en.wikipedia.org/wiki/Quaker_Run.

SAVE THE DATE

September 15-16, 2016

2016 AWRA
MID-ATLANTIC CONFERENCE

solving tomorrow's water resource challenges today

ON THE RIVERFRONT
IN WILMINGTON, DE

Chase Center on the Riverfront
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Wilmington, DE 19801

For more information, visit:
MAC2016.wildapricot.org

Presented by:

In conjunction with the New Jersey State, National Capital Region, Pennsylvania State, and Philadelphia Metropolitan Area Sections

AWRA

American Water Resources Association
National Capital Region Section

Annual Fall Conference Wrap-up

PA-AWRA's annual fall conference was held October 9, 2015 in State College with **Andrew Dehoff**, PA AWRA President and Susquehanna River Basin Director presiding. Taking advantage of the location, the agenda included several notable speakers from Penn State and from the surrounding area. The general theme was focused on "Planning for Water Quality Improvements on a Watershed Basis."

Professional Planner **Jerry Walls** set the stage by discussing the challenges facing Pennsylvania's water resources and those tasked with managing it, to include data needs, costs, policy development, and the disbursement of responsibilities over several state and regional agencies. Jerry closed by encouraging Pennsylvania's water managers to work together to standardize data collection and processing and to follow the principles of Integrated Water Resources Management (IWRM) in a cooperative and comprehensive fashion.

The speakers in the morning session focused on an issue of particular prominence in IWRM – the growing requirements surrounding Stormwater Management – and offered thoughts on innovative approaches to meeting those requirements.

Matthew Royer, Director of the Agriculture and Environment Center at Penn State University, discussed his experience working within a watershed to achieve success in reducing agricultural runoff. The Center strives to facilitate partnerships, research and community engagement with the goal of addressing non-point source pollution through adoption of cost-effective BMPs.

Dr. Lara Fowler, Research Fellow at Penn State Institutes of Energy and the Environment and Senior Lecturer at Penn State Law, shared insight on the use of mediation to bring together different jurisdictions. By their nature, stormwater and flooding often cross political boundaries, making it critical that neighboring stakeholders are able to work cooperatively to find creative solutions.

Megan Lehman, lead planner for Lycoming County's Department of Planning and Community Development, provided an overview of her county's use of nutrient trading as one component of its strategy for meeting stormwater and

Chesapeake Bay requirements. Partnership-based programs and a regional approach benefit the stakeholders and assist them in meeting their stormwater related objectives.

The afternoon session speakers offered case studies and information about ongoing efforts to identify and address water quality issues in Pennsylvania's water resources.

Tom Clark, Mine Drainage Program Coordinator at Susquehanna River Basin Commission, discussed his efforts to strategize and achieve restoration of mine impaired streams. By focusing on the most significant sources of impairment in a watershed, significant restoration can be achieved with cost-effective projects. Such a strategy has restored Bear Run in Indiana County, now supporting wild trout after a 100-year absence, and other similar opportunities can be found elsewhere across Pennsylvania's coal regions.

Elizabeth Boyer, Director of the Pennsylvania Water Resources Research Center, explained the research she has been conducting on the impacts of atmospheric deposition to Pennsylvania's watersheds. Of particular interest are the nitrogen, sulfur and mercury compounds emitted by coal power plants that, once in the atmosphere, travel to Pennsylvania and are introduced to our landscape through rainfall or dry fallout. Monitoring of the deposition shows that introduction of the compounds is trending downward as a result of federal policies, but effects on human and aquatic life are still risks in need of mitigation.

Bryan Swistock, Water Resources Extension Specialist in the College of Agricultural Sciences, summarized the efforts he has undertaken to characterize the water quality of roadside springs, a popular source of drinking water in rural Pennsylvania. Despite the general perception of such springs as being "natural" and therefore safe, testing revealed that nearly all sampled springs failed at least one health-based drinking water standard. This research into the quality of popular roadside springs will assist policy makers in determining what regulatory or advisory needs should be instituted to address the health risks associated with drinking such water.

The Board of Directors extends its appreciation to all the presenters and to the conference attendees. The information offered and subsequent discussions were valuable and worthwhile. Thank you all for helping to make our annual conference a success!

