

Susquehanna River Basin Commission
ANNUAL REPORT
2016

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Andrew D. Dehoff, P.E.

EXECUTIVE DIRECTOR'S *Message*

Reflecting back on the accomplishments of this past year, the Commission is proud to have released two reports that show the breadth and depth of the work achieved every day by our staff. First, with the advent of unconventional natural gas activities within the Basin, the Commission considered it important to review and assess those activities from a water management perspective. The resulting report summarizes the Commission's regulatory response and various water quality monitoring and compliance efforts, as well as the water use characteristics of the industry. From the Commission's perspective, the industry's unique operations posed challenges to ensuring proper protective oversight and management of the Basin's water resources. The report documents the regulatory and monitoring initiatives undertaken by the Commission, and summarizes the findings and future recommended efforts.

Later in the year, the Commission released the *Cumulative Water Use and Availability Study* which represents the most comprehensive analysis to date to characterize water use and availability for the Basin. The purpose of the study was to closely examine sustainability within the context of water uses, needs, and the natural availability of water resources. The Commission believes that a thorough understanding of how water is being used, and where the potential for conflicts may arise, are essential for making informed, long-term management decisions. Only with such knowledge can we continue to balance resource

development with protection of aquatic ecosystems.

The year ahead holds a sustained emphasis on comprehensive resource management backed by the best science and technology available. We intend to accomplish our goals through collection of critical water quality and usage data and conscientious efforts to develop policies that enhance ecosystems and promote wise development. I encourage our stakeholders to be on the lookout for opportunities to share your insights with us and provide valuable input on Commission efforts.

Cover: Susquehanna River, Asylum Township, Bradford County, as seen from Marie Antoinette Overlook along US Route 6. Photo by Nicholas A. Tonelli.

Opposite page: Northerly view of the Susquehanna River Valley from the Council Cup Scenic Overlook, Conyngham and Salem Townships, Luzerne County. Photo by Nicholas A. Tonelli.

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Gwyn W. Rowland
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Monitoring and Protection

SECRETARY TO THE COMMISSION

Stephanie L. Richardson

STUDY PROVIDES INSIGHT *on* WATER USE *and* AVAILABILITY



Staff measuring streamflow during stable conditions.

The Commission wrapped up work on the *Cumulative Water Use and Availability Study (CWUAS)*, the most comprehensive analysis to date that characterizes water use and availability for the Susquehanna River Basin. The purpose for the study was to closely examine sustainability within the context of water uses, needs, and the natural availability of water resources.

Overall, water availability for most Basin watersheds was found to be sufficient to satisfy known water uses. However, certain areas of the Basin do show potential for future conflicts and warrant further examination. Not surprisingly, the Lower Susquehanna subbasin, host to most of the Basin’s population and industry, exhibits the most intense water use and needs compared to water availability.

Finally, the study suggests that current management practices should have a positive effect on managing water resources during a drought and provides insight into areas where additional management measures can increase water sustainability.

In addition to the report, planning tools were developed to allow continued

assessment of water use and availability throughout the Basin. A publicly accessible, interactive web map was developed for use by applicants, consultants, agencies, non-governmental organizations, academics, and the public. The web map displays approved and reported water use and water availability summarized by watershed.

“The study provides valuable insight regarding the state of water use and availability in the Basin, along with an evaluation of the effectiveness of various low flow management measures.”

**Andrew Dehoff, P.E.,
Executive Director,
Susquehanna River Basin Commission**

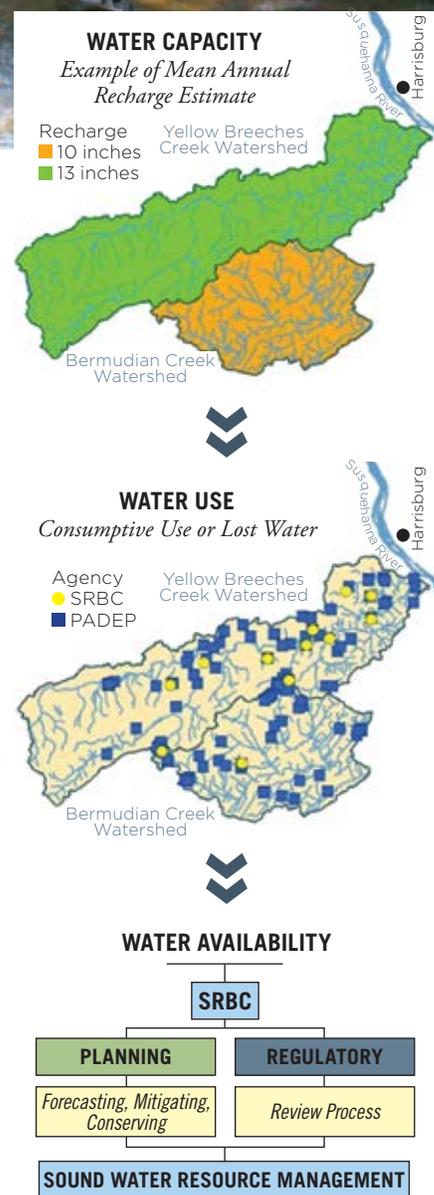


Figure 1. Conceptual model of key Cumulative Water Use and Availability Study components.

A FIVE-YEAR REVIEW of WATER USE *by the* NATURAL GAS INDUSTRY



The Commission issued a new report that examines its management of water use by the natural gas industry, focusing on the Commission's regulatory response, impacts to aquatic ecosystems, and compliance efforts. The report examined the period from July 2008 through December 2013. The report found:

- Surface water sources provided most of the water used by the natural gas industry (222 surface water withdrawal approvals, in contrast with only eight groundwater withdrawal approvals).
- Twenty individual watersheds accounted for over 97 percent of the 9.76 billion gallons of surface water withdrawn by the industry during the report period.
- The total amount of water consumptively used (not returned to the Basin's creeks and streams) was 13.4 billion gallons. While significant, the average daily usage rate (6.7 million gallons per day (mgd)) was comparable to other water users within the Basin and much lower than that used by electric power generators (86.2 mgd).
- The total number of wells drilled and hydraulically fractured within the Basin during the study period was 3,995 and 2,860, respectively. Activities were concentrated in northern Pennsylvania counties.
- Since December 2012, more than 70 percent of the water withdrawal approvals for the industry were considered significant enough for the Commission to include streamflow protection measures.
- Through 2013, the Commission's monitoring programs have not detected discernible impacts on the quality of Basin's water resources as a result of natural gas development, but continued vigilance is warranted.
- Generally, the quantity of the Basin's water resources are sufficient in magnitude to accommodate the water demands of the industry concurrently with other water users currently operating within the Basin.

The primary competition for water resources associated with the industry has occurred not between the industry and other human water needs, but between the industry and the aquatic ecosystems existing within the Basin—especially in the small, lower-yielding watersheds in which the industry has been most active.

Looking ahead, the Commission will use the observations made and conclusions drawn from the report to inform and direct its future efforts.

SOLVING *the* SINKHOLE CHALLENGE *with* INNOVATIVE STORMWATER SOLUTIONS:

A Partnership with Hampden Township, Pennsylvania

The Commission, in partnership with Hampden Township and the Alliance for the Chesapeake Bay, recently completed an innovative stormwater treatment system within an area plagued by sinkholes using grant funding from the Pennsylvania Department of Community and Economic Development. The project will improve water quality and reduce the quantity of stormwater runoff from approximately 50 acres in a very popular and heavily used township park in the Cedar Run Watershed, located in Cumberland County, Pennsylvania.

The project involved retrofitting an existing traditional stormwater basin at the Hampden Fire Station, and construction of a swale and an aquifer recharge system at the Hampden Township Community Swimming Pool. The swimming pool site was the location of a recurring sinkhole that formed as a result of using traditional infiltration stormwater design concepts. Because of the extensive depth to the karst bedrock, the Commission designed an aquifer recharge system—a combination of two existing technologies—a filtration area (similar to a rain garden to improve stormwater quality) and a direct connection well to inject the water to the aquifer. The use of the well allows for groundwater recharge without the potential for soil movement, and formation of sinkholes. Native plants and grasses have been installed to filter pollutants and improve water quality throughout all the constructed features.

As part of the grant, on-site monitoring and sampling will be performed to evaluate the aquifer recharge system to quantify improvements.