Archived Conference Presentations

If you missed the conference, you can find copies of the presentations available on the PA-AWRA web site. See http://state.awra.org/pennsylvania/conference/annual_conf.htm online.

SAVE THE DATE!

2016 AWRA Conferences

It is fitting that the 2016 AWRA Summer Specialty Conference, GIS and Water Resources IX, will convene in Sacramento, California, also a global economic and agricultural powerhouse. The 2016 Summer Specialty Conference on GIS and Water Resources IX will focus on the role of GIS to support better decisions across a broad spectrum of water, land, ecological, and related resources. Topics cover a range from data development techniques to complex computer modeling infrastructures.
http://www.awra.org/meetings/Sacramento2016/

Join the Florida Section of the American Water Resources Association for the 2016 AWRA Annual Water Resources Conference in Orlando, FL, November 13-17, 2016. You can expect a great conference full of information on the latest national and local water resources topics, along with four days of productive community building, conversation, and connections while enjoying what Orlando offers.
http://www.awra.org/meetings/Orlando2016/
ABSTRACTS SUBMISSION DEADLINE: MAY 16TH, 2016

For more information visit

www.awra.org

Upcoming Summer Webinars:

More details to follow...

"Pittsburgh's Green First Initiative"
Presented by Pittsburgh Water and Sewer Authority.
Wednesday, June 22 (tentative)

"Five-year Progress Report on City of Lancaster's Green Infrastructure Plan"
Charlotte Katzenmoyer, City of Lancaster Director of Public Works
Tuesday, July 19, 2016; Noon to 1:00 p.m.

Thank you to our two new corporate members!

A.D. Marble & Company, Water Resources Engineering Services
A.D. Marble & Company provides a wide range of water resource engineering services to support transportation infrastructure, environmental design, and site development projects. Using an in-house interdisciplinary approach, water resources engineers, designers, and environmental scientists work together to evaluate and design the best solution for each project.

Raudenbush Engineering
Raudenbush Engineering is a full-service engineering firm providing site planning, land development, structural engineering, landscape architecture, transportation design, surveying, and environmental engineering.

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MEMBERSHIP AND DUES

Take part, join the Section, and become more aware of our precious water resources!

The American Water Resources Association (AWRA) is a multi-disciplinary organization dedicated to the advancement of research, planning, management, development, and education in water resources. AWRA provides a focal point for the collection, organization, and dissemination of ideas and information in the physical, biological, economic, social, political, legal, and engineering aspects of water related issues.

The Pennsylvania Section of AWRA is financially independent of the national organization and is supported by its own membership dues. Membership in the Pennsylvania Section is easy to obtain and inexpensive.

Membership in the Section provides the following:

- The informative Section Newsletter delivered to your email inbox twice a year;
- An annual conference and other water-resource related announcements and information;
- A network of colleagues living and working in the Ohio, Susquehanna, and Delaware Basins in water-resource-related fields; and
- A forum for the dissemination of information on all aspects of water-related issues.

MEMBERSHIP APPLICATION - ANNUAL DUES PAYMENT

If you are not currently a member or would like to renew your membership, please complete the form below. The National AWRA does not collect dues for State Sections, so it is the responsibility of the individual or the organization to submit dues directly to the Pennsylvania Section AWRA.

Contact Information:

Name: _____ Address: _____

Title: _____ City: _____

Employer: _____ State/Zip: _____

E-Mail Address: _____ Telephone: _____

Type of Membership:

Please indicate whether this membership is a: ☐ New Membership or ☐ Renewal

The Section by-laws provide four classes of memberships: Individual, Associate, Institutional, and Corporate. Individual members are those individuals who are regular, student, emeritus, or transitional members of AWRA. Persons who are not members of AWRA, but wish to be members of the Pennsylvania Section, are eligible for Associate membership. Please check below the type of membership desired.

☐ Individual $10.00 ☐ Associate $10.00 ☐ Institutional $20.00 ☐ Corporate $25.00

Return this form with your payment made out to PA-AWRA to:

Dale Glatfelter, Secretary/Treasurer PA-AWRA

Gannett Fleming, Inc., P.O. Box 67100

Harrisburg, PA 17106-7100