A well being drilled for the aquifer recharge system

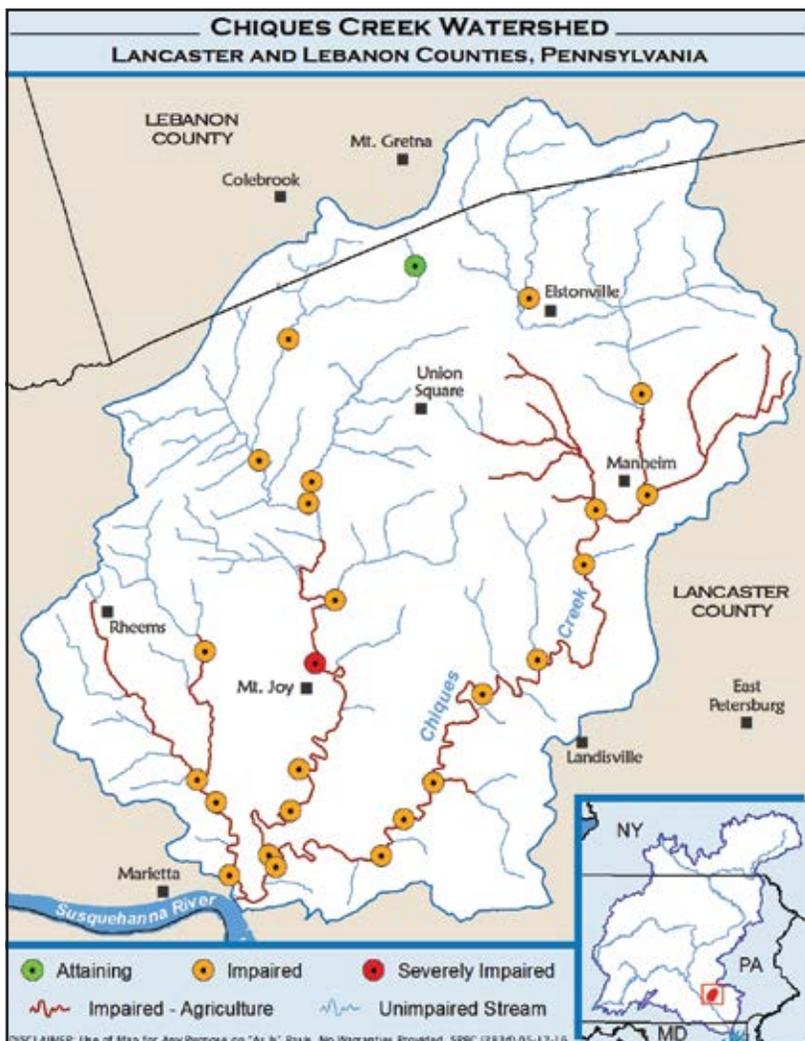
These types of management facilities improve stormwater runoff quality, reduce localized flooding, and enhance local ecosystems and aesthetics by attracting birds, butterflies, and other pollinators using natural landscaping.



The conceptual design for the site once fully established.

CHIQUES CREEK TMDL-ALTERNATIVE — A NEW APPROACH

The Commission is partnering with the Pennsylvania Department of Environmental Protection (PADEP), the Penn State Agriculture and Environment Center, Lancaster County Conservation District, local municipalities, and many other interested stakeholders to collaborate on an innovative approach for achieving water quality improvements in the Chiques Creek Watershed, Lancaster and Lebanon Counties, Pennsylvania. Instead of pursuing the more prescriptive Total Maximum Daily Load (TMDL) approach of assigning pollutant allocation loads and dictating restoration goals, this diverse stakeholder group will develop a restoration plan for restoring the watershed's streams and creeks through a collaborative process established under a new TMDL-Alternative framework.



Local stakeholder interests are heavily involved in the process and will be critical to the success of the TMDL-Alternative. Strong public interest and organized stakeholder groups were one of the driving factors for piloting the TMDL-Alternative in this watershed.

The outcomes of the process will be:

- an improved understanding of nutrient and sediment pollution in the watershed;

Based on assessment work through 2014, approximately 50 miles of streams within the Chiques Creek Watershed do not meet clean water standards, with most of the pollution coming from a wide range of human activities that add excessive amounts of soil (sediment) and fertilizer (nutrients) into the streams.



Commission staff explaining various water quality monitoring methods to local stakeholders.

- the development of decision-making tools to assist stakeholders in employing the most cost-effective strategies for reducing pollution entering the streams;
- technical assistance provided for implementing best management practices for achieving “on the ground” results; and
- an established framework for monitoring progress.

The development of the Chiques Creek TMDL alternative has been a great collaborative effort between DEP and SRBC along with our many other partners.

**Lee A. McDonnell, P.E., Director,
Bureau of Clean Water, PA Department
of Environmental Protection**

cause flooding. In addition, hydraulic/hydrologic computer modeling efforts are being used to develop a companion strategy for local communities to implement projects that both lower flood risks and damages, and reduce polluted storm flows. These efforts also rely heavily on input from local officials, emergency managers, and other stakeholders to determine the best management strategy.

Checkpoints have been established to evaluate progress at regular intervals during the process and the partnership will make any necessary adjustments to the approach. Upon successful completion, the TMDL-Alternative will serve as a model for achieving success in other areas of the Basin.

The first phases of the project included both monitoring efforts and building a network of watershed stakeholders. The monitoring and assessment of the existing water quality and biological conditions began in the spring and included the installation of state-of-the-art real-time monitoring equipment that can continuously track water quality conditions.

Major efforts in 2016 included establishment of five active stakeholder

workgroups which include representatives from over 20 organizations, including local/state government officials. These workgroups will provide the backbone for the efforts needed to work towards restoring the watershed.

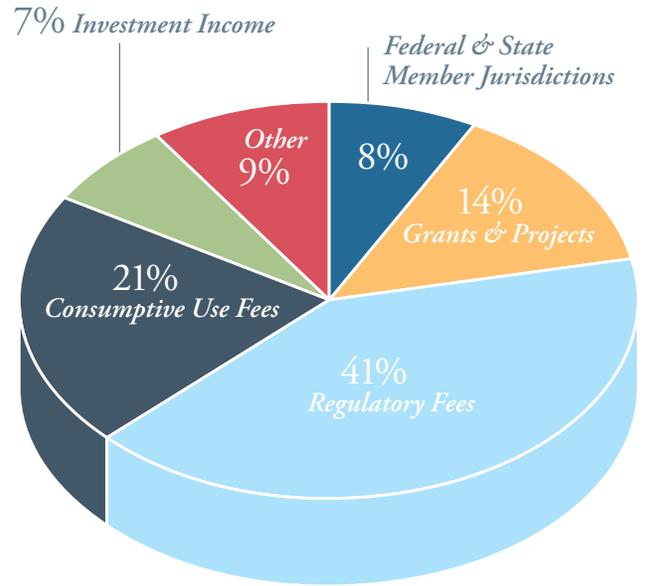
Other components of the project are examining local flooding issues. A new digital, real-time camera system is undergoing testing for providing local officials advance warning on when local streams may overtop their banks and

SUSQUEHANNA RIVER BASIN COMMISSION FISCAL YEAR 2016 FINANCIAL SUMMARY

Fiscal Year 2016 Total

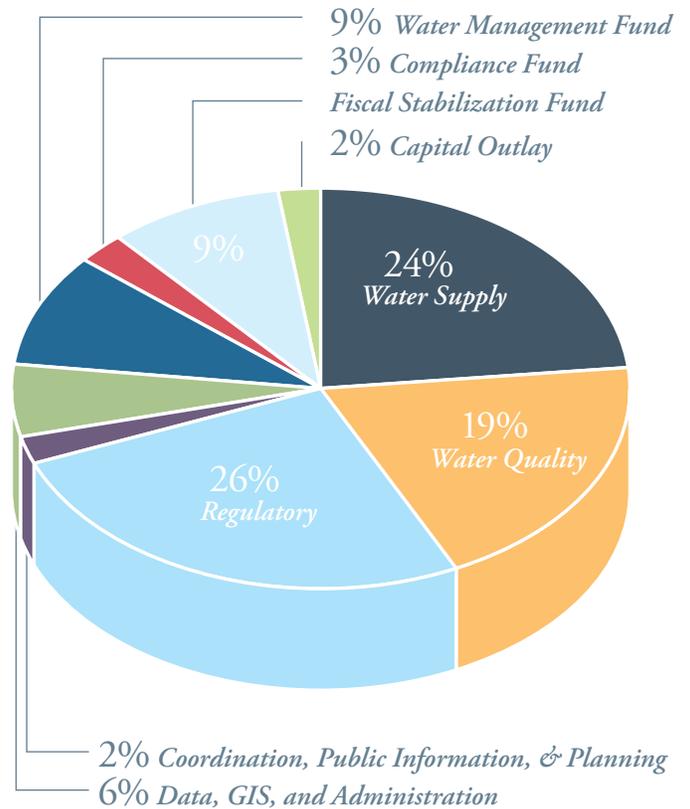
REVENUE

Federal and State Member Jurisdictions	\$ 1,092,000
Grants and Projects	\$ 1,942,710
Regulatory Fees	\$ 5,685,637
Consumptive Use Fees	\$ 2,899,507
Investment Income	\$ 952,684
Other	\$ 1,303,563
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TOTAL	\$ 13,876,101



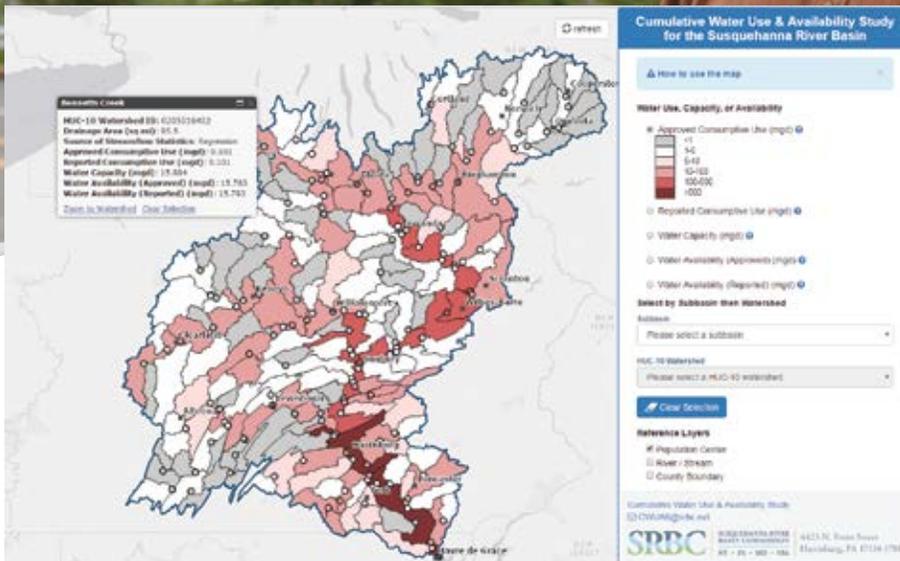
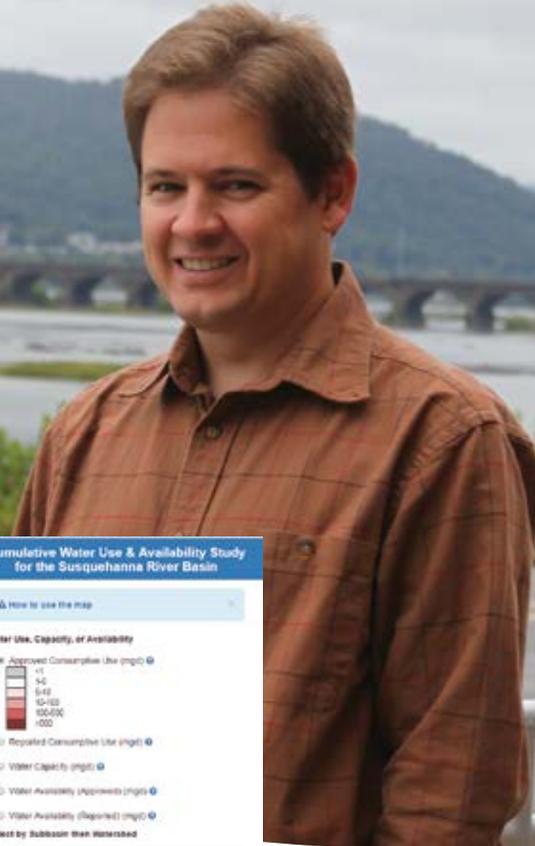
EXPENDITURES

Water Supply	\$ 3,260,228
Water Quality	\$ 2,686,079
Regulatory	\$ 3,618,270
Coordination, Public Information, and Planning	\$ 313,642
Data, GIS, and Administration	\$ 808,383
Water Management Fund	\$ 1,269,490
Compliance Fund	\$ 371,820
Fiscal Stabilization Fund	\$ 1,251,377
Capital Outlay	\$ 296,812
<hr/>	
TOTAL	\$ 13,876,101



2016 ANNUAL EXCELLENCE AWARD

Chuck Frank
Web Application Developer



The CWUAS interactive map web page.

Chuck was instrumental in designing and developing a comprehensive water use database for the *Cumulative Water Use and Availability Study of the Susquehanna River Basin* that integrated Commission and member state water use records. The database provided the framework for the most robust assessment of consumptive water use conducted for the Susquehanna River Basin to date.

Chuck's efforts were further showcased in the development of two web-based planning tools—an internal tool

that staff uses to evaluate water withdrawal applications and a publicly accessible, interactive web map that displays approved and reported water use and water availability summarized by watershed.

Throughout the study process, Chuck worked effectively across multiple technical programs to solicit and incorporate input to improve the study and tool functionality. His work ethic, humble demeanor, and commitment to accuracy and quality was extraordinary.

2016 QUARTERLY SPOTLIGHT AWARD

FIRST QUARTER
Erin Lynam
Aquatic Biologist

SECOND QUARTER
Jason Oyler
General Counsel

THIRD QUARTER
Brent Bauman
Hydrogeologist

FOURTH QUARTER
Aaron Henning
Aquatic Biologist